

Prepare to Respond Programme

This course is being run through the Prepare to Respond programme, jointly arranged by the Austrian Red Cross and RedR UK. The project is co-funded by the European Commission's Humanitarian Aid Department (ECHO), Pipelife, Austrian Red Cross and the City of London Corporation.

Within this programme, courses are being offered across a range of humanitarian areas including General Humanitarian Skills and Water, Sanitation and Hygiene (WASH). The training programme has been developed specifically to build the capacity of aid agencies in the new EU member states and Croatia, however places are also given to relief workers from other countries.

The programme caters for all knowledge levels with training appropriate for individuals beginning a career within the sector, as well as courses for experienced relief workers looking to develop specialist skills. For more information, please visit: www.redcross.at/preparetorespond

Sanitation Training

Safe disposal of human excreta is a key factor in avoiding the spread of diarrheal diseases. However, 2.6 billion people globally lack access to proper sanitation. In emergencies sanitation, although a high priority, can often be neglected and can lead to outbreaks of diarrheal diseases such as cholera. In-depth training is necessary to raise water and sanitation focused aid worker's awareness about the multiple interconnections between technical and social issues, which make sanitation interventions so complex.

The course is directed at humanitarian and development personnel. Participants should have background/experience in water & sanitation. The training will consist of a mix between practical exercises, lectures and interactive classroom sessions, covering technical as well as non technical aspects of excreta disposal.

After the trainings attendees should be able to:

- Demonstrate knowledge about pathogens in faeces
- Demonstrate knowledge about properties of soils (mechanical and with respect to water transport)
- Distinguish between different technology options, including their advantages & disadvantages
- Effectively deal with contractors and craftsmen
- Demonstrate awareness about gender and other social dimensions of sanitation
- Demonstrate awareness about the complex linkages between technology, education & promotion in sanitation projects (incl. CLTS)
- Reflect upon possible benefits and disadvantages of reusing human excreta

The sanitation training is delivered and facilitated jointly by Austrian Red Cross (www.redcross.at/watsan) and Robert Reed from the Water, Engineering and Development Centre (WEDC), Loughborough University UK (www.wedc.lboro.ac.uk). The course is held from 26 – 29 June 2012 in Vienna, Austria.

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2 Why does excreta disposal matter?

Coverage

It is a sad fact that, when it comes to providing essential services such as water supply and sanitation, excreta disposal receives much lower attention. This has led to the situation where only 780 million people in the world don't have access to a safe water supply but

2.5 Billion People

don't have access to safe excreta disposal.

So, for every one person without access to a safe water supply, there are 3200 people without a toilet.

These figures are taken from a regular survey managed by UNICEF and WHO and relate to the situation in stable communities. The situation in emergencies, especially in the early stages of a response is hardly any different. For reasons we will discuss later, water supply is always a much higher priority with excreta disposal either ignored or coming a lot lower down the list of priorities.

Health

This will be covered in a separate presentation but remember

Someone dies every 8 seconds because of poor water supply and sanitation.

Mainly children

Poverty and well being

Poverty is a life experienced by some 1.4 billion people, meaning that one in four of those living in the developing world were living on less than \$1.25 per day. Poverty reduction is more than economic improvement; it is also about other resources – human, natural, social and physical. By looking closely at people's lives, it may be possible to improve access to one or more of these resources and provide opportunities to make lives better. For example, a tarmac road – as opposed to a dirt track brings more traffic – providing a larger market for local goods and services, but it may also introduce local communities to more diseases, leading to the need for improved local health services. Experience in many developing countries shows that these opportunities do not happen on the scale required without sound government policies, the presence of private sector enterprise and investment, and openness to how organizations work to facilitate empowerment of individuals and communities.

Improvements in sanitation have a role to play in poverty reduction. It's key benefits are:

- Saving time – families with a latrine in or close to their homes will spend less time trying to find a private and safe place to defecate.
- Improvement in health – as already mentioned, improved excreta disposal is closely linked to improved health, especially when linked with hygiene promotion.
- Increased productivity – people who are healthy can work more often and for longer so produce larger incomes
- Improved levels of education – healthy children lose less time from school.

Well-being is about how you feel. People who feel better about themselves, their families and communities are more productive and have a better quality of life. Improved sanitation increased dignity and self-respect, promotes gender equity, improves the local environment, and makes people feel safer.

Children

Poor excreta disposal facilities especially affect children. Children are more vulnerable to disease and have less resilience to combat infection. This means they are easily infected by excreta related diseases and have less ability to fight off the disease once infected.

Even where excreta disposal facilities are available children are often unable to use them. Difficulty with access, poor design for small bodies and a common belief that children should not use communal facilities leads to low use of existing latrines by children.

There is also a widespread misconception that excreta from small children and babies is not dangerous and can be handled by mothers without any health issues. This is not true; in fact gram for gram baby's excreta can hold more pathogens than adult excreta. Failure to follow good hygiene practices by mothers with babies is a frequent cause of disease spread within the family.

Importance to users

The primary reason relief and development organisations promote and build latrines is to protect health.

However, if you ask users why they use a latrine they will hardly ever mention health!

This mismatch of perception between providers and users is a very common cause of confusion and project failure. Providers must understand that people don't have to use latrines; they only do so if they want to. If you ask people why they would like to use a latrine you get a very interesting response. The most common reasons given are:

- Privacy
 - Security
 - Convenience
 - Prestige
 - Smell
 - Flies
 - I can invite visitors to my house
- Any latrine building program, even in emergencies, must address these concerns else you will find that your beautiful new latrines remain unused!

Why is it so bad?

Lack of political will

There is little political incentive for government to deal with this subject. Politicians rarely lose their jobs because of poor sanitation, particularly where people most in need have the least political power. Political commitment is needed to create an environment in which demand for sanitation can grow, and which, in turn, can strengthen political will. The issue of political will is thus both a cause and an effect of the other problems, and a key to successful sanitation promotion. We will discuss this topic in more detail in a later unit.

Prestige

Promoting low cost sanitation facilities and hygiene education has never been prestigious. Politicians and movie stars do not demonstrate latrines. Among professionals, many of the best and the brightest avoid working on approaches to excreta management that are readily affordable because of the low status and low pay of such work. Others, recognizing the frustration of dealing with extremely limited resources, public apathy, and lack of political will, often seek the more professionally rewarding route of higher, more exciting and better funded technologies. Even among potential consumers, low-cost solutions to excreta management have little prestige compared to the conventional sewer systems used by the world's more affluent populations.

Poor policy

In general, agencies responsible for creating a supportive environment for sanitation have had ineffective and counterproductive policies at all levels. These include too much attention to water supply at the expense of excreta management and hygiene education, a focus on short run outputs (hardware) rather than long term behaviour change and subsidies that favour middle- and high-income communities. More fundamentally, a philosophical approach to the problem upon which sound policy can be based is often lacking.

Poor institutional framework

Many players are affected by sanitation and many more could be involved in its promotion. However the institutional frameworks in place often fragment responsibilities in a multiplicity of government agencies and departments, neglect the needs of the most vulnerable segments of the population, and ignore the powerful role that NGOs can play. It is clear that governments by themselves have failed to promote sanitation, and that existing institutional frameworks need to change.

Inadequate resources

Excreta management and hygiene education only attract a fraction of the resources needed to do the job. Sanitation is at least as important for health as water supply and is a far more demanding problem; yet sanitation receives far fewer resources. Increasing resources are required just to maintain the status quo. Since urbanization and population growth are making the hazards of poor sanitation more acute, where resources are available, far too much goes into hardware and not enough into community mobilization and hygiene promotion.

Inappropriate approaches

Even where the promotion of sanitation is attempted, the approach taken is often wrong. Too often attempts are made to find universal solutions. These are problematic because they fail to acknowledge the diversity of needs and the cultural economic and social contexts in which they occur. For example, although the expectations of urban populations differ from those living in rural settings, the technological options offered are often the same. Critical issues of behaviour are frequently ignored or handled badly. Short term 'fixes' have been generally favoured over long term solutions and we fail to learn from collective experience.

Failure to admit the need for change

The collection and transport of human excreta by water carriage has been usefully employed in many parts of the world and has resulted in the development of extensive social, political and technical infrastructures. Nevertheless, the disadvantages of these systems should be considered as well. These include the cost, volume of water required and energy needs, amongst others. The problems of water carried excreta is discussed in more detail in a later unit.

Neglect of consumer preferences

Too often we try to promote what people do not want or cannot afford or both. Low cost technologies are often seen by consumers as low status technologies. Solutions, found appropriate by their promoter, are far beyond the financial reach of those in most need.

Division of responsibility

Most governments consider that families should be responsible for what happens in their home, institutions have a role in delivering communal facilities. This division works well for water supply, roads, health, etc. but can be a problem for sanitation provision. On-site sanitation, as its name suggests, mainly takes place on the family plot. Most governments therefore consider such provision the responsibility of the family. They may be willing to give advice, and will frequently institute legal proceedings to force families to provide adequate services. Many however will not provide financial support, the very thing the poor need.

Poor sector training

The quality and appropriateness of the training provided to those intending to work in the sanitation sector is still largely poor. Training institutions still retain syllabuses developed for countries having a completely different social and economic structure. There is still a strong belief amongst many academics that their teaching should be comparable with that provided in Europe and North America rather than being tailored to the needs and aspirations of their home society.

Ineffective public promotion

Although people have opinions about excreta management, they are reluctant to talk about the management of their excreta. Thus, selling the idea of improvements in sanitation is difficult. Professionals who are responsible for promoting sanitation are often unaware of effective promotional techniques and continue with top down approaches that alienate the target populations by denying their voice, desires and involvement in the process.

Minimal awareness of gender and special needs

Women are potential agents of change in hygiene education and children are the most vulnerable victims of poor sanitation. Yet it is men who usually make the decisions about whether to tackle the problem and how. Most sanitation programmes ignore the needs of minority groups within the community, even when they are numerically large. Handling and disposing of children's faeces, access and use of facilities by the elderly and physically disabled, are all regularly ignored, leading to discrimination and exclusion of the most disadvantaged.

Low demand

If more people expressed a demand for improved sanitation loudly enough, many of the problems would resolve themselves. This seeming lack of demand is often considered a constraint. People may want sanitation very badly, but are powerless to express that desire in financial or political terms. Where sanitation is poor we need to understand why the demand is low and determine whether it is most amenable to political, financial, technical or information change.

Cultural beliefs

In most cultures the handling of excreta is considered unacceptable and viewed as a disgusting or a dangerous nuisance not to be discussed openly. The excreta taboo lies behind many of the barriers to progress. This must be countered by sanitation promotion, hygiene education and an understanding of the role human wastes play in environmental degradation and the ecological cycle.

Cost

We can't ignore the fact that good sanitation costs money. As we have already said, the communities with the poorest sanitation are frequently the poorest. Sustainable ways have to be found to enable such communities to improve their environment whilst allowing them to retain responsibility for decision making and management.

Conclusion

This long list of problems could be enough to make you decide to forget the rest of this module! Fortunately the problem is not as bad as it looks. Solutions do exist to many of the problems described, at least enough to enable you to make a positive impact on the current situation. Some of the problems have not yet been fully solved, there is still room for you to help in developing new solutions and making a contribution to further improvements in the sector.

Bob Reed
WEDC, Loughborough University
June 2012

3 Handwashing

Introduction

Hygiene promotion, together with improved water supply and sanitation, is a key component of intervention programmes which aim to reduce the burden of diarrhoeal diseases. However, the impact of hygiene promotion, and the washing of hands with soap in particular, has wider health implications.

Hygiene Promotion and handwashing

Hygiene is the practice of keeping oneself and one's environment clean and free of infection risk. Though many hygiene practices can assist in preventing disease, the one with the strongest evidence for effectiveness and cost-effectiveness in developing countries is handwashing with soap.

Hands are vectors that can transport disease agents from person to person directly or indirectly via surfaces. Hands that have been in contact with faeces, nasal excretions and other bodily fluids, and not subsequently adequately washed, can vehicle large numbers of viruses, bacteria and possibly other parasites. They can also carry pathogens from contaminated sources such as animal or bird faeces, contaminated foods or domestic or wild animals to new susceptible hosts. Handwashing is likely to be especially important where people congregate (such as refugee camps), where ill or vulnerable people are concentrated (hospitals, nursing homes), where food is prepared and shared and in homes, especially where there are young children and vulnerable adults.

In developing countries the biggest killers of young children are respiratory infections and the diarrhoeal disease and both are preventable via handwashing.

