

# 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

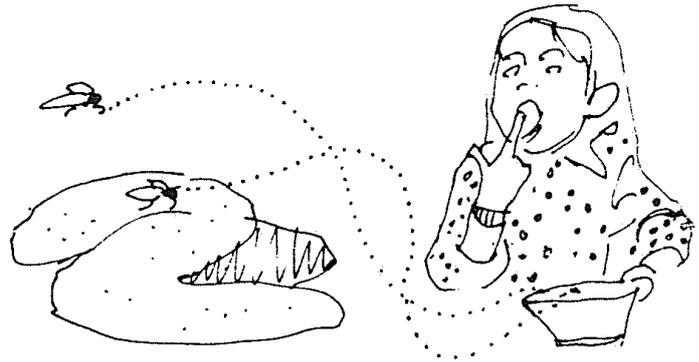
Source	Distance	Water usage L/Person/day
Well:	>2,500m	5
	<25m	15
Standpost:	<250m	15-35
Piped:	yard tap	75

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).

# Health water and sanitation (1)

## 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><b>WATER-BORNE</b></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><b>WATER-WASHED (WATER-SCARCE)</b></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><b>WATER-BASED</b></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><b>WATER-RELATED INSECT VECTOR</b></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><b>SOIL-BASED</b></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>

## Faecal-oral transmission

Although water-borne infections may be spread through water, the majority are spread by other routes, i.e. on hands, clothes, food, eating and drinking implements etc. As organisms from faeces reach the mouth by one of these routes the transmission is often called faecal-oral. Water-washed infections come into this category if the source of pathogens is excreta, e.g. pinworm infection. However some water-washed infections, such as scabies and trachoma, are not related to excreta but solely to personal hygiene and hence quantity of water rather than quality.

## Health and hygiene

For improvements in water and sanitation to give maximum reduction in disease, some changes in hygiene practices are often necessary. Both personal and domestic hygiene practices are involved and include:

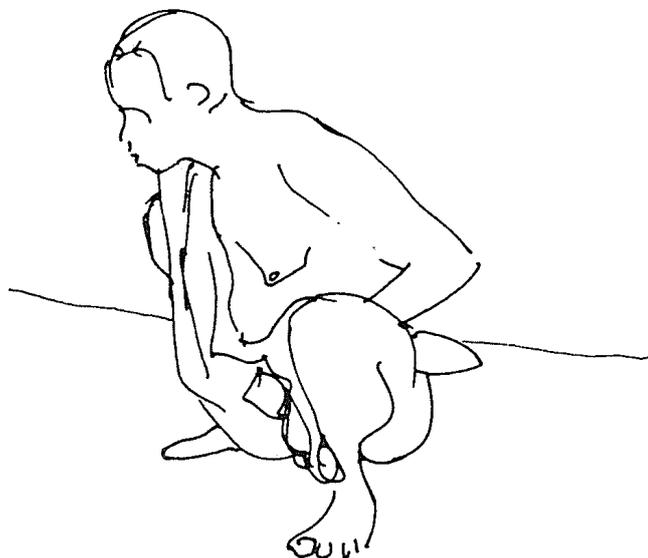
### Water care – health care

Clean vessels should be used for collection and water should not be run over the hands into the vessel. Covering storage containers protects water from possible contamination by birds or animals. The drinking water supply may also be kept separate from water for cooking and washing.

The area around the collection point should be kept free of wastes and standing water. If water does collect in pools or ponds for sufficiently long periods, insects, particularly mosquitoes, will be able to breed and increase the spread of the disease. If the ground around the collection point is moist, worm eggs and larvae can develop and infect other people collecting water.



*Covered storage containers*



*Open-field defaecation is a serious health risk*

### Cleaner latrines – better health

Unless it is kept clean, even a well built latrine can increase the spread of disease. Hence the expenditure in time, labour, materials and finance, aimed at improving sanitation and health may be wasted. If the slab is soiled and water or urine is allowed to collect it can become a feeding and breeding site for flies and mosquitoes. Also eggs and larvae of intestinal worms deposited on the slab may be able to infect other users of the latrine.

If the latrine is structurally unsafe, unsightly or smelly and attracting insects, people will be discouraged from using it. They will revert to former practices, (e.g. open-field defaecation) and the health risks associated with them.

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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).



*Disposing of children's excreta*

## 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.



*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.