



Ingestion of unsafe water: is having a safe source enough?

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BANGLADESH HAS ACHIEVED a remarkable success in handpump and piped water supply coverage. Majority (64 per cent) of the urban population and nearly all (93 per cent) of the rural population have access to handpump or piped water (BBS, 1995). Despite reaching such enviable success in installing handpump or piped water system, water related diseases remain a major cause of mortality and morbidity in Bangladesh (Mitra, 1992). This indicates that ingestion of contaminated water - the predominant mode of pathogen transmission - continues to be practised. The logical questions are: why do people keep on using unsafe surface water sources, what are the practices that put people at risk of ingesting unsafe water, and what behavioural changes are required to prevent such ingestion. Presented here are findings of a study undertaken to investigate domestic water management practices in rural and urban homes in Bangladesh in an attempt to answer these questions.

Methods

Forty-eight rural and forty-five urban slum households were selected randomly for this study. Local women with good writing skill were recruited and trained. They observed and recorded all water related activities performed by the housewives such as collection, transportation, storage, use, ingestion, etc. The observations were conducted for two consecutive days from 6:00 a.m. to 6:00 p.m.

Any water that was taken into mouth by a housewife under observation was sampled and tested. The samples were collected from water left in a container or from the source. These water samples were tested for faecal coliform contamination following procedures described in the *Standard Methods for the Examination of Water and Wastewater* (APHA, 1985).

In a limited attempt to understand the roles of containers on bacteriological contamination, we scraped the insides of five aluminium and ten earthen pitchers, using a sterilised brush. After adding 300ml distilled water for rinsing, the rinsed water was tested for faecal coliform bacteria.

At the end of two days of observation, the housewives were requested to state reasons why they were using various polluted water sources for different purposes.

Results and discussion

We found that people predominantly used water from safe sources for drinking (or serving to others for drinking). This was irrespective of the distance of the safe source from their homes. Therefore, it may be concluded that people

consider handpump or piped water as safe and essential for drinking purpose. However, we observed that people were not similarly selective about their water sources for non-drinking purposes. Our observation identified bathing, ablution and mouthwash as the three most frequent practices that involve taking unsafe water into mouth. Table 1 shows that for these three practices people tend to use unsafe water, while for drinking the use of safe water is very high.

About 81 per cent of rural and 69 per cent of urban families were observed to store water in earthen pitchers. The rest used aluminium or plastic containers.

Bacteriological analysis of water used for drinking showed that the quality was alarmingly poor, especially in rural homes (Table 2). Water samples from urban homes were of relatively good quality. This is mainly due to presence of residual chlorine detected in piped water samples. It may be noted that the recommended standard for drinking water is 0 faecal coliform colony per 100ml sample. Therefore, water quality in both rural and urban homes fell far short of the standard.

The quality of stored drinking water is decidedly poor when compared to the quality at the source (handpump or piped water outlet). It was observed that none of the housewives washed their containers properly while collecting water. They simply rinsed the containers with water. All the housewives caused contamination by allowing their hands to come in contact with the water in their pitchers. About a quarter of the women also re-contaminated the storage containers at home by dipping their fingers into the containers while pouring water.

Table 1. Observed major acts involving ingestion of water

Table 2. Bacteriological quality of drinking water from rural and urban homes

<p style="text-align: center;">*faecal coliform colony forming units</p>
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The scraping test showed that the sludge layer inside all the containers were highly contaminated with faecal coliform bacteria. Interestingly, aluminium containers yielded markedly low counts as compared to earthen pitchers (Table 3)

Table 3 also shows that there is little association between age of pitchers and bacterial count. The period between water collection and sampling also shows little bearing on bacterial counts. Much older aluminium pitchers yielded much smaller counts than fairly new earthen pitchers. It is possible that having a smooth surface, aluminium pitchers are easier to clean. Therefore, the housewives clean them more often. On the other hand, earthen pitchers have a porous and rough surface, making them harder to clean, and at the same time provide a conducive environment for proliferation of bacteria. Aluminium itself may inhibit bacterial growth. Further research is suggested in this regard.

When asked why they continue to use surface water, the housewives stated the following reasons:

- bathing in handpump water makes hair sticky
- a bath in pond saves time and labour
- not owning handpump or piped water connection (i.e., having access, but a limited one)
- cooking with handpump water stains and hardens food
- it is traditional and more satisfying to bathe in surface water

Conclusion

It was encouraging to find that people were aware of handpump or piped water being safer than surface water. They took efforts to use these safe sources for drinking purpose. However, we noticed that the housewives were not properly collecting and storing water. The water which was safe at the source, and to collect which they took great efforts, became contaminated in their storage containers. We suggest that public education on water supply must address this point. It is essential that the insides of pitchers be cleaned thoroughly as often as possible using an abrasive agent (e.g., sand or ash) and scrubbed with straw or grass. Care should be taken also to avoid dipping one's fingers in stored water. The pitchers should be covered and gently tipped to pour water.

While it is impractical to suggest a complete restriction on use of surface water, people may be educated not to take water into mouth (a traditional practice) when bathing in a pond or river. For other purpose that requires a small

Table 3. Faecal coliform counts in water from storage containers after scraping insides

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quantity of water, such as ablution or mouthwash, it is better to use handpump or piped water.

We conclude that it is not enough to provide a safe source to break the transmission cycle of water related diseases. Public education is an essential component in the battle against such diseases.

Lastly, we emphasise that the water supply and sanitation sector must be sensitive to people's customs, needs and conditions. Messages must be practical and appropriate. In our experience, we have seen that people take great concern about water and sanitation. With understanding and careful planning, we are confident that changes in practice can be brought about for a better future.

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