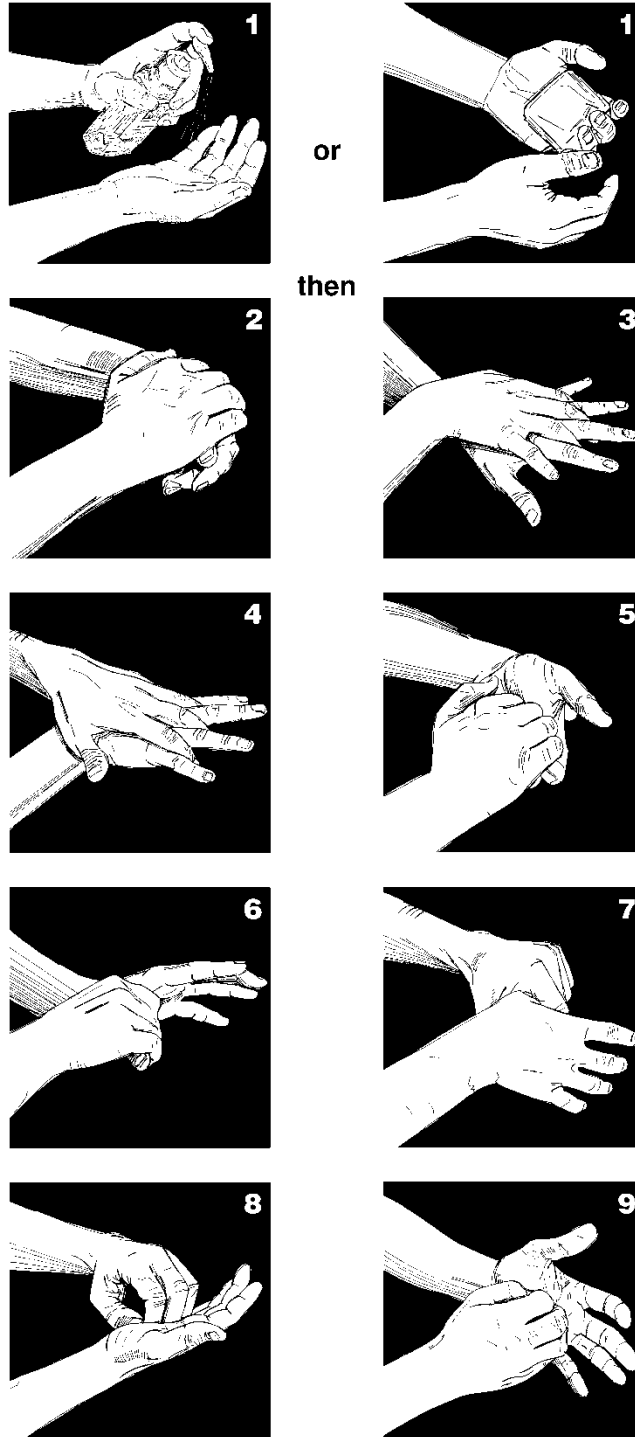
What are the benefits of the use of soap?

The use of soap (or other mediums like sand or ash) has the added benefit that it increases the contact time, facilitates friction and breaks down grease and dirt (which contain the largest concentrations of microbes). The use of soap in addition results in fresh and clean smelling hands, which makes hygiene promotion much easier. Trials in Bangladesh and Zimbabwe showed that handwashing with soap were more effective than handwashing with only water to reduce faecal bacteria on hands.

How do you do it?

There doesn't appear to be a universally agreed method of washing hands. Most public health agencies publish advice on the subject and they are all broadly the same but also slightly different. The poster below (Figure 3.1) is one method that seems to have general approval but your organisation may have its own preferred method.

Handwashing



Rinse well

Figure 3.1 Pictorial guide to good handwashing technique

Simple devices

When building communal latrines it's important to provide adequate handwashing facilities **and soap**. There are a wide variety of devices available, some more sophisticated than others. With all of them however, the most important factor is to keep them filled with clean water and replace the soap when it is finished.

I suggest you provide one handwashing facility for every 5 – 10 toilet cubicles.



Simple bucket plus soap on a string



Oxfam prototype handwashing device



Water bag with push button dispenser on the bottom, liquid soap on the side



Slightly larger bucket with soap on top

Handwashing in cold climates

People will be less inclined to wash their hands in very cold climates so it may be worthwhile to consider maintaining warm hand-washing water outside toilets to encourage their use. Storing the water in an insulated container is the easiest method but it may be necessary to construct a small building to house the unit. In very cold climates extra care must be taken with the disposal of waste water to prevent it freezing around the unit.

Anal cleansing materials

All toilet users require something to clean themselves with after defecation, although what is used varies widely from water to paper, leaves, stones or even mud balls. In an emergency it is the toilet provider's responsibility to ensure appropriate anal cleaning materials are readily available in every cubicle.

In some cases, traditional anal cleansing materials will be inappropriate for the design of toilet constructed. Allowing stones or plastic bags to be used where the wastes have to be pumped out of a storage tank will create serious operation difficulties. In these circumstances the provider must liaise closely with the users to determine which alternative anal cleansing methods will be acceptable.




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June 2012

4 Links with water supply & hygiene practices

“The water and excreta-related communicable diseases can be categorised by their common environmental transmission routes. Thereby, an important distinction is made between water-washed and waterborne diseases.

Classification of diseases into communicable (pathogen-related) and non-communicable (e. g. caused by exposure to chemicals) was discussed in the chapter “Definitions”. The communicable diseases can be further subdivided. This chapter describes the currently used environmental classification and uses the biological classification to discuss the different diseases.

An environmental classification of disease groups, such as water-related and excreta-related diseases, is more useful to environmental engineers than one based on biological types because it groups the diseases into categories of common environmental transmission routes. Thus, an environmental intervention designed to reduce transmission of pathogens in a particular category is likely to be effective against all pathogens in that category, irrespective of their biological type.

Categories and typical transmission routes	Examples of pathogens (Bold = described in this Module)	Control strategies
Feco-oral waterborne and water-washed diseases 	Hepatitis A and E (virus) Rotavirus Cholera (bacterium) Amoebiasis (protozoa) Ascariasis (helminth)	Improve water quantity, availability, and reliability (water-washed disease control); Improve water quality (water-borne disease control); hygiene education.
Non-feco-oral water-washed diseases 	<i>Skin infection:</i> Leprosy (bacterium) <i>Eye infection:</i> Trachoma (bacterium)	Improve water quantity, availability and reliability; hygiene education.
Geohelminthiases 	Ascariasis (helminth) Hookworm infection (helminth)	Sanitation; effective treatment of excreta or wastewater prior to reuse; hygiene education.

An important distinction is made between “waterborne” and “water-washed” diseases. Water-borne diseases are caused by pathogens in the water a person drinks. Whereas water-washed diseases are diseases where transmission is facilitated by insufficient quantities of water (regardless of its quality), thus, directly linked to issues of personal and domestic hygiene. All diseases, commonly considered waterborne, can also be transmitted by the water-washed route. Epidemiological studies have revealed that the latter is more important under conditions of water scarcity, such as in rural and periurban areas of developing countries. The water-washed transmission route is likely to be important even in areas with adequate water supplies but poor personal and/or domestic (including food) hygiene. Table 8 provides an overview of an environmental classification of water and excreta-related diseases. (Mara et al., 1999, p. 334)”¹

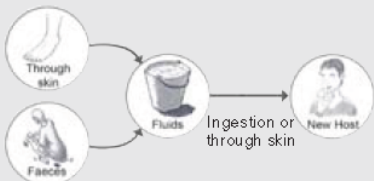

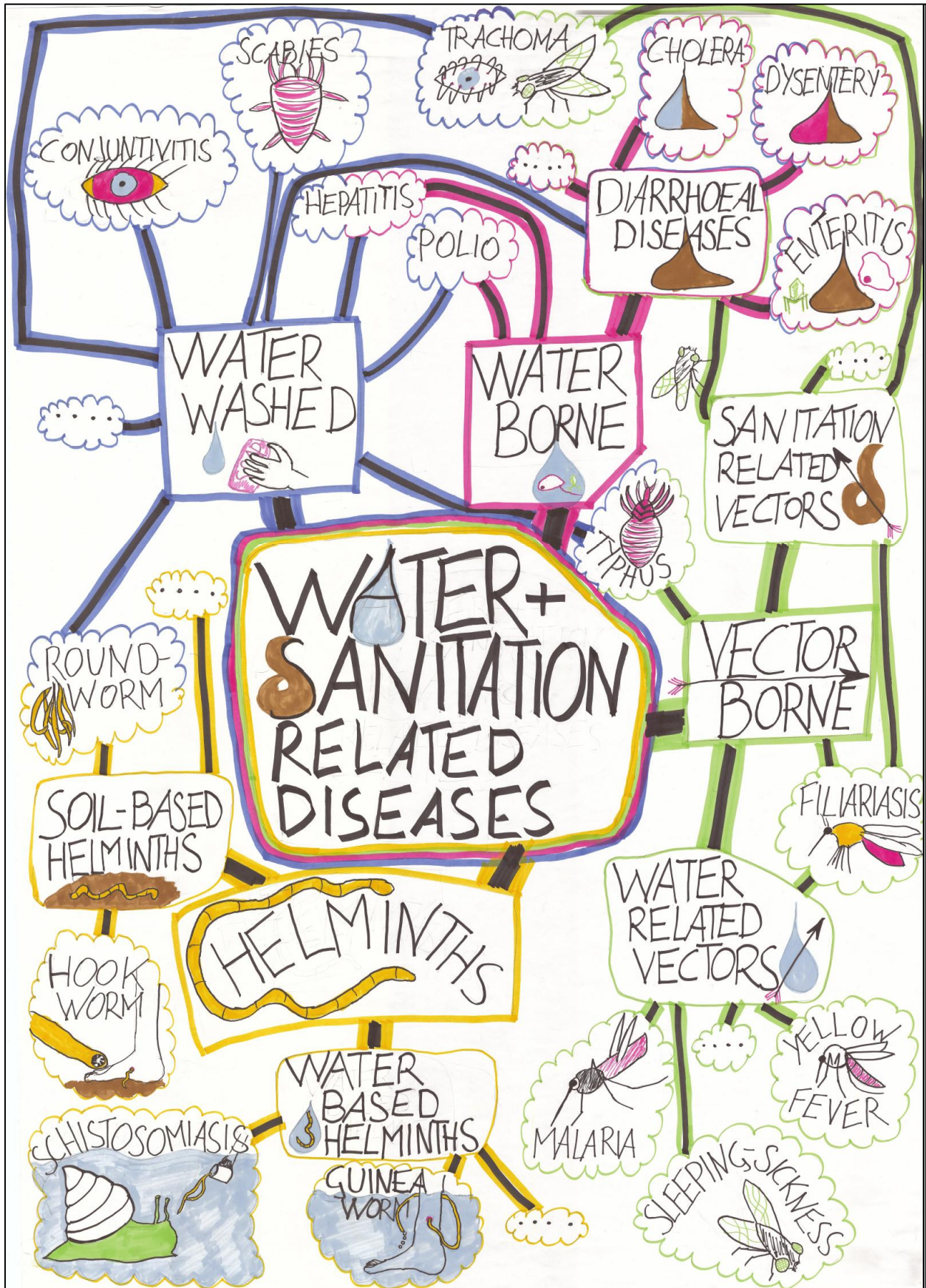
<p>Water-based diseases</p> 	<p>Legionellosis (bacterium) Clonorchiasis (helminth) Schistosoma (helminth) Guinea worm infection (helminth)</p>	<p>Decrease contact with contaminated water; improve domestic plumbing; public education; sanitation; treatment of wastewater prior to reuse, public education; drying of flood-damaged homes.</p>
<p>Insect-vector diseases</p> 	<p><i>Water-related:</i> Malaria (protozoa) Dengue (virus) Yellow fever (virus) <i>Excreta-related:</i> Fly-borne and cockroach-borne excreted infections.</p>	<p>Decrease passage through breeding sites; larvicide application; biological control; use of mosquito netting and impregnated bed nets; improve stormwater drainage; public education.</p>
<p>Rodent-vector diseases</p>	<p>Rodent-borne excreted infections.</p>	<p>Rodent control; hygiene education; decreased contact with contaminated water; public education.</p>
<p>Taeniasis</p>	<p>Beef and pork tapeworm infections.</p>	<p>Sanitation; effective treatment of excreta or wastewater prior to reuse; hygiene education. proper cooking of meat and improved meat inspection.</p>

Table 8: Unitary environmental classification of water and excreta-related diseases. (Summarised from Mara et al., 1999, p.335)

¹ Sandec Training Tool: Module 2, section 3.1; http://www.susana.org/images/documents/07-cap-dev/c-training-uni-courses/available-training-courses/sandec-tool/02_health/module2_final.pdf



5 Toilets and people

Thinking about the users

People don't have to use toilets but they can choose to. It's therefore our job as providers to provide facilities that people want to use. However, what do we mean by users?

Are we all the same?

Other than the fact that we are all human (we hope!), it's safe to say that nobody is the same as anyone else – we are all different. Fortunately, when considering latrines, we can break users into fairly broad groups that have similar needs. The most obvious groups are between men and women but within that, there are numerous sub-groups with specific needs. Complete the table below listing the main sub groups and describing their specific needs or limitations related to latrines. I have listed a few sub-groups but see how many more you can think of.

Su-group	Needs and limitations
Men	
Women	
Children	
People needing a wheel chair to get around	
Blind people	

As you can see, people needing to use latrines come in a variety of shapes and sizes with differing needs and limitations. Our task is to develop latrines that allow the maximum number of users to access them in a way that they find acceptable.

Who are our primary clients?

I suppose the simple answer is – all of them. However, we can be a little more specific by looking at the environment in which the latrine is being used. Knowing who the primary users are allows us to design latrines that most meet their needs. Look at the following table and think which sub-groups are likely to be the primary clients for each location.

Location

Sub-groups

School

Hospital

Emergency feeding centre

Refugee camp

Market

Individual home

How do we deal with differences?

Our goal is to design latrines and their environment to allow the maximum number of users to access and use them in a way that they find acceptable. There are three broad approaches to doing that:

Inclusive design

(Also known as ‘Universal design’ and ‘Design for all’). Inclusive design is a process whereby designers, manufacturers and service providers ensure that their products and services address the widest possible audience, irrespective of age or ability, and aims to include the needs of people currently excluded or marginalised by mainstream design practices. It places people at the centre of the design process, acknowledges and offers choice and flexibility to accommodate diversity and difference. This is more cost effective than attempting to introduce modifications to facilities as an after-thought. It is most appropriate for toilets in public places, such as schools, health clinics, hospitals, places of work and other public buildings.

Adaptation and modification of existing facilities

Where facilities already exist, this approach involves modifying or adding to the fabric of the structure to make it more accessible for different users. For example; constructing a ramp to the doorway, widening the doorway, adding a handrail besides the steps or raising the seat.

