

19. Health water and sanitation (2)

Water and excreta-related disease

In *Health, water and sanitation 1* (Technical Brief No 17, 1988) diseases related to water and excreta were considered. The routes for the transmission of pathogens (disease-causing organisms) from excreta or blood of infected people to other, susceptible people were used to classify these diseases as:

1. Faecal-oral
2. Water-washed
3. Water-based
4. Insect vector
5. Soil-based

This Technical Brief will consider control of water and excreta-related diseases by interruption of transmission routes.

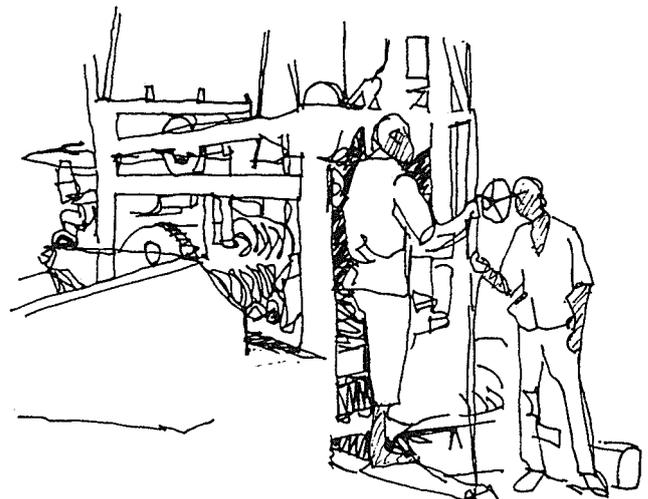
Measures to interrupt disease transmission

The main factors affecting transmission of water and excreta-related diseases are – water quality, quantity and management, excreta disposal, vector control and health education. Nutritional, medical and financial status are additional factors. Changes in these factors can control, reduce or even eradicate the incidence of disease by blocking transmission routes in one or more places. Some of the measures and their effects on disease transmission are considered below.

Water quality

Water quality is particularly related to the faecal-oral transmission of disease. In addition, improved water quality alone can markedly reduce the incidence of Dracunculiasis (Guineaworm infection) – UNDP, 1988. For drinking-water quality guidelines similar to WHO's (WHO, 1987), may be adopted. Maintaining quality involves care, not only in the selection and protection of sources and, where necessary, of treatment methods, but also in ways in which the water is collected at the source and then transported to and stored in the home.

Selection: Good boreholes provide reliable supplies of potable water. Groundwater quality is often better than that of surface water and therefore needs little or no treatment. Drilling boreholes, however, requires expertise in locating sites and operating rigs. The cost of operating and maintaining a borehole programme may be offset by savings on water treatment costs.



Drilling a borehole

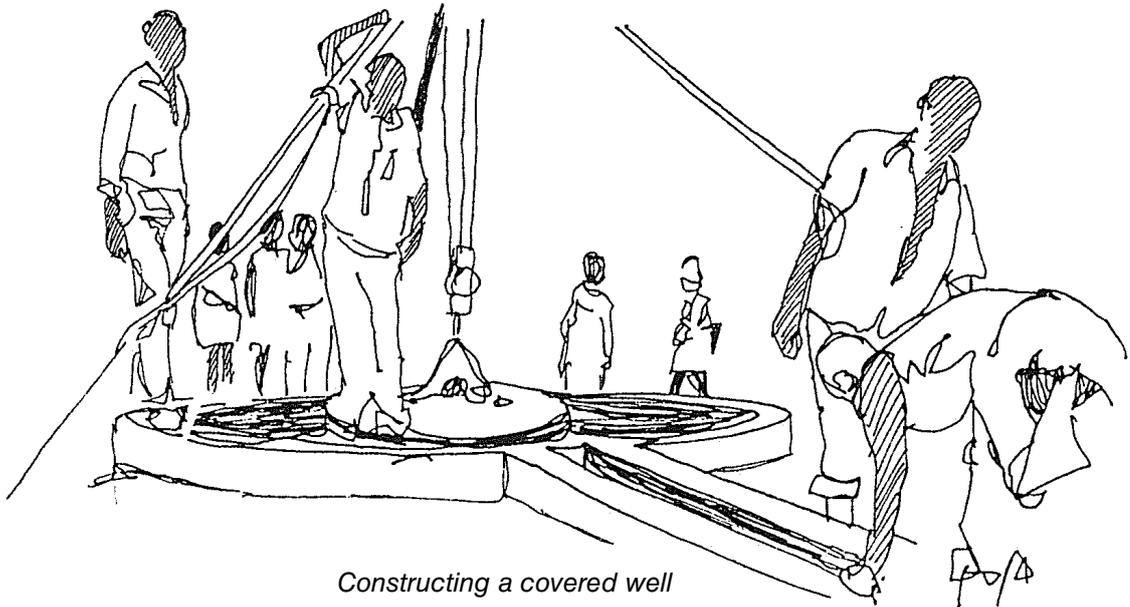


Filtering water through a fine mesh cloth

Treatment: Processes to improve water quality can be simple, for example filtering through a fine mesh cloth to remove Cyclops, the Guineaworm vector, or complex, for example a series of sedimentation, filtration and disinfection processes.

