

17. Health water and sanitation (1)

Safe drinking-water and sanitation are essential for the health and the development – social and economic – of families, communities and nations. Without water, humans die within a few days from dehydration. Death tends to be higher and life expectancies lower in areas with poor water and sanitation. In half of the developing countries, the Infant Mortality Rate is greater than 100/1000 live births and the life expectancy at birth is less than 50 years (WHO, 1986). About 40,000 children die everyday of diseases related to water and sanitation. The great disparity in the provision of essential facilities between the developed and the developing countries and, especially in the latter, between urban and rural populations is illustrated in Table 1.

| | Urban | Rural |
|------------------------------|-------|-------|
| % total population | 30-35 | 65-70 |
| % with adequate water supply | 74 | 39 |
| % with adequate sanitation | 52 | 14 |

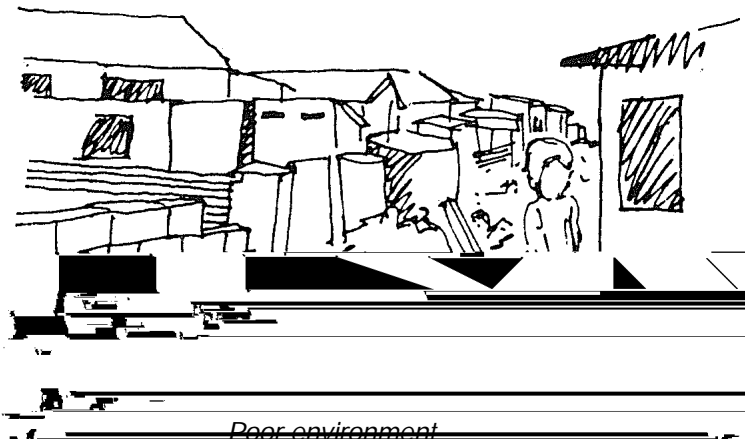
Source: WHO, (1986)



Poor water contains many micro-organisms

The need for clean water

Many people in the world, and especially those in developing countries, have water but still die because of its poor quality or the irregular quantity available to them. People, usually women and children, may spend many hours each day fetching and carrying water which is poor in quality simply because it is their only supply, and without it they die. Provision of clean water closer to homes may reduce the time and energy spent in water collection and increase the volume used. (See Table 2.) Yet this may not improve people's health if they continue living in otherwise insanitary conditions or have insanitary/unhygienic habits.



Poor environment

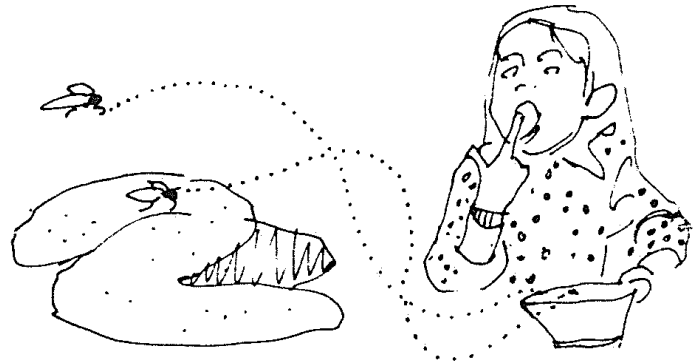
| Source | Distance | Water usage L/Person/day |
|------------|----------|--------------------------|
| Well: | >2,500m | 5 |
| | <25m | 15 |
| Standpost: | <250m | 15-35 |
| Piped: | yard tap | 75 |

This Technical Brief introduces health in relation to water and sanitation facilities and hygiene practices. Later Briefs will look in more detail at the effect of water and sanitation on health, disease (for example, malaria and schistosomiasis) and groups of infections (diarrhoeas and eye diseases).

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Poor environment – poor health

Poor environmental conditions arising from unhygienic disposal of excreta and sullage and accumulation of solid wastes, contribute to the spread of disease. They lead to contamination of food and water supplies, either at source or in the home. They may encourage breeding of vermin and insects, further increasing the spread of disease.