Provision of assistive equipment to individual users

It may be difficult to modify the facility, e.g. where accommodation is rented. It may be possible to enable some users to access and use existing facilities by providing mobility equipment such as a moveable seat or support frame. This approach may be more appropriate for toilets installed by individual families according to their available resources. Failing that, an alternative to the latrine may need to be considered. Often a combination of approaches is needed.

What should be our objective?

Our objective should always be to design and build latrines to be as inclusive as possible. This does not have to be difficult or expensive, especially if it is considered from the very beginning.

Thinking about access

Inclusive design of latrines is mainly about accessibility, i.e. the physical ability of a user to get to a toilet and use it with ease. We can break down that process into three phases; getting there, getting in and usability.

Getting there

If a person can't reach a latrine then they can't use it. Below is a list of the main barriers to reaching a latrine, consider what could be done to overcome them.

Principle barriers

Solutions

Toilet too far away

Fear of using it because of theft or rape

Ground conditions too difficult to cross

Can't see the route to the latrine

Toilet entrance higher than
surrounding ground

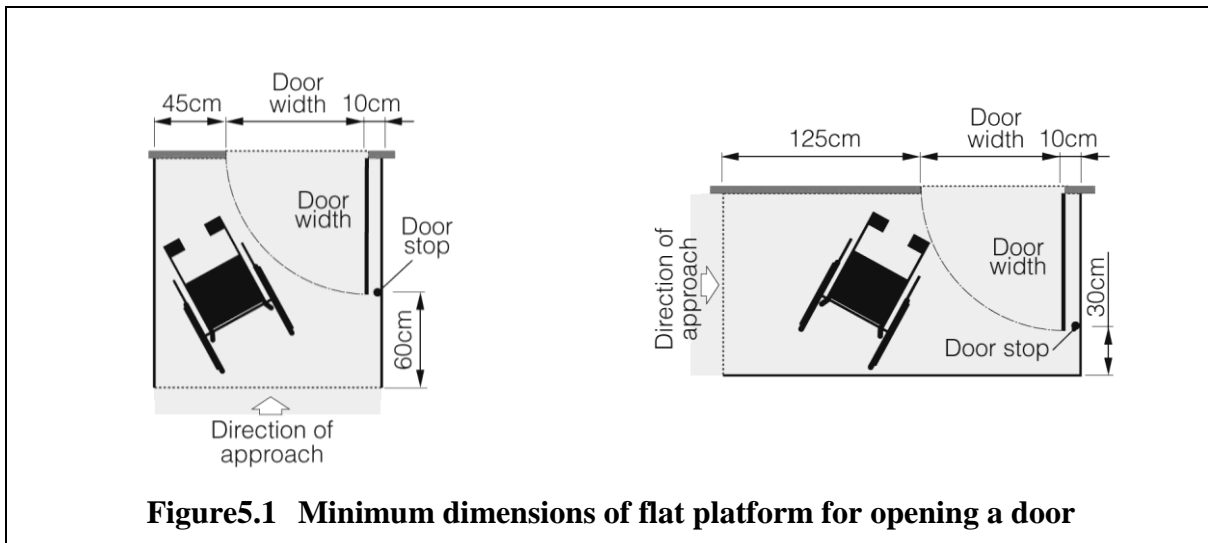
Getting in

There's no point in building latrines if people can't get into them. Here are the main features to consider

Entrances

The area immediately outside the latrine door needs to be firm and level, so that users can balance easily while opening and closing the door. This area should be level with the floor inside the latrine. The width of the level area depends on the type of door. It should be at least 1m or the width of the door plus 0.5m, whichever is the greatest (Figure 5.1).

People with difficulty walking or standing without support will benefit from a hand rail on ramps and on the wall next to the latrine door.



Doors and their features

Latrine doors should be wide enough for a user in a wheelchair, or with a helper to enter. This will vary according to the design of the wheelchair but a minimum width of 800 mm is recommended. It should be easy to open, close, lock and unlock. An outward opening door leaves more room to manoeuvre inside the latrine but can be difficult to close from inside. A horizontal rail fitted on the inside of the door makes it easier to pull closed. A two-way hinge allows the door to be pushed open from either inside or outside.

Privacy and security

In most cases users will prefer the door to be lockable. This can be achieved with a variety of slide bolts or latches but whatever is used the handles should be easy to hold and simple to operate

Usability

To sit or to squat?

There is no fixed rule as to whether to install sitting or squatting toilets. From a hygiene, simplicity and cost perspective, squatting toilets are better but this misses the point. The most important consideration is, will people use them? Two main factors come into play here; what are the people accustomed to using and what would they prefer?

Middle and upper class people normally prefer pedestal toilets but those from a poorer background may never have had a toilet. If they did however it was probably a squatting type. Never the less, if asked what they prefer, they may well say a sitting type as they believe them to be more modern. The problem is that some people who are unaccustomed to using pedestals will continue to squat, thus fouling the sitting area and making it unfit for other users.

The decision has to be taken on a site by site basis. A general rule of thumb is to start with the assumption that a squatting pan is the most appropriate and see if the community can change your mind.

Pedestals

There are many designs of pedestal toilet (Figure 5.2). All should be easy to clean and have a tight fitting lid.



Figure 5.2 Examples of pedestal toilets

Squatting pans

These are commonly made of concrete, ceramics or plastic (Figure 5.3). They should be easy to clean, comfortable for the user and have a tight fitting cover over the hole. Users normally prefer to squat facing the door.

The plates should not be raised above the surrounding floor area as this makes them difficult to use, especially for the elderly.



Figure 5.3 Examples of squatting slabs

Toilets for children

Children find adult toilets too large and either foul them or refuse to use them. Squatting pans and pedestals can be designed to meet their needs by reducing the hole size, changing the location of the foot rests and lowering the height of the pedestal. Figure 5.4 shows the layout of a school toilet block with different hole sizes for different aged children.

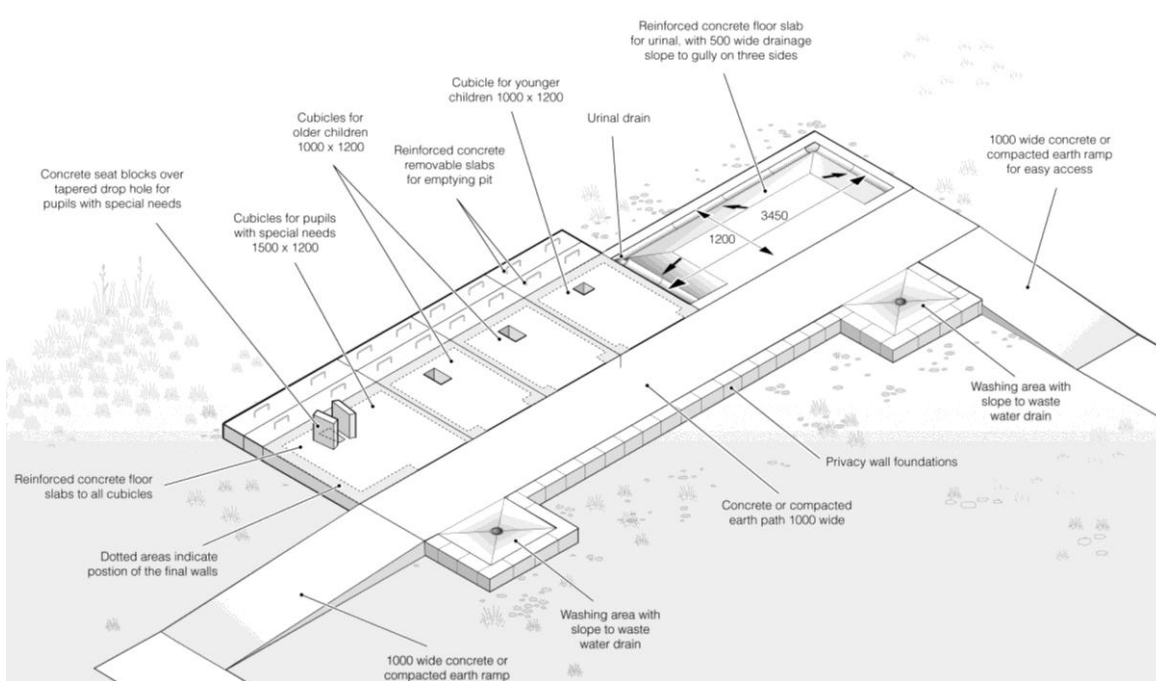


Figure 5.4 Floor layout for school toilet block showing different drop hole sizes for different aged children

Internal dimensions and layout

If the latrine is to be used by people in wheelchairs, there should be enough space between the door and the toilet for the chair to turn through 180 degrees. If the arm rests of the wheelchair are removable, sideways transfer from a wheelchair is the easiest, so there must be space at the side of the toilet (about 1.0m) to allow this. This allows wheelchair users to enter the latrine forwards but transfer to the toilet facing the door. The amount of space required to do this will vary depending on the design and dimensions of the chair. Take a look at the design of local wheelchairs and measure the turning circle (Figure 5.5).

This space can also be used by a carer to assist a disabled person. If the latrine is to be used by a number of disabled people the space must be provided on both sides of the latrine since the side a person uses depends on the particular disability and personal preference.

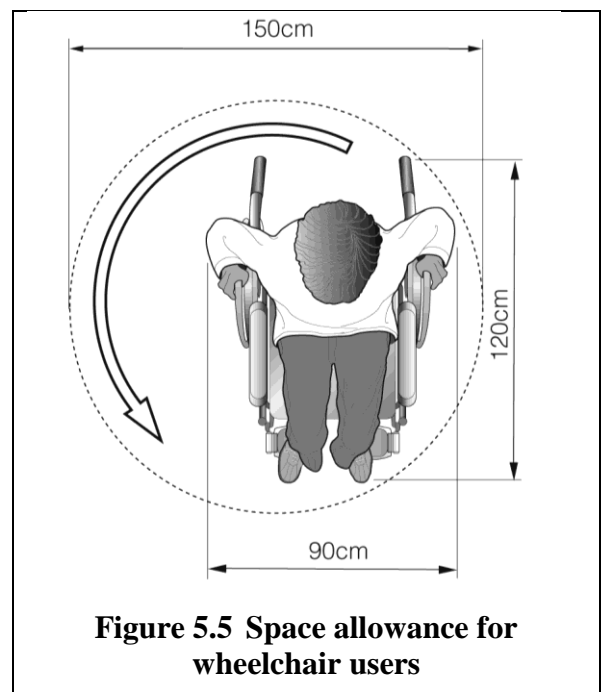


Figure 5.5 Space allowance for wheelchair users

Floors

A concrete or tile floor is better than a mud or wooden one. The finish should be smooth to make it easy to clean. However if the latrine is to be used by people using crutches, a slightly roughened surface is preferred to prevent slipping. If the social preference is to use water for anal cleansing, always provide a water source close to the toilet and at a convenient height.

Support rails

Many disabled persons require some form of support to transfer to/from the toilet or whilst using it. This can be provided by handrails. Rails may be provided in different locations, depending on the latrine structure, available space and users' needs. They may be fixed to the floor or walls (if these are sturdy enough), on either side of the toilet. Where this is not an option, a frame around the toilet is a good alternative. A low cost way of providing support is to suspend a knotted rope from the ceiling, but this should only be used as a last option.

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June 2012

6 Excreta disposal technologies

Introduction

The range of excreta disposal technologies is wide and most of them are appropriate for both development and emergency situations. However, there are some technologies that are specifically suited to emergencies, particularly the early stages of a response. We call these temporary sanitation facilities.

This presentation will introduce the all the main low cost sanitation technologies currently available, dividing them into temporary technologies and longer term technologies. We will start however with the most important element of all latrines, the cubicle.

Toilet cubicles

As we have already said, the most important element of any latrine is that people use it. They don't really care what happens to their excreta when they've finished with it, they just want to get rid of it in a way that they find appropriate and comfortable.

The cubicle should be clean, light, safe, large enough for the users, appropriate for local customs and practices, and free from odour and flies. They must be easy to reach and get into and large enough for users to move around safely.

The cubicle floor area should be approximately 120cm deep x 80cm wide *provided the cubicle door opens outwards*. If it opens inwards then increase the depth to approximately 150cm. Cubicles designed for vulnerable groups should be approximately 160cm wide

The cubicle should be about 2.0m high with good ventilation at the top. A roof is necessary to keep out the elements and for privacy.

Doors should be rigid and fitted with a simple internal locking device. Do not leave a space between the door and the floor as it reduces privacy and dignity. Doorways may be as narrow as 45cm but a minimum free opening space of 50cm is recommended. Cubicles designed for use by vulnerable groups should have a minimum door opening width of 80cm.

Floors should be smooth and level and preferably made of concrete. Plastic sheeting or wood can be used as a temporary measure (Figure 6.1). Mud floors are not recommended as they become uneven and slippy when wet.

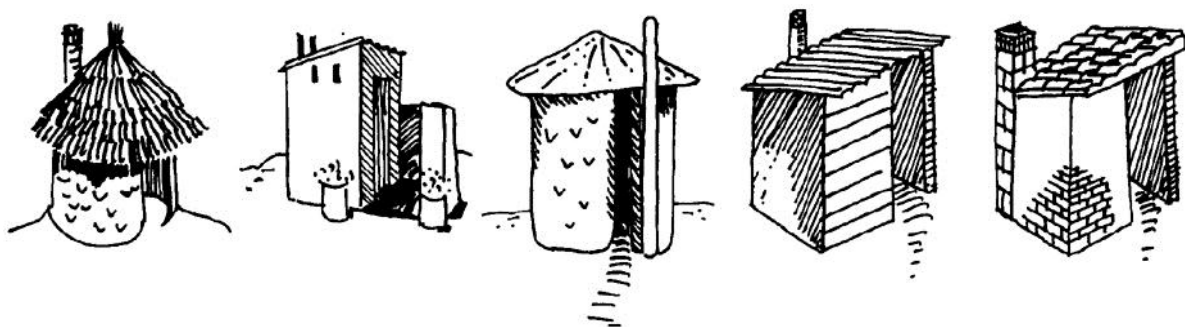


Figure 6.1 Typical toilet cubicles

In an emergency walls can be made of plastic sheeting (Figure 6.2) but for longer term use solid walls of wood, brick (Figure 6.3) or locally available materials (Figure 6.4) are preferred.