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Protection: Covering wells protects them from pollution by pathogens. These may enter the source in surface run-off, especially during the rainy season, with animals or humans entering it, or on dirty containers used to collect water.

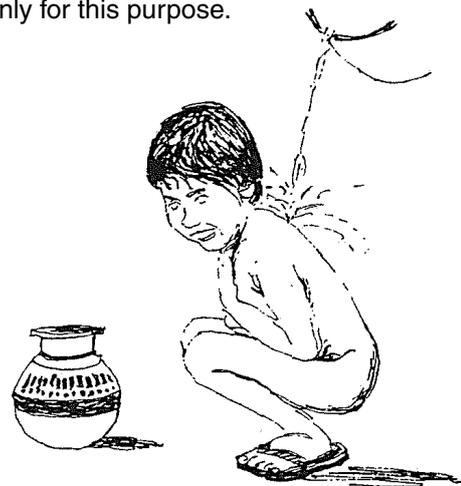


Constructing a covered well

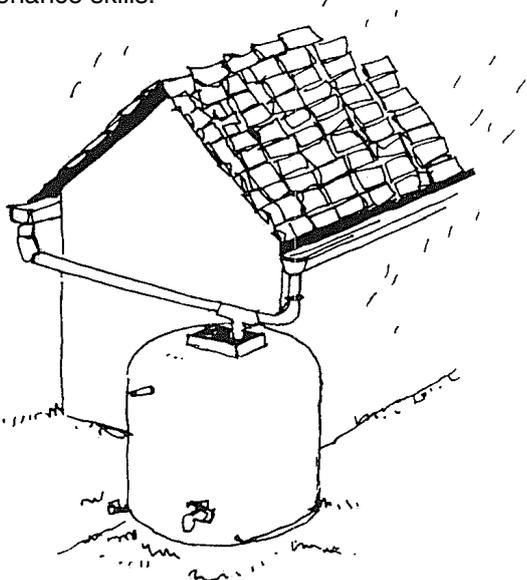
Storage: Drinking-water should be stored in covered containers separate from non-potable supplies to prevent contamination. Water should be collected in clean containers used only for this purpose.

Water quantity

Water quantity affects transmission of water-washed diseases such as scabies and also some faecal-oral diseases such as typhoid. It may be associated with changes in health awareness and behaviour. If it is increased sufficiently, agricultural practices and hence nutrition may improve. Water quantity is also determined by water management measures (below) that reduce loss through leakage, equipment failure and accidents resulting from poor design and/or operation and maintenance skills.



Regular supplies increase personal hygiene



Rainwater harvesting

Hygiene: Regular reliable water supplies near to the home can increase the use of water for personal and domestic hygiene. Good hygiene helps reduce skin and eye disease and promotes practices that block transmission of other types of disease.

Nutrition: Raising water quantity for agriculture improves health through changes in quantity, variety and quality of foods. Better nutrition leads to better health. Surplus food may be sold and earnings used to improve the quality and quantity of life.

Sources: Improving present sources of water and locating new sources close to homes also helps ensure provision throughout the year. Collection and storage of water in reservoirs or other rainwater harvesting systems regulates the supply.

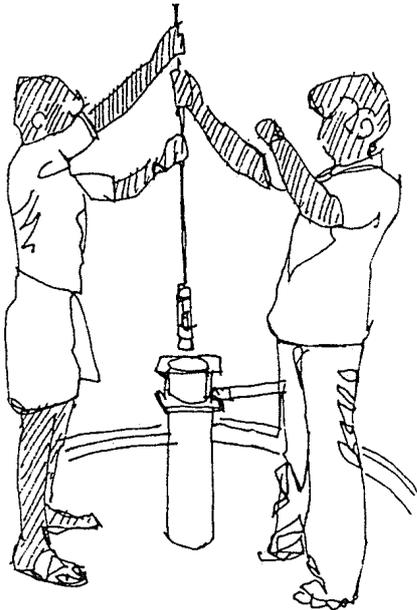
Water management

Water management measures affect most transmission paths. This is apparent after flooding where incidences of diarrhoeal disease and insect-vector disease such as malaria increase markedly. In addition, other infections associated with poor living conditions (measles, coughs and tuberculosis) may also develop if water management is poor.

