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INTEGRATED DEVELOPMENT FOR WATER SUPPLY AND SANITATION

Home-made water contamination in Jimma town

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EVEN THOUGH IMPROVED water sources have important effect on the reduction of the morbidity and mortality of waterborne diseases, providing safe water alone will not guarantee the water to be drunk will be safe as well (Pinfold, 1991).

It is usual for the deterioration of water quality between the collection site and its use because of poor water-handling (Asnake, 1992). Some times, the fecal coliform (FC) are dramatically higher in stored water than in source water (Feachem,1980). This indicates that the handling practices of drinking water in homes pose potential danger in the transmission of waterborne diseases.

In Jimma town, the recently established water treatment plant provides treated water to the residence of the town. The raw water passes through a number of treatment procedures that give the finished water best quality with no indicator bacteria. But, the question that may be raised is "Would this degree of quality be maintained in homes?"

The present study is an attempt to determine the water handling practices of households in Jimma town. The degree of contamination that may be caused by these practices is also assessed.

Methods

The study was conducted in Jimma town in Oct.1996 on hundred (100) randomly selected households that use treated water supplied by the town water treatment plant.

The data were collected using interview and observation methods. In the interview method, information on water handling practices were collected from the hundred households using structured, pre-tested questionnaire. In the observation method, bacteriological test was done to determine the degree of contamination of water during distribution and storage. Twenty (20) paired water samples were collected from twenty (20) households'(20 per cent of the sample) water taps and from drinking water storage containers, and tested for indicator bacteria (fecal coliforms) using Most Probable Number (MPN) method. The samples from the storage containers were transferred to sterile sampling bottles using the cups used by the households for scooping. The water samples from the taps also were collected without sterilizing the tap before collection. This water sample collection method is used to reflect the water handling practices of the study population.

The mean bacteria counts of the two sets of samples are compared using a two-tailed t-test at 0.05 significance level.

Results and discussion

It is known that the provision of safe water has had an important role in reducing the magnitude of waterborne diseases. However, if the hygiene practices of a community is poor, the health benefits from provision of bacteriologicaly safe water supplies will be limited(Pinfold,1991).

Because of the availability of water near the homes(mostly in the yard), almost all washings (clothes, utensils, etc.) are done using water directly from tap and most households (64 per cent) collect water to their house only for cooking and drinking. As a result, the length of time water had been stored in the present study is less than two days in the majority (93 per cent) of the households (Table 2) which reduces the risk of contamination during storage (Anonymous, 1993).

Table 1. Some practices related to water collection and transport in the households, Jimma town, Oct. 1996

Practice	% of households (n=100)
Type of collection container	
Plastic bucket	35%
Metal bucket	33%
Jerry can	32%
Cover during transport	
Yes	58%
No	42%
Collection frequency	
Once per day	14%
Twice per day	31%
Three times per day	52%
Four times and above	3%
Wash hands before collection	
Yes	37%
No	63%
Wash/rinse the container before collection	
Yes	86%
No	14%
Separate drinking water from water for other purpose	
Yes	89%
No	11%

Table 2. Some practices related to water storage in the households, Jimma town, Oct. 1996.

Practice of	Number (%) households
Store water	
Yes	98 (98%)
No	2 (2%)
Type of storage conatainer	
Plastic bucket	39 (59.1%)
Metal bucket	14 (21.2%)
Clay pot	13 (19.5%)
Cover the storage container	
Yes	93 (94.9%)
No	5 (5.1%)
Length of storage	
2 days or less	92 (93.9%)
More than two days	6 (6.1%)
Method of drawing	
Pouring	29 (29.6%)
Dipping	69 (70.4%)
Dipping cup	
With handle	36 (52.2%)
Without handle	33 (47.8%)
Wash the storage container before refilling	
Yes	60 (91%)
No	6 (9%)

The method of drawing water from the storage container, i.e. dipping by 70 per cent of the households, and the use of handleless cups by a good number of households (Table 2), in this study could contribute to the contamination of stored water. The use of the dipping cup for other purposes also increases the risk of stored water contamination as the come in contact with other contaminated objects. In a study done in Peru, cholera patients were more likely than healthy control subjects to live in households where stored drinking water was dipped out with hands or utensils (Swerdlow, 1992). Another study also revealed that stored water was more likely dipped out in the homes of patients with waterborne diseases while more likely to be poured in homes of healthy neighbors (Mintz, 1995). These findings suggested that hands and objects introduced into stored water were sources of contamination.

Although home stored water, in this study, showed a mean coliform count of 3.1FC/100ml (Table 3), the extent of contamination is much lower than the finding of Swerdlow in which the mean coliform count was 20FC/100ml. Since the water sampling did not include all the interviewed households, it was difficult to identify which practice introduce or prevent contamination of stored water. However, the absence of fecal coliforms in most (60 per cent) water samples from storage containers, and lower mean coliform counts may be accounted for by such practices as use of cover for the storage container, washing of containers before refilling and shorter storage time by a higher proportion of households (Tables 1 and 2). Such practices reduce the chance of contamination and diseases incidence (Anonymous, 1993, Mintz, 1995, Swerdlow, 1992).

Table 3. Mean fecal colifirm counts per 100 ml water samples from households storage container and water taps, Jimma town, Oct. 1996

Method	*Test and Source*	Number of *samples*	No. of FC/100 ml *(mean,* range)	*P**
MPN	Fecal coliform Tap water	20	0, 0	<0.05
	Fecal coliform Water container	20	3.1, 2-16	

*The means of the bacteria counts of samples from water containers Vs taps, two tailed t-test for paired samples.

Conclusion

The study results have revealed that the effort made by the households to retain the quality of the water is encouraging. Easy access (i.e. shorter distance) to water sources (i.e. tap) makes the households to practice good water handling and use enough water for hygiene purposes.

Finally, the importance of hygiene education on how to maintain the quality of water in homes should not be neglected as water handling in homes is one of the hygiene behavior that determines the transmission of enteropathogens.

References

ANONYMOUS,1993, Dialogue on Diarrhea. The International Newsletter on the control of Diarrheal Disease. No.54.

ASNAKE, M. ET AL., 1992, Water-handling procedures and their association with childhood diarrhea. Ethiopian J. Health Dev. 6(2).

FEACHEM, R.G., 1980, Bacterial standards for drinking water quality in developing countries. Lancet. 2., 255-256.

MINTZ, E.D., et al., 1995, Safe water treatment and storage in the home: A practical strategy to prevent waterborne diseases. JAMA., 273(12):948-953.

PINFOLD, H. and HORAN, N., 1991, Water use and patterns of contamination in rural north-east Thailand. Waterlines., 9(4).

SWERDLOW, D.L., et al., 1992, Waterborne transmission of epidemic cholera in Trujillo, Peru: lessons for a continent at risk. Lancet., 340:28-32.

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