Figure 6.2 Cubicle floor & walls of plastic sheeting



Figure 6.3 Brick cubicles on pit latrines



Figure 6.4 Cubicle made of palm leaf

A strong hand rail attached to the side walls to help users get on and off the latrine is essential in cubicles for vulnerable users and preferable in all other cubicles.

The floor level in the toilet should be as near as possible to the level outside. A large step in can cause trips and falls, especially when leaving at night

Women in particular prefer privacy when using latrines. A simple screen in front of the toilet block in addition to the doors will often meet this need. The main issue with privacy walls is security. Women must be sure that the design does not provide places for people to hide.

Longer term technologies

Pit latrines

Simple pits

Quick and cheap to make, these are the most common type of dry toilet to be built. The basic design, consists of a pit, cover and superstructure (Figure 6.5). The pit should be kept sealed and as dark as possible, to allow the contents to decompose. A tight-fitting lid is therefore needed to cover the squat hole when not in use. The pit should usually be at least 2 metres deep, and may need lining if the soils are unstable. If facilities exist for regular mechanical emptying then the pit need not be as deep, provided the walls are fully lined.

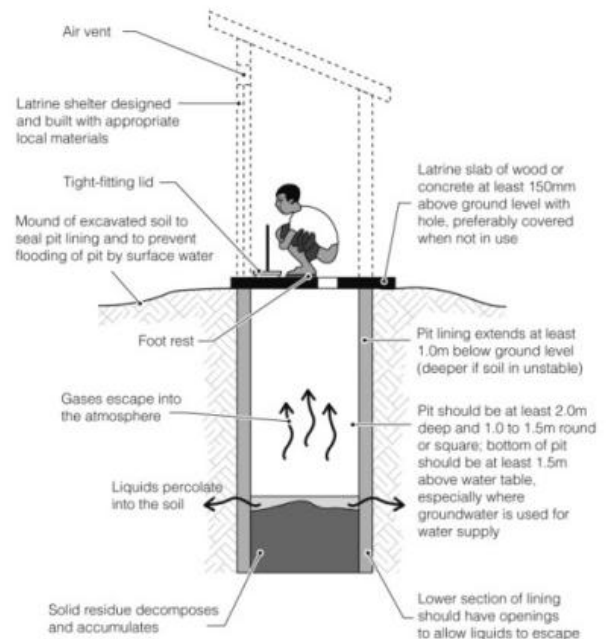


Figure 6.5 Simple pit latrine

VIP latrine

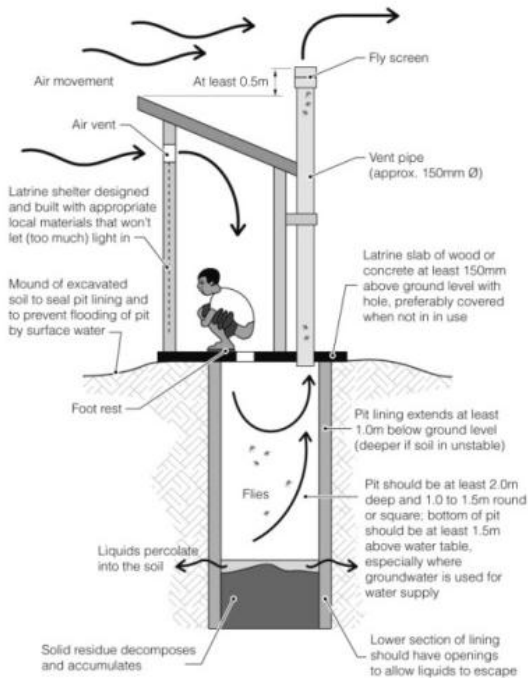


Figure 6.6 VIP latrine

made slab or pan with a shallow U-bend can be incorporated into a simple pit latrine, or can be offset from a sewer or septic tank. This is a 'wet' option, and requires a regular supply of water for flushing (a few litres each time).

Septic tanks

Septic tanks are commonly used for the treatment of wastewater from individual households in low-density residential areas, institutions such as schools and hospitals, and from small housing estates. The wastewater may be from toilets only, or include sullage (wastewater from kitchens, laundries and bathrooms). Septic tanks may be appropriate for situations where the volume of wastewater produced is too large for disposal in pit latrines, and water-borne sewerage is uneconomic or unaffordable. They provide only *partial* treatment for wastewater.

A ventilated improved pit (VIP) latrine is a pit latrine with an added vent pipe to increase circulation and so reduce odours and flies (Figure 6.6). The vent pipe should lead straight from the pit, be external to the superstructure, and should be high and exposed to allow the local air currents to draw the odours out of the pit. The end of the pipe should be covered by a fly screen to prevent any flies entering or leaving the pit. No cover is needed for the squat-hole, and the interior of the superstructure should be kept dark to reduce the number of flies entering. A gap is needed above or below the door to allow free circulation of air.

Pour-flush latrines

Also known as a water-seal latrine, this option uses water to flush excreta down the pan, and a simple water seal prevents odours and flies returning from the pit (Figure 6.7). A ready-

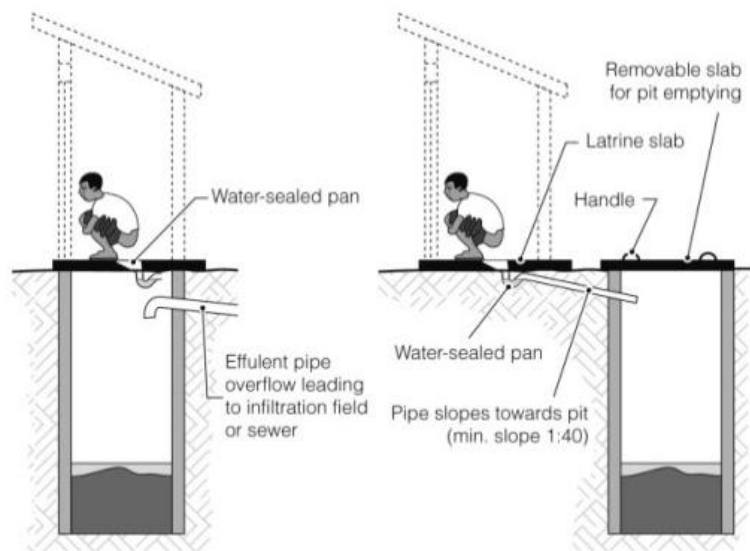


Figure 6.7 Pour flush latrine

A secondary treatment process must always follow them before the effluent is discharged into the open environment. In most cases this will take the form of sub-soil infiltration. The wastewater is allowed to soak into the soil, thereby disposing of the liquid and cleaning it at the same time.

Treatment process

Wastes from toilets, and sometimes kitchens and bathrooms, pass through pipes to a watertight tank where they are partially treated (see Figure 6.8).

After 1 to 3 days, the liquid wastes leave the tank and are carried to the secondary treatment system. This is commonly some form of underground disposal system (described later). Alternatively they may be discharged to a sewerage system for secondary treatment elsewhere.

Settlement & flotation

The shape and size of the septic tank is designed to produce calm conditions in the liquid. This allows the heavy solids to settle to the bottom. Dividing the tank into a number of compartments improves the efficiency of the solids removal. The settled solids form a **sludge** on the bottom of the tank, which gradually increases in thickness and must occasionally be removed. Some of the solids in the incoming liquid are lighter than water and float to the surface to form a **scum**.

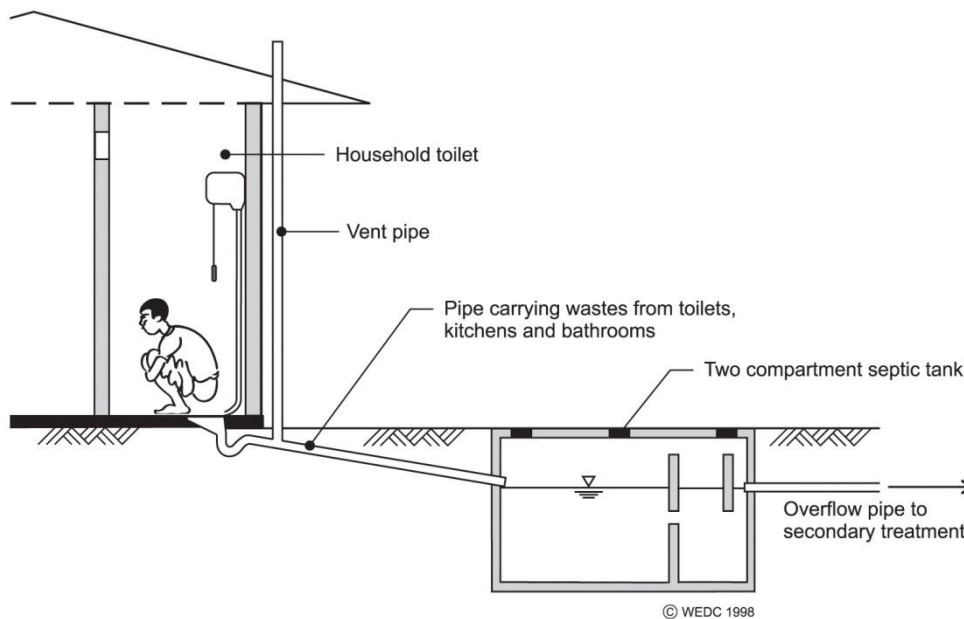


Figure 6.8 Septic tank

Consolidation and sludge digestion

The rate at which sludge builds up in the tank is less than the rate at which it is deposited. Two processes contribute to this: the sludge at the bottom of the tank is compressed by the weight of new material settling on top, increasing its density (**consolidation**); and organic matter in the sludge and scum layers is broken down by bacteria which convert it to liquid and gas. The process is called **sludge digestion**.

Stabilisation

The liquid in the tank undergoes some natural purification but the process is not complete. The final liquid (effluent) is anaerobic and may contain pathogenic organisms.

Effluent disposal

Most failures of septic tank and aqua privy systems are initially due to the failure of the effluent disposal system. There are a number of different effluent disposal systems, the two most common are discussed in this section.

Soak pits

Soak pits are large holes in the ground, which store effluent from the septic tank. They are commonly between 2 and 5m deep and 1 to 2.5m in diameter. Their volume below the inlet pipe should be larger than the tanks they are connected to. Effluent soaks into the surrounding soil through the sides of the pit. The pit can be lined (Figure 6.9) or filled with large stones, blocks, bricks etc. (Figure 6.10). The fill is for supporting the pit walls and cover - it plays no part in the treatment process.

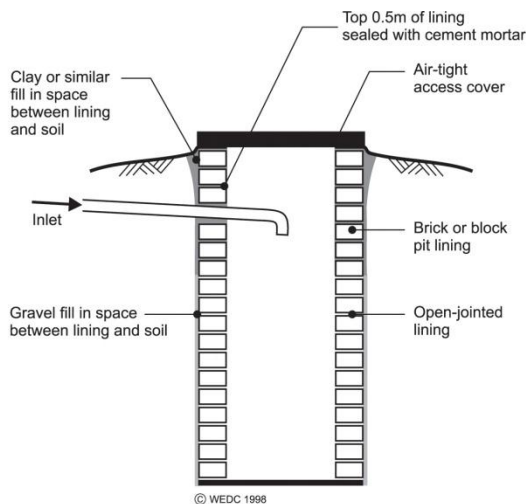


Figure 6.9 Lined soak pit

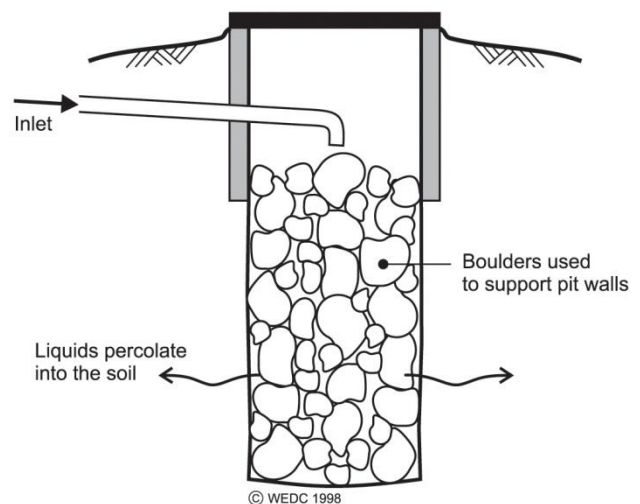


Figure 6.10 Unlined soak pit

Drainage trenches

Disposing of effluent in a trench provides a higher surface area for the volume of soil excavated (Figure 6.11). It also utilises the upper soil layers, which tend to be more porous. Pipes disperse the effluent from the septic tank along a series of trenches that have been filled with coarse gravel.