Faecal-oral transmission

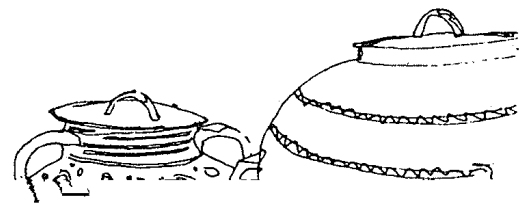
Classification of water and excreta-related infections

The diseases caused by or related to water and excreta can be either non-infectious such as fluorosis, from high fluoride levels, or infectious such as cholera and malaria, which depend on disease-causing organisms (pathogens). In developing countries the infectious diseases predominate, hence they will be looked at in more detail.

As excreta is the major source of pathogens in water, most of the routes by which water and excreta-related diseases are spread (or transmitted) are the same. These routes can be used to classify the diseases as outlined below with examples and some control measures being given for each class. In addition to management of water and wastes, measures may include control of vectors (mosquitos for malaria or snails for schistosomiasis) or immunisation and other medical-based methods.

| | | | |
|---|--|---|---|
| <p>WATER-BORNE</p> <p>example:</p> <p>control:</p> | <p>pathogens are present in water supplies</p> <p>diarrhoeal infections, cholera, typhoid</p> <p>water quality, hygiene education</p> | <p>WATER-WASHED (WATER-SCARCE)</p> <p>example:</p> <p>control:</p> | <p>spread of the pathogen is affected by amounts of water available for hygiene</p> <p>scabies, trachomas, pinworm infection</p> <p>water quantity, soap hygiene education</p> |
| <p>WATER-BASED</p> <p>example:</p> <p>control:</p> | <p>the pathogen must spend part of its life cycle in aquatic intermediate host or hosts</p> <p>1 guinea worm infection 2 schistosomiasis 3 lung fluke infection</p> <p>excreta disposal (2,3) water quality (1) water access (1,2)</p> | <p>WATER-RELATED INSECT VECTOR</p> <p>example:</p> <p>control:</p> | <p>the pathogen is spread by insects that feed or breed in water (flies and mosquitoes)</p> <p>malaria, yellow fever, Bancroftian filariasis, Onchocerciasis</p> <p>surplus water drainage and management, insecticides</p> |
| <p>SOIL-BASED</p> <p>example:</p> | <p>the excreted organism is spread through the soil</p> <p>hookworm infection</p> | <p>control:</p> | <p>excreta disposal</p> |

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Education on the importance of both latrine hygiene and maintenance skills is therefore vital. One important part of such education should be that children's excreta can be very infective. It needs to be disposed of hygienically (e.g. in the latrine if the child is unable to use the latrine correctly or is too young to do so).

Regular washing of clothes and skin

Failing to wash hands after attending to children's excreta or after using the latrine can lead to faecal contamination of food, water and clothing which in turn, may lead to illness. Good personal and domestic hygiene is more likely if water supplied or collected is greater than 35 litres per person per day and is located within 250–500 metres of the home.

The use of soap when washing hands and clothes is an important aid to good health. Soap can be made easily and cheaply from locally available materials (See Technical Brief No. 8). If not available, soap can be replaced by ash for washing.



Disposing of children's excreta



Washing clothes

Planning water and sanitation projects

Knowledge of the diseases endemic in a particular area is an important factor in the selection of water sources and sanitation provision. Engineers should be aware of the locally common diseases and ensure that the facilities they are involved in providing do not increase rather than decrease the incidence of disease. For example, surplus water around wells and standposts should be drained, and disposal methods for sullage and waste water should be included in plans, and the customs and economic capabilities of those who will use the facilities should be taken into account.

For further information:

Cairncross, S. and Feacham, R. (1983) *Environmental Health Engineering in the Tropics*, UK, John Wiley & Sons.

Feachem, R.; McGarry, M.; Mara, D., (1977) *Water, Wastes and Health in Hot Climates*, UK, John Wiley & Sons.

T.A.L.C. (Teaching Aids at Low Cost), PO Box 49, St Albans, Herts AL1 4AX, UK.

Technical Brief No. 2 — *Introduction to Pit Latrines* 7 — *The Water Cycle*.

Technical Brief No. 8 — *Making Soap*.

W.H.O. (1986) *The International Drinking Water Supply and Sanitation Decade. Review of National Progress* (as at December 1983), CWS Unit, Environmental Health Division, W.H.O. 1211 Geneva 27, Switzerland.