The effects of supplied water quality on human health in an urban development with limited basic subsistence facilities

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Abstract

Domestic unavailability of water supply in South Africa often leads to improper use of supplied or other unsafe sources of water. The relationship between water quality, water availability, water accessibility, water use and incidence of diarrhoea due to these factors, was investigated in this study. The study was conducted in a large low socio-economic developing urban settlement. Reported diarrhoea cases were followed up to establish the water usage pattern of consumers in these particular households. Water was generally obtained from supply at public standpipes and stored in various forms of containers in households. Microbiological indicators were used to assess possible contamination of the water supply. Tests indicated limited instances of faecal and other forms of microbiological contamination in sections of the water-supply network. Indications were also found that the network in this area could intermittently be subjected to pollution from unknown sources although incidences were limited and not prolonged. Tests on the bulk water supply from the utility to the consumer water network indicated no faecal contamination in the bulk supply. In general the supply quality tested indicated no risk to consumers. However, the insanitary condition of containers as well as the manner of storing and handling of the containerised water led to contamination of water supplies. By implication, the system of water supply through public standpipes was conducive to conditions that could lead to contamination of stored water supply in households within the target consumer group.

Introduction

Water is generally accepted to be a vehicle for disease transmission under certain circumstances and must be properly controlled from a public health point of view (Chanlett, 1992). Public health control over water supplies in developing countries is often not sufficient to protect communities against disease (UNEP, 1991).

In South Africa, water infrastructure is well developed in many regions, providing treated water to a substantial portion of the population. However, large parts of the population often do not have ready access to such treated water (Von Schirnding et al., 1993). This domestic unavailability of water supply often leads to improper use of supplied and other unsafe sources of water which can be related to health and disease (Feachem and Blum, 1983). Even when a community in a low socio-economic environment is supplied with treated piped water, it does not necessarily mean that water-related health hazards will be totally eliminated. Factors such as treated piped water being contaminated due to low pipe pressure and breakdown in the network system may contribute to diarrhoeal infections (Hebert, 1983). Water hauled from the supply point should be protected from contamination during haulage, storage and handling by consumers as it can also contribute to diarrhoea (Pinfold, 1990). Supplied water quality, water haulage, storage and handling must, therefore, be taken into consideration in any water supply system to ensure that the consumer is provided with safe drinking water (Forsyth, 1993).

Diarrhoea is an enteric disease often related to the ingestion of contaminated water (Levine et al., 1993). In areas with less adequate water supply, diarrhoea can also be the indicator for the breakdown of any number of social habits. It may also be the indicator for some unknown aetiological agent produced from environments such as food and water as well as personal hygiene patterns (Von Schirnding et al., 1993; Pinfold, 1990; Levine et al., 1993). It is not clear to what extent the handling and storage of water obtained from a controlled remote supply influence the sanitary quality of such volumes of water. Furthermore the influence of such sanitary quality on the health of the consumer is not certain.

Therefore, this study was aimed to assess the health impact of:

- limited availability of water due to underdeveloped reticulation
- consumer-use patterns and quality of supplied water during haulage and storage.

The study was conducted in a section of a large, low socio-economic urban development with limited sanitary facilities and drinking water provision. Information obtained from a community health diagnosis project (Keil and Figaruoa, 1994) indicated that diarrhoeal infections were the disorders responsible for the largest percentage incidence of disease causing a high infant mortality rate in the area. However.the aetiological agents for such enteric infections were not generally known nor investigated due to the lack of information, lack of community participation and the absence of general health diagnoses in the area.

Potential faecal contamination in the supply was tested by using total and faecal coliform bacteria as indicators. Total bacterial presence in the water was assessed through heterotrophic plate counts. Enteric virus contamination was assessed using somatic coliphages as model virus indicators (Grabow et al., 1993). *Clostridium perfringens* was used to indicate the possible presence of spore- and cyst-forming pathogens.

The parameters to measure environmental health risk were the *South African Water Quality Guidelines for Domestic Water* (Vol. 1) (Department of Water Affairs and Forestry, 1993) and *Proposed Water Quality Criteria in South Africa,* of the

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