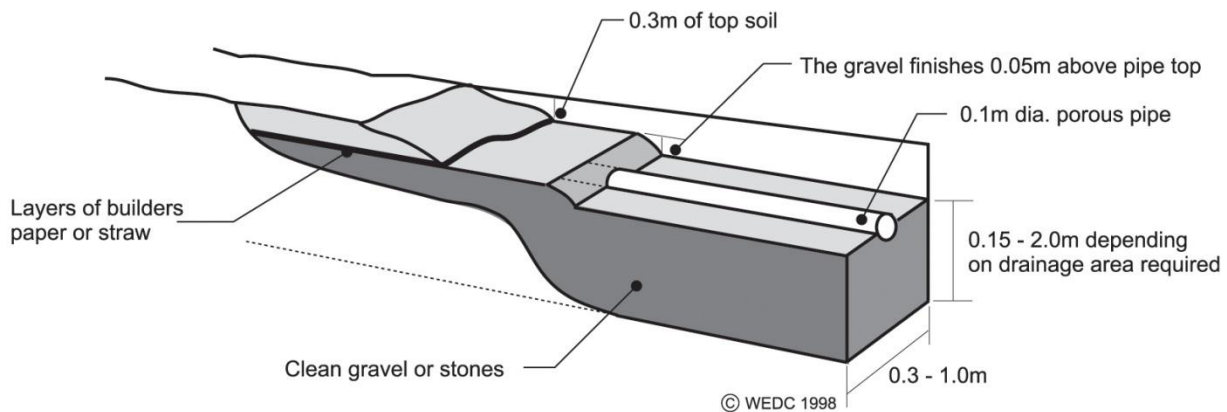


Figure 6.11 Section through an infiltration trench

The pipes are porous so that the effluent can seep out into the surrounding gravel. They are laid horizontally to spread the effluent evenly along the whole length of the pipe. The size of the pipe depends on the quantity of effluent to be disposed of but for most situations 100 mm diameter is sufficient. The gravel disperses the effluent from the pipe to the walls of the trench where it is absorbed into the surrounding soil. A layer of paper, straw or porous plastic sheeting covers the top of the pipe. This allows air to enter the trench and gases to escape but prevents the topsoil from mixing with the gravel and blocking the trench.

Composting toilets

Composting is the process of biological breakdown of solid organic matter to produce a substance (compost) which is valuable as a fertiliser and soil conditioner. Excreta can be composted if mixed with other matter to control the moisture content, adjust the chemical balance of the mass and improve the texture.

The wastes generated by a single family are not enough to support the increased temperatures required for proper composting therefore the process cannot be relied upon to destroy pathogenic organisms. Any latrine based on this process must contain other features to prevent the spread of disease. Decomposition can take place in the presence (aerobic) or absence of oxygen (anaerobic). Anaerobic is slower and does not produce any rise in temperature. It may also produce a strong odour. However, this too can be incorporated into the design of a latrine.

The big incentive for considering composting toilets is that they are completely enclosed and so do not pollute the ground below them. They are worth considering where shallow groundwater must be protected.

Aerobic composting latrines

Modern aerobic composting latrines were originally developed for rural areas as an alternative to conventional latrines where it was impossible to infiltrate wastes into the ground. Since then they have been developed and tried in many parts of the world. The basic principles of their design are to:

- keep the waste material open and relatively dry so that air can freely circulate;
- separate new wastes from old; and
- contain the wastes for long enough for any pathogenic organisms to be destroyed.

- Excreta and other wastes are added to a receptacle about 3m in length which slopes away from the inlet (Figure 6.12).

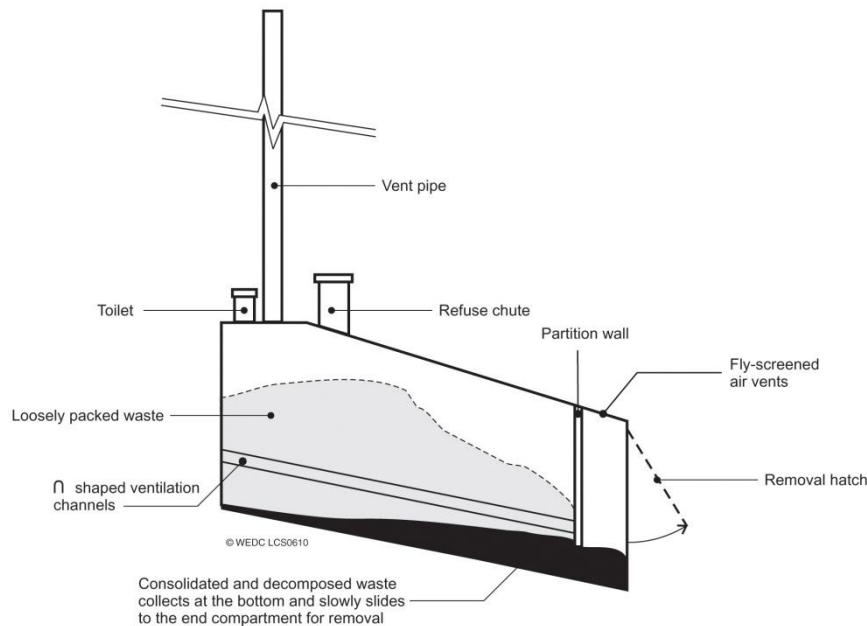


Figure 6.12 Aerobic composting toilet

The latrine is fitted with a suspended floor made of 'n'-shaped channels that draw air in through the storage chamber, through the decomposing mass and out via a ventilation pipe. The mass gradually slides down the suspended floor as it decomposes. Eventually it collects in a storage chamber from which it can be removed. The main chamber holds the material for about a year to ensure that the pathogens have died. Sometimes the top of this chamber is exposed and covered with a metal plate to make use of the sun's heat to evaporate some of the liquid. The compost moisture content and chemical balance are controlled by adding vegetable waste and sawdust or ash to the excreta. The process is continuous, with the weight of new material helping to push the decomposing waste towards the storage chamber.

The latrines have proved successful in small communities in industrialised countries but it is usually necessary to install a fan on the ventilation pipe to increase ventilation to control odours and flies. Attempts to introduce them in other parts of the world have not been a success. Problems were experienced with over use, too high a moisture content and insufficient vegetable waste being added. These problems lead to foul smelling, unpleasant latrines which were shunned by the users.

The main problem seems to have been that the users did not consider the end product worth the effort required to produce it. Family composting latrines are expensive to build and produce only small quantities of compost. Many people prefer to purchase chemical fertilisers (which are often subsidised by the State) than work with human excreta.

Anaerobic composting

A moist mass of excreta and other wastes will naturally compact, which will exclude the air and turn the mass anaerobic.

Anaerobic latrines usually work on a batch system. Excreta, organic waste (to control the chemical balance) and ash or sawdust (to control the moisture content) are deposited in a sealed container (Figure 6.13). Urine is collected separately. When the container is full it is sealed and another container used. When the second container is full the first container can be emptied and re-used.

The wastes should be stored for around 2 years to ensure all pathogens are destroyed.

Batch composting toilets have had mixed success. Failure has generally been due to poor understanding of the process or lack of interest in the final product.

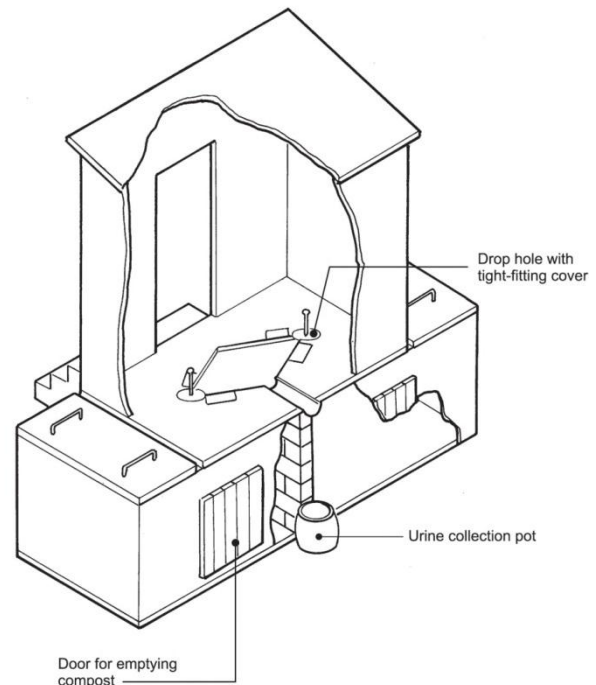


Figure 6.13 Anaerobic composting toilet

Biogas

If human excreta is combined with animal and agricultural wastes, and water, it will give off gas as it decomposes (Figure 6.14). Given the right temperature and mix of wastes, much of the gas will be methane, which is flammable. The mix of gases produced is called 'Biogas'.

Biogas generation has been incorporated into domestic latrines in a number of countries with mixed success. The plants are used widely in China where the gas produced is used for cooking and lighting. They are designed to take a mixture of excreta, pig wastes and water.

Biogas plants typically store the wastes for about 30 days. This removes some of the pathogenic organisms but by no means all. It is better to store the excreta for a period after putting it in the biogas tank.

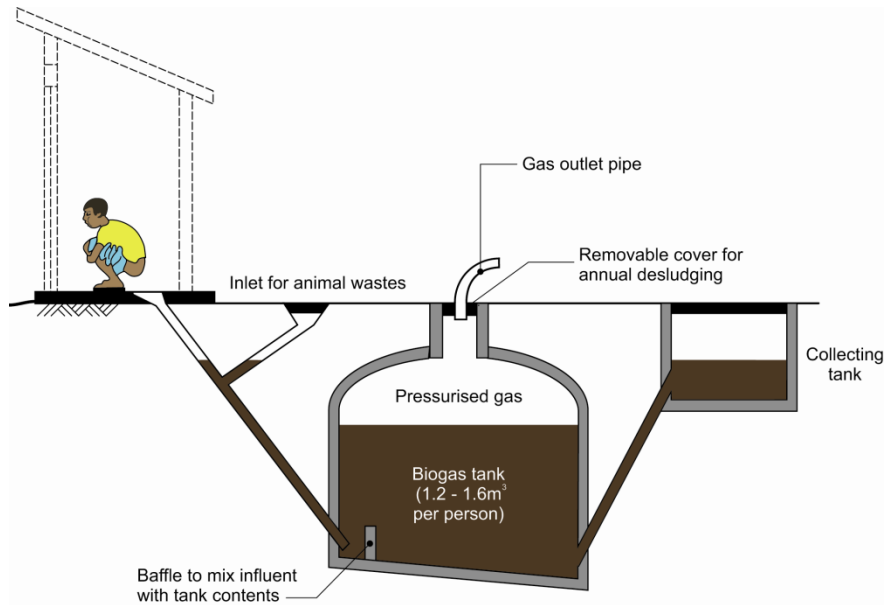


Figure 6.14 Biogas tank with latrine

Biogas plants are very expensive to build and difficult to operate. Poor maintenance leads to loss of gas production and blockage of the digester tank with solids. They are only appropriate in communities with a commitment to recycling organic wastes and little access to alternative power sources.

Dewatering toilets

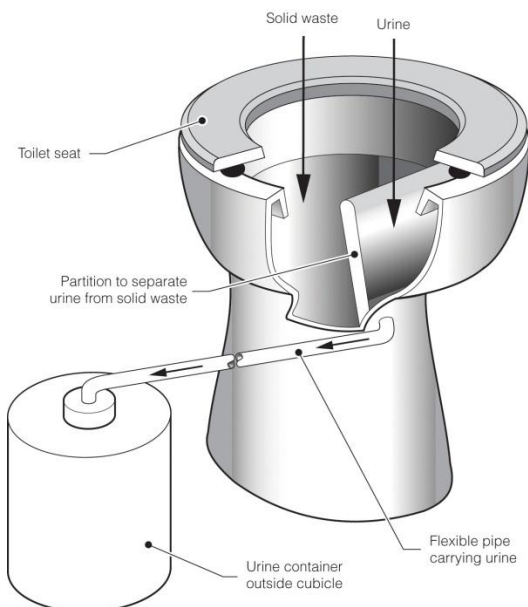


Figure 6.15 Urine diversion

De-watering may be a worthwhile and appropriate solution, because of the high reduction in the volume of waste it produces. A variety of approaches have been developed to achieve this.

Urine separation

Urine is a valuable and relatively safe organic resource. Mixing it with faeces not only makes it unusable individually but adds considerably to the total volume of wastes to be disposed of. It therefore makes sense to try and keep the two separated rather than mixing them up. A number of designs have been developed to provide separation, most work on the 'split defecation hole' principle (Figure 6.15). The pedestal or squatting plate defecation point is divided into two sections that allow the faeces to go one way and the urine another. These devices have been tried in many parts of the world, but the most obvious complaint is that many seem to have been designed by men for men!

Temporary latrines

Defecation fields

Where there is insufficient time to provide facilities for a disaster-affected population, open defecation areas should be used only as an extreme short-term measure before latrines are ready for use. Defecation areas or fields surrounded by screening may be set up, with segregated sites for each sex. People should be encouraged to use one strip of land at a time and used areas must be clearly marked.

It is essential that defecation areas are:

- far from water storage and treatment facilities;
- at least 50m from water sources;
- downhill of settlements and water sources;
- far from public buildings or roads;
- not in field crops grown for human consumption;
- far from food storage or preparation areas.

**WHEREVER POSSIBLE AVOID DEFECATION FIELDS
AND INSTALL TRENCH LATRINES AS A FIRST OPTION**

Trench latrines

Shallow trenches

A simple improvement on open defecation fields is to provide shallow trenches in which people can defecate (Figure 6.16). This allows users to cover faeces and improves the overall hygiene and convenience of an open defecation system. Trenches need only be 200-300mm wide and 150mm deep, and shovels may be provided to allow each user to cover their excreta with soil.

Only short lengths of trench should be opened for use at any one time to encourage the full utilization of the trench in a short time.