Drainage: Provision of storm water drainage reduces flooding and amounts of standing water where insects and pathogens may breed. However, design and maintenance of channels, by cleaning out debris, removing plants and repairing faults, is essential to reduce breeding sites for pathogens and vectors (snails, insects etc) in both drainage and irrigation systems.



Maintenance of drainage



Mending a pump

Operation and maintenance: Consistent care of pumps and distribution systems helps to reduce losses and ensure a regular water supply. Intermittent supplies can cause not only water contamination but also customer dissatisfaction and reversion to old, poor quality but 'reliable' supplies.

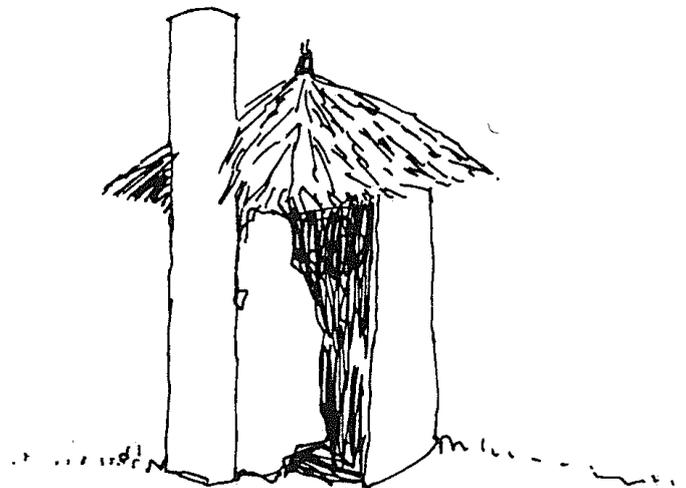
Wastewater: Adequate treatment is necessary for all wastewater. Sullage disposal systems, often neglected, should be included in all water supply schemes. Casual disposal can lead to soil conditions favourable for insect and hookworm development. Use of soakpits (separate or with latrines), drainage channels or piped systems are preferred.

Excreta disposal

Transmission of all diseases where the pathogen is excreted will be affected by the method of excreta disposal. This will include all faecal-oral and soil-based diseases. Latrine and personal hygiene practices are also important in blocking transmission of faecal-oral disease.

Design: Containing excreta so that water and soil are not contaminated and flies cannot carry pathogens from it to food is an effective way of blocking transmission of much disease. A variety of latrine designs are needed to allow for different site conditions and for the social and cultural preferences of users (see Technical Brief No 2). Maintenance of disposal systems (the slab, superstructure and, if incorporated, emptying equipment) is vital.

Location: Siting the latrines downhill from wells and at sufficient distances to prevent infiltration are critical, otherwise pathogens from excreta will contaminate the water source.

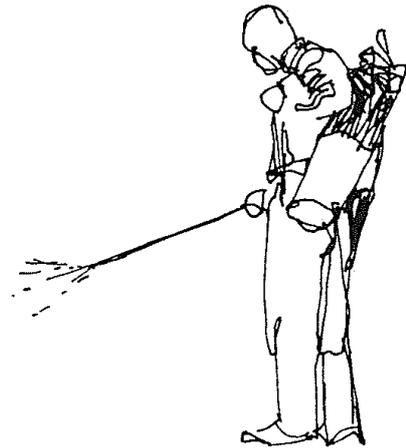


A mud and wattle latrine

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Vector control

Control will depend on the vector (insect, mollusc etc.), but the purpose is to interrupt the life cycle of the vector. This will include measures to reduce breeding sites, i.e. all water and excreta management methods, and chemical and biological measures directed at specific stages of vector development. This is especially important for malaria and schistosomiasis control.



Spraying for vector control



Health education = better health

Education

Health awareness has to be learnt. Knowing transmission paths for locally endemic diseases increases appreciation of measures to block transmission. Health education can use all media methods available, oral, visual and aural, and different sites – schools, clinics and community meetings. Television and radio reach larger audiences and have been used in campaigns to increase use of oral rehydration salts (ORS) for treating diarrhoeas. Teaching health awareness promotes changes in behaviour and attitudes that affect incidence of disease. Integration with preventive measures, such as water and sanitation provision and child immunization programmes, and with curative health (treatment of those already ill) leads to good health. This requires awareness at individual, community, national and international levels.

The environment and human health

Human health, therefore, depends on many factors in the environment, including climate; composition of air; water for drinking, cooking, bathing, agriculture etc; disposal of excreta and solid wastes; housing quality and density; availability of types of food and social and cultural practices. Disease, as well as good health (social, physical and mental) depends, therefore, on how these factors interact with each other and with people wherever they live.

For further information:

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Technical Briefs

No. 2, *Introduction to pit latrines*

No. 7, *The water cycle*

No. 17, *Health, water and sanitation I*.

WHO, *Guidelines for Drinking Water Quality*, WHO, Geneva, Vols. 1-3, 1985.

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