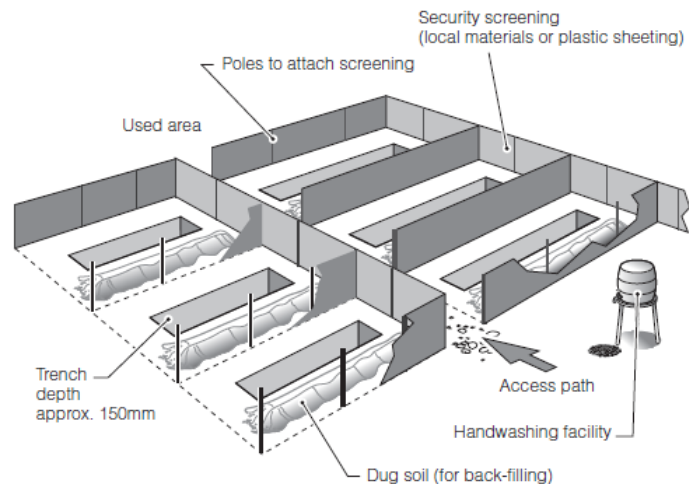


Figure 6.16 Shallow trench latrines

Deep trenches

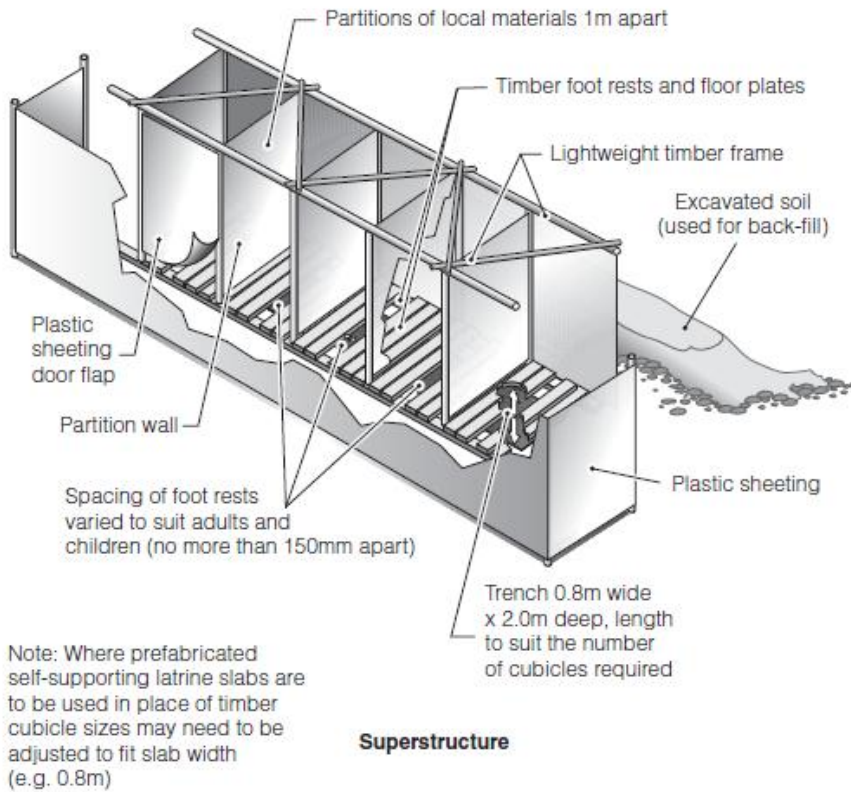


Figure 6.17 Layout of a trench latrine

Deep trench latrines are often constructed in the immediate stage of an emergency. They involve the siting of up to six cubicles above a single trench which is used to collect the excreta (Figure 6.17).

Trenches should be 0.8-0.9m wide and **at least the top 0.5m of the pit should be lined** to ensure that the trench remains stable. After the trench has been dug, the quickest option is to put self-supporting plastic slabs straight over the trench. If slabs are not available, then wooden planks can be secured across the trench until proper wooden or concrete slabs can be made.

Shallow family latrines

These are particularly suitable where people are keen to build their own latrines, or have experience of latrine construction and, where there is sufficient space, but where rocky soil or high water-tables makes deeper excavation difficult. A shallow pit of approximately 0.3m x 0.5m x 0.5m depth may be excavated. Wooden foot-rests or a latrine slab (approximately 0.8m x 0.6m) can be placed over this, overlapping by at least 15cm on each side (Figure 6.18). This latrine is an immediate measure only and back-filling should occur when the pit is full to within 0.2m of the slab. A simple superstructure for privacy can be made from local materials.

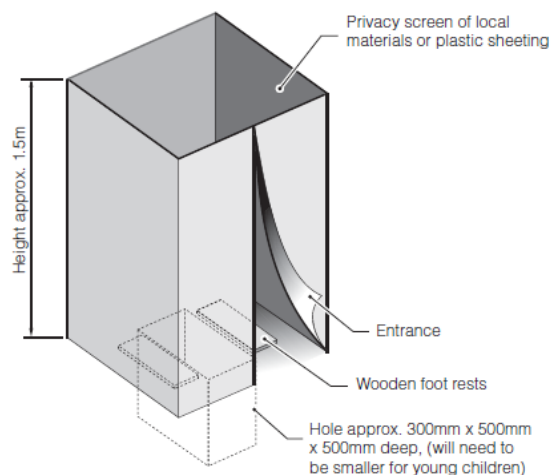


Figure 6.18 Shallow family latrine

Plastic bags

Single use plastic bags (sometimes called ‘Packet Latrines’) are an excellent immediate excreta disposal response. The bags, which should be bio-degradable, sometimes contain enzymes to breakdown the excreta. They may also contain absorbent cloth to keep the faeces dry. There are various commercial options available but simple plastic bags will often be satisfactory in the early stages.

The bags are usually placed under a pedestal in a container (Figure 6.19). After use, the bag is removed; the top tied and then placed in a sealed container for disposal. The pedestal can be placed anywhere that provides suitable privacy for the user.

Some designs are intended for direct use, requiring no seat. The bag is held directly against the bottom and the top sealed after use (Figure 6.20).



Figure 6.19 Single use bag systems

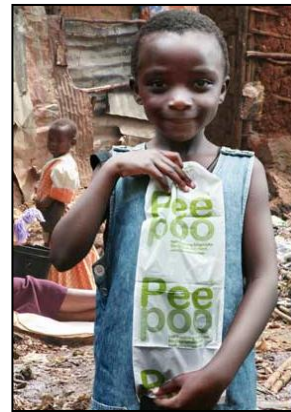


Figure 6.20 Single use bag, no seat



Figure 6.21 Single compartment holding tank



Figure 6.22 Prefabricated

Holding tanks

Pre moulded plastic water tanks make excellent containers for storing excreta. They come in many sizes but the most commonly used are the 250 and 500 gallon (1000 litres & 2000 litres). The tanks are placed at ground level or partially buried, with the toilet block built on top (Figure 6.21). Holes cut in the top of the tank, are located directly below the drop hole and a chute (often a large bucket with the bottom cut out) placed between the two. The 250gall containers are connected to individual cubicles whilst the 500gall ones are attached to four cubicles.

Smaller prefabricated portable toilets are widely used in South and Central America (Figures 6.22). These are basically the same, having a holding tank directly below the pedestal seat. The tank capacity is very small, requiring the tank to be emptied daily. Chemicals are commonly added after each emptying, mainly to reduce odour and to make the tank contents look less offensive.

Toilets over sewers

The system is relatively quick to implement, as the disposal system is already in place, and will not need replacing (Figure 6.23). The main constraint is the assumption that the system is running, has adequate water, and will continue to function with the additional load. Blockages may need to be dealt with, and expansion possibilities may be limited. These latrines are only suitable for those using water or toilet tissue for anal cleansing.

Toilets for small children

Children are a key group who are often not considered when making toilets. Foot rests may be too wide for little legs to straddle, holes may be too easy to slip into, and squatting unaided too difficult for small legs (Figure 6.24). As they are smaller and often have lower immunity to diseases, children are more vulnerable than adults to diarrhoeal diseases, and so should be provided with safe facilities where there is minimal risk of them coming into contact with faeces. Adequate nappy cleaning and/or disposal facilities will also need to be provided.

portable toilet

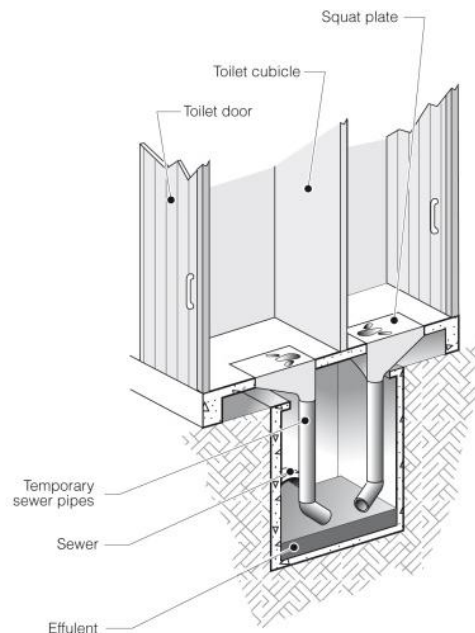


Figure 6

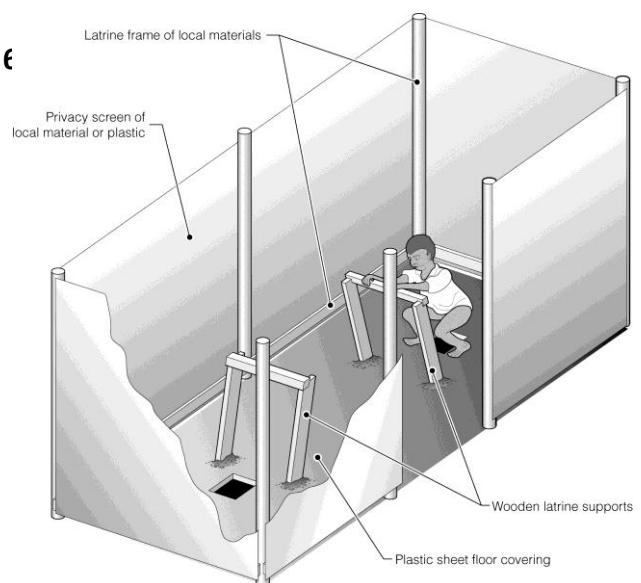


Figure 6.24 Trench latrine for children

Emptying tanks and pits

The emptying of tanks and pits is a problem around most of the developing world both during normal times and especially following a disaster. Lack of suitable equipment and poor access to latrines are the biggest issues.

Vacuum pumps

Vacuum pumps reduce the air pressure inside a storage tank (i.e. they pump air). A pipe connected to the storage tank is fed into wastes to be pumped and the difference in pressure between the tank and the atmosphere draws the wastes into the tank. The advantage of this method is that no waste products pass through the pump, meaning solid materials can be moved without damaging the pump. This is the normal type of pump fitted to a standard vacuum tanker (Figure 6.25).

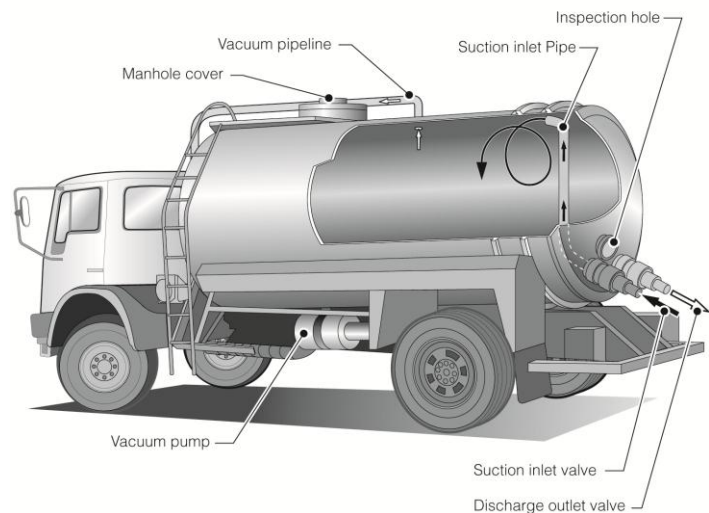


Figure 6.25 Vacuum tanker

Diaphragm pumps

A small metal tank is sealed across the top by a flexible rubber disc (the diaphragm). The tank has two openings on opposite sides, protected by simple flap valves that only allow liquids to move in one direction. The diaphragm is connected by a series of levers to an engine so that when it is working, the diaphragm is pushed up and down (Figure 6.26). The inlet opening on the tank is connected via a pipe to the wastes to be pumped. The outlet opening is connected via another pipe to some form of portable storage tank

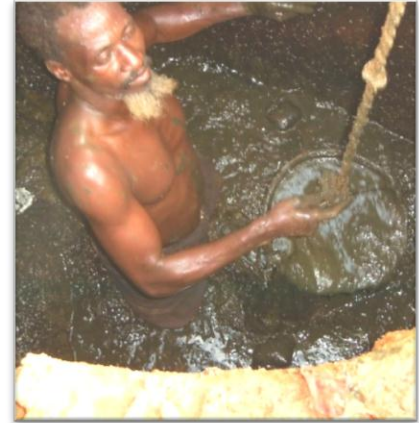


Figure 6.26 Diaphragm pump

Manual emptying

While very common, manual emptying of excreta cannot be recommended. It is highly dangerous and a serious health hazard to those doing the emptying and the community around the tank being emptied.

Relief and development agencies have a responsibility for the health and safety of the people they employ. Therefore, if they intend to use this method for emptying latrines they must provide the workers with protective clothing such as boots, gloves, overalls, face mask and safety hat. They should also supply the appropriate tools. Ideally this will be a powered or manual sludge pump. Failing that, buckets, shovels and hauling rope. The agency must also supervise the workers to protect them against major hazards.



Excreta transport

Vacuum tankers

The vacuum tankers used to empty toilet storage tanks also transport the faecal sludge to the disposal site. Whilst this is convenient it ties up valuable equipment. Separating the pumping operation from the sludge transport, allows more effective use of the pump as it can work with multiple tankers. Vacuum tankers are complex machines requiring regular maintenance and ready access to spare parts.

General garbage trucks & other vehicles

Single and multiple use defecation bags can be mixed with general garbage. If large amounts of excreta are to be collected, a dedicated vehicle is more appropriate (Figure 6.27). Some defecation bags are however likely to burst during transit so vehicles must be waterproof and preferably be able to tip for emptying



Figure 6.27 Transporting excreta collected in plastic bags

Sludge disposal

Sludge that has been left undisturbed for over two years is not a hazard to the environment. It can safely be spread anywhere convenient such as gardens or on refuse tips. Its fertilizer value is poor, but it will add humus and fibre to the soils that will promote plant growth. Sludge containing non-biodegradable substances such as plastic bags is more environmentally intrusive and should be buried.

The safest way of disposing of fresh faecal sludge is to bury it. The hole should be large enough to hold all the sludge and still leave room for a 0.5 to 1.0 metre covering of soil. Where the volume of

sludge is large and space limited, the two most common methods of disposal are burial in a garbage tip and combining the sludge with the influent to a sewage treatment plant.

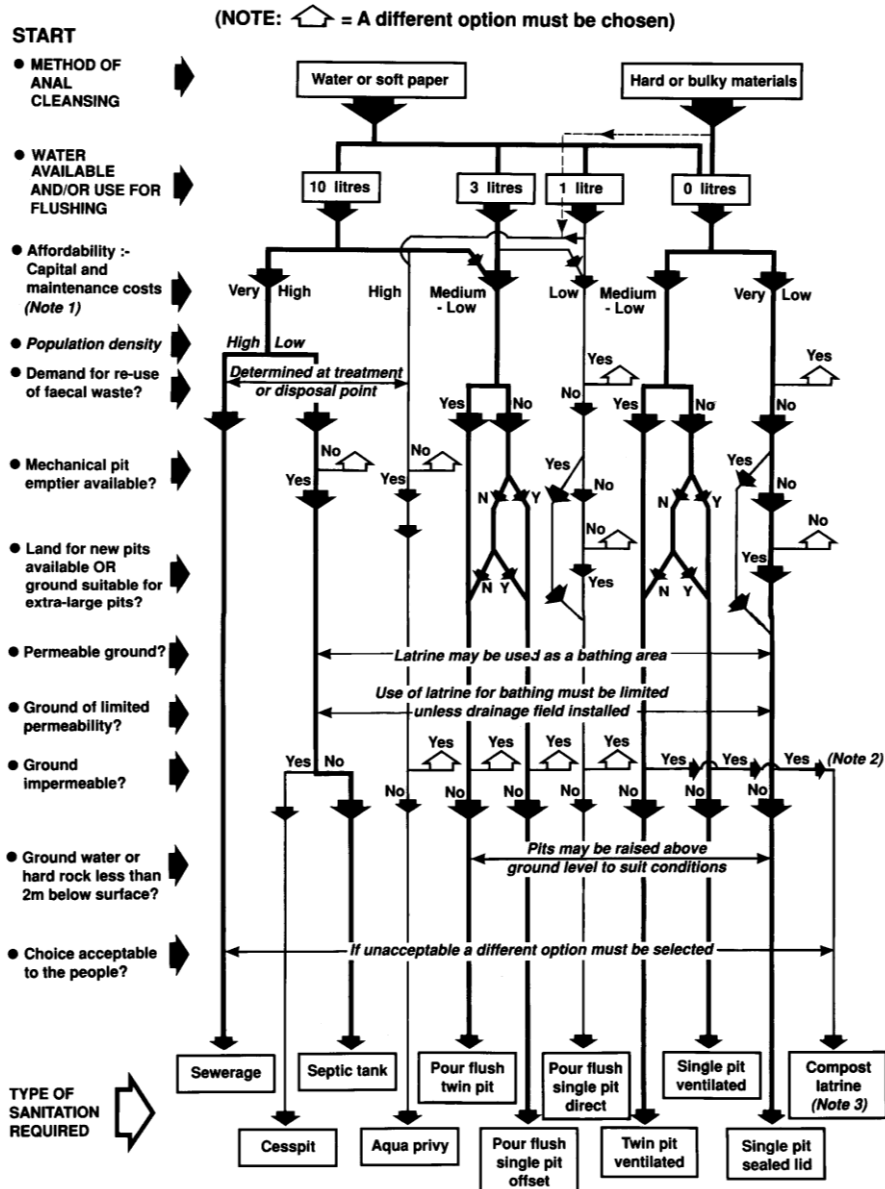
Factors affecting technology selection

In selecting appropriate excreta disposal interventions there are many local criteria that must be considered. These can be cultural, physical and/or practical. Often there are one or two factors that over-ride all other criteria, and determine the choice made. Much of this information will have been collected during your baseline assessment. The key factors affecting choice are:

- Site conditions
- Space availability
- Cultural factors
- User considerations
- Institutional constraints
- Financial constraints
- Operation and maintenance –

Latrine selection

Trying to select the most appropriate latrine design based on all the factors mentioned above is daunting. In practice however the decision is somewhat easier, since it will be limited by technical appropriateness and local acceptability. Except in the most urgent of interventions, community consultation in selection and design is essential. Figure 6.28 suggest a way of selecting latrine designs, but in the end you must come to the correct decision!



Note 1: Not all possibilities are illustrated as it is assumed that water availability is related to affordability

Note 2: Use extra large pits or consider composting

Note 3: Also dependent on willingness to collect urine separately, demand for compost, availability of ash or vegetable matter etc.

Figure 6.28 Decision tree for excreta disposal in refugee camps

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June 2012

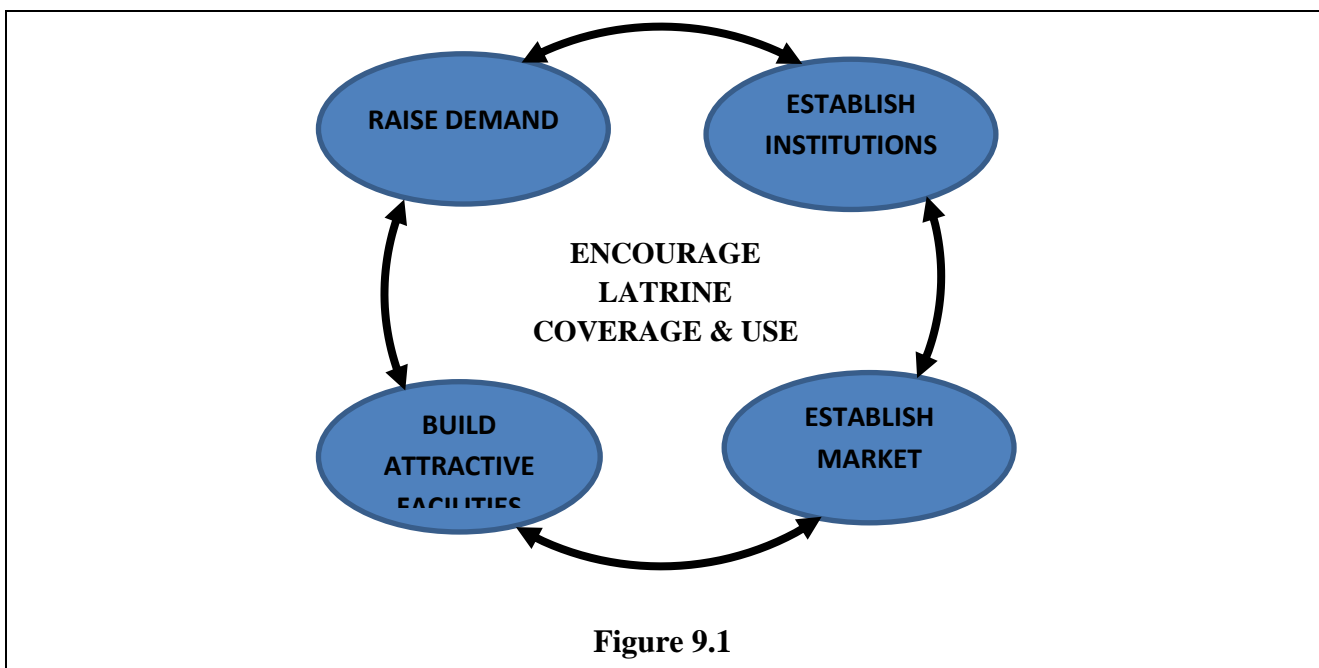
7 Encouraging latrine coverage & use

Introduction

As has already been said, people don't have to use latrines, they choose to. This issue is compounded in emergencies by the sudden changes in the environment and the extreme stress under which people are living.

The sudden change from say, living in a rural area to being forced to live in a refugee camp, may mean that their previous sanitation practices are no longer possible. Some may never have used a latrine before – just the nearby fields. If they are now forced to live in high density groups where latrines are the only viable option for safe excreta disposal, they will be faced with new ideas, technologies and practices; all of which may be a barrier to taking on safe practices.

No matter what the situation, the approach to improving latrine coverage and use always includes the same elements (Figure 9.1).



Build attractive facilities

Usually (but not always), the first step is to construct latrines that people will want to use. As well as providing essential services, these will act as a demonstration of what can be done and provide examples for people who have not been used to using latrines.

The key word here is 'attractive'. People must want to use the facilities provided so they must meet their individual needs. As we have seen before, key areas of concern to users are:

- Convenience
- Accessibility
- Security
- Cleanliness
- Comfort
- Privacy

Constructing a range of well designed and constructed latrines will normally provide community members with an idea of what is possible and for the starting point for a dialogue.

Institutional reform

Any programme to improve sanitation needs good institutions. The key roles of a sanitation institution are:

- Set policy and strategy
- Monitoring
- Legislation and Regulation
- Advice and support
- Core services such as waste disposal
- Promotion of good practice
- Coordination
- Core funding.
- Construction capacity

Not all of these functions have to be carried out by the same institution but they have to be carried out by someone. As a general rule, it is better for external organisations to support and strengthen formal institutions than to take on these roles themselves.

Raising demand

The primary purpose of raising demand is get people to construct and use latrines. There are a number of ways of doing this.

Hygiene promotion

We have already talked about this, but mainly from the perspective of improving hygiene practices such as hand washing. One of its other purposes is to promote the proper use of latrines.

Carrot and stick

Encourage people to use build toilets by providing them with things they will appreciate. Subsidies to reduce the cost, free materials for construction, free tickets to the cinema, even free food hampers can be considered.

The opposite approach is to force people to build facilities through local laws and regulations or increased charges for not having a toilet. This rarely works but some element of pressure combined with a large element of positive persuasion can be effective.

Communication

People are not cattle, they have opinions, likes and dislikes, just like you! You must talk to them to find out what they want and agree compromises with them between what you can do and what they would like.

Talk to all sections of society, not just the leaders. Men, women, children, the elderly, disabled people, political and religious leaders will all have views on what should be done. It is for you to find a compromise that all will accept.

Be aware of political and social divisions in the society. Not everyone will want the same thing, some will even wish you weren't there. In general, spending time understanding the way communities function and the key drivers to decision making will always be worthwhile.

Community led total sanitation (CLTS)

A relatively new technique based on shock tactics. CLTS is an innovative method for mobilizing communities to completely eliminate open defecation (OD). Communities are facilitated to conduct their own appraisal and analysis of open defecation (OD) and take their own action to become ODF (open defecation free).

At the heart of CLTS lies the recognition that merely providing toilets does not guarantee their use, nor result in improved sanitation and hygiene. CLTS focuses on the behavioural change needed to ensure real and sustainable improvements – investing in community mobilization instead of hardware, and shifting the focus from toilet construction for individual households to the creation of “open defecation-free” villages. By raising awareness that as long as even a minority continues to defecate in the open everyone is at risk of disease, CLTS triggers the community’s desire for change, propels them into action and encourages innovation, mutual support and appropriate local solutions, thus leading to greater ownership and sustainability.

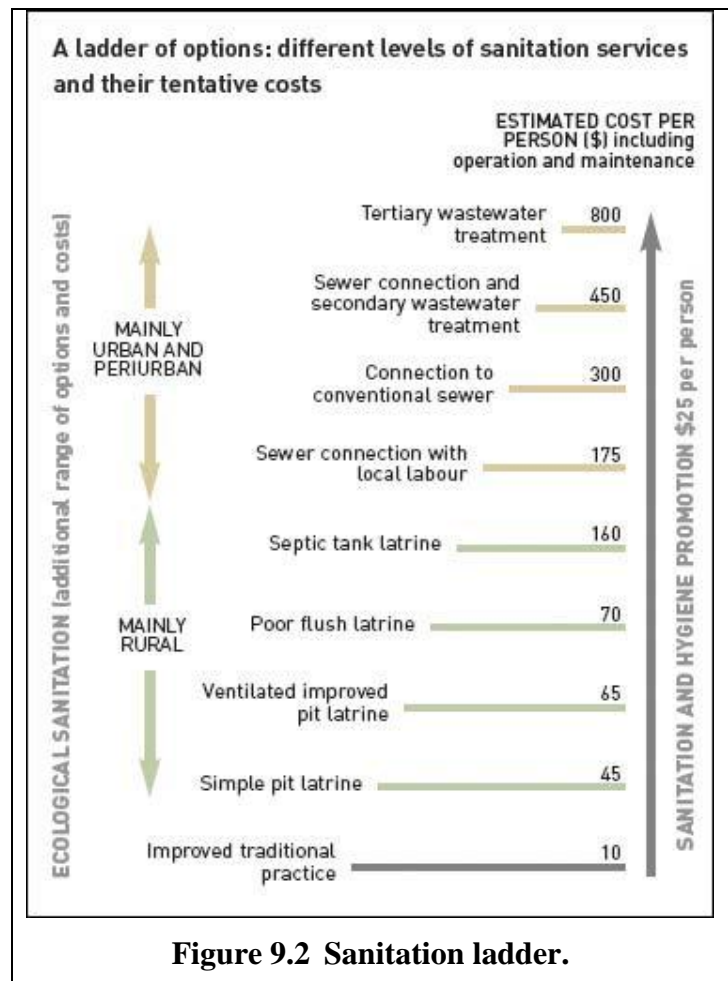
CLTS has had wide success, especially in rural communities where there is a strong feeling of community identity. It is very successful at triggering action to improve the environment but requires long term support to ensure it leads to sustainable sanitation delivery.

Sanitation ladder

200 hundred years ago in Europe, most families had very rudimentary toilets or, indeed, none at all. We now mostly have high quality facilities in comfortable surroundings. The important point is that we didn’t get here in a single step, we gradually improved our facilities and services and our wealth and expectations increased. We call this phenomenon ‘Incremental development’ and the same approach applies is poor communities today.

Sanitation improvement should not be seen as a single one, off event but a step on a continuum to service levels similar to what we experience today. We may be promoting basic solutions but they must be delivered in a way that allows for future development and growth.

This approach is called the ‘Sanitation Ladder’ (Figure 9.2) whereby individual families and communities can join the ladder at any point they wish and move up it as circumstances allow. Sometimes the improvements will be small and others major leaps will occur because of major changes in circumstances.



Marketing

Latrines are a commodity, like washing machines, televisions and motor cars. It follows therefore that they can be marketed in the same way. Promotion consists of creating a message that will persuade recipients to modify their attitudes or actions and considering the media through which that message will be sent. Both have an impact of demand. When applied to promoting changes in society beliefs or actions we call it 'Social Marketing'.

Messages that appeal to a consumer's personal feelings are popular. Applied to sanitation this means suggesting that a new toilet is a sign of prosperity, middle class or superiority can be very powerful. Also appeals to improved lifestyle such as a clean environment with less bad smell and fly problems work well.

The way the message is delivered is also important. By all means hold community meetings and talk to school children and social groups but many will be more impressed and persuaded by an advertisement on the radio, television or cinema.

Sanitation marketing is more suitable for longer term promotion of family latrines, it is unlikely to have a role in early stages emergency relief.

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8 Latrine operation and maintenance

Family latrines

Responsibility for the operation and maintenance of family latrines lies with the users. However some roles, especially around emptying, have an institutional component. Most on-site sanitation options will eventually require emptying and this can become a major issue, especially in urban areas. In rural areas, when a latrine becomes full, the most common approach is to abandon it and construct another one. If the latrine was expensive and it is considered better to empty it for re-use it is common to transfer the contents into a nearby hole in the ground and then cover them up. The process is usually done manually, which has significant health hazards but replacing it with a more organised and mechanical approach is unrealistic.

In urban areas emptying is a big issue. Lack of space for replacement latrines, poor access for vehicles, lack of suitable emptying equipment and long distances to sludge disposal points (where they exist) all make the process very difficult. In many cases the answer is to provide specialist emptying vehicles funded and managed by a central organisation (usually the local council) and paid for by a mixture of user fees and subsidy. Examples of successful systems are very rare.

Communal latrines

From the first decision to opt for communal over household or family-type toilets, consideration must be given to how they will be cleaned and maintained, and who will oversee this process. The cost of wages and consumable materials such as paper, water, soap and electricity must also be factored-in to the overall cost of the toilets. If not clear from the outset, the responsibility for the O&M of communal latrines can become a source of tension or resentment, resulting in a less hygienic and potentially hazardous environment for all.

Attendants

In the early stages of a new communal latrine it is probably appropriate to ensure the latrine has an attendant in place for the whole time the latrine is open. Not only will this ensure the latrine is kept clean and in good condition but it will add to the feeling of security for users. Depending on the level of use of the facility, the presence of an attendant could be reduced to no less than once a day to thoroughly clean the floors, pans or slabs, and to ensure a hygienic environment through the maintenance of suitable hand-washing facilities and adequate provision of anal cleansing materials and soap.

Communal latrines tend to be heavily used and need constant maintenance. Issues to be attended to are items such as locks on cubicle doors and lighting for use at night. If covering of excreta is required, this needs to be overseen, and it may be necessary to add ash to the pits, which can help reduce the smells. To carry out the above tasks, the attendant needs to be provided with suitable tools, materials and reliable protective clothing. Without this attention, communal latrines will rapidly become foul and unhealthy, and a breeding ground for disease.

This service may be most practically provided by a private contractor.

If the community is involved in the decision-making from the outset, they are also likely to have a preferred maintenance method. It is often suggested that all users pay a very small tariff to support the payment of the attendant, although this may not always be appropriate in times of emergency. In such cases it may be down to the implementing agency to provide funding. It may also be possible

to persuade the community to provide attendants on a voluntary basis but it is more difficult to manage volunteers than paid employees.

In the longer-term, a more sustainable system will need to be set in place, such as the use of private contractors who charge an entry fee or transfer of responsibility to the local council.

Supervision

It is important that latrine attendants are supervised. Cleaning attendants quickly become disinterested and unproductive if they feel they are not being supervised effectively. The key roles of a supervisor are:

- Check attendants are present during their shift
- Ensure they have sufficient cleaning materials to carry out their duties
- Check the attendants are carrying out their duties correctly and effectively
- Monitor sludge accumulation rates in collector tanks and notify management when they need emptying
- Check the building for damage, arrange for minor repairs to be carried out by the cleaner and notify management of the need for major repairs.
- Monitor the sludge collection process to ensure it is carried out correctly.
- Liaise with the local community to deal with any issues that may arise.

The number of latrines a supervisor can supervise depends on the size of the latrines and their distance apart. A typical number would be around 5 – 10 per supervisor.

Management

Any group of latrines must be managed to work effectively. The manager is responsible for ensuring that all the latrines in their care are functioning correctly and meeting the needs of the user communities. Their primary functions are:

- Raising funds to pay for the operation and maintenance programme
- Hiring and firing staff
- Monitoring operational costs.
- Supervising the supervisors
- Liaising with the user community to ensure latrines meet their needs.
- Planning for future developments.
- Reporting to senior management on progress and key issues
- Organising the collection and disposal of sludge
- Liaising with partner organisations and regulating institutions (such as local government)

In smaller programmes the role of manager and supervisor may be combined.

Fly control

Fly breeding can be a big problem, particularly in shallow pit latrines and communal latrines that are not kept clean. Fly breeding should be kept to a minimum because flies can cause eye infections and transmit diarrhoeal diseases. Flies have a life span of one to two months as adults, but can remain in the larval stage for long periods, especially in cold weather.

Preventative measures to eliminate or reduce breeding are the best long term solutions. This is achieved through good hygiene practices, safe disposal of excreta and proper drainage and garbage disposal. Keeping latrines clean and the safe storage of food will limit the spread of disease by flies.

Chemical insecticides can be used to kill flies, but they are not recommended for general use as they are expensive and can be toxic to humans and the environment. They should only be used as an emergency short term measure. Another option is to spray the pit and superstructure with small quantities of diesel. About 0.05 litres per latrine should be sufficient.

Controlling the development of fly larvae is another approach. This can be done by coating pit walls with a mixture of lime and salt, regularly covering faeces with soil or ash or adding a biological larvicide to the pit. The latter is more appropriate for family latrines, as the additive quickly becomes diluted or covered in heavily used communal latrines.

Sludge reduction

A number of chemicals have been developed that are claimed to reduce the volume of sludge in pit latrines and septic tanks. Field trials have produced very mixed results, with reductions varying between 5% and 50%. There is very little experience of their use in emergencies, but current evidence suggests that the high sludge accumulation rate experienced in such situations prevents the chemicals from working effectively. The chemicals are also expensive and appear to only work when the sludge is regularly stirred to dissipate the additive.

When a latrine is full

If short-term options are used during the immediate phase of an emergency, the chances are that pits will become filled rapidly, and will need either emptying or covering and replacing.

Covering a pit

A pit latrine should be considered full when the contents are 0.5 m from the top. This area needs to be backfilled with soil, to safely cover the contents and stabilise the ground. Pathogens in the excreta can still be harmful for up to two years, and so it is important that they are securely contained. A new pit should be constructed far enough away from the covered pit that there is no danger of collapse between the holes, and planned so that the route to the new pit is not across the old one.

Emptying a pit

This subject was covered in Unit 8

Decommissioning latrines

It is likely (and indeed expected) that many of the latrines constructed in the early stages of an emergency will be taken out of use, either because they are replaced by longer term solutions, or the affected community leave the area. In general, the organisation that was responsible for building the latrines should take responsibility for their decommissioning. The following table lists some of the key issues to consider.

Issues to consider when decommissioning a latrine

1	<p>If the pit contents are to be left in the pit, aim to decommission in the dry season when the pit contents have dried out.</p> <p>If the pit contents are to be removed, decommissioning in the wet season may be easier because the contents are more liquid.</p>
2	Train staff and provide full protective clothing before starting work.
3	Disinfect the superstructure prior to dismantling.
4	Dig a leach pit next to the pit, to collect supernatant liquor as the pit is back filled.
5	Debris from the superstructure can normally be put in the pit, provided it is broken into small components to prevent the production of large voids in the pit.
6	The top 0.5 to 1.0 metres of the pit should be filled with soil and rubble which should be mounded up above ground level to accommodate settlement of the pit contents.
7	Consider capping the pit with a concrete slab in populated areas for safety.
8	Consider planting vegetation (trees or bushes) above the pit for safety and to make use of the organic matter in the pit.
9	Fence off the area for safety and to prevent disturbance (such as by dogs and rats).
10	Collect and re-package prefabricated components for re-use.
11	Arrange with local councils for the recycling or proper disposal of remaining materials.

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9 Managing emergency sanitation projects

Introduction

This presentation describes the key elements of the planning and management of an emergency sanitation programme. Implementing a program in a development context would be broadly similar but would be spread over a much longer period and involve more involvement from the community and other key stakeholders.

Stages of programme planning

The key to good decision-making is a proper assessment and the approach recommended is illustrated in Figure 11.1 This assessment need not be too lengthy (approx. 0.5 days/10,000 pop), but it is essential that all relevant information is collected and recorded. This minimizes the likelihood of inappropriate actions and wasted time and resources.

Rapid assessment and priority setting

This stage is designed to gather key relevant information rapidly and analyse it quickly in order to decide the level and type of intervention necessary. It may not always be possible to gather the most reliable information, so make sure you have received similar information from more than one source.

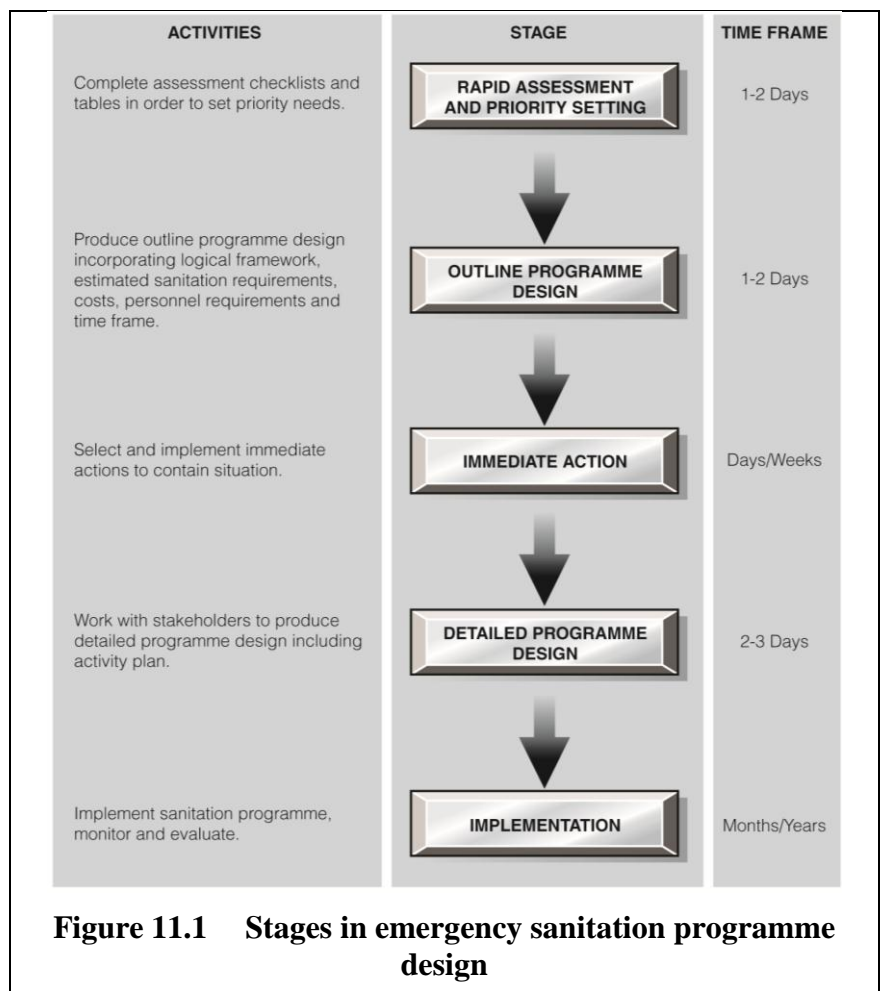
Outline programme design

In this stage an outline design for intervention is produced. This is intended for submission to senior staff or donors for initial approval and release of funds.

Immediate action

Should there be an immediate danger to health then actions may have to be taken before programme approval is given. These actions should be aimed at dealing with the short term problem and minimizing the spread of excreta-related disease without interfering with the longer term plan.

This task is absent in a non-emergency setting as a rapid response is not required.



Detailed programme design

Once the outline design has been approved, a stage of more detailed data collection, analysis and consultation should occur. This should adopt a more consultative and participatory approach involving all affected groups in the decision making process.

Implementation

The implementation of the longer term emergency sanitation programme can now be conducted. This should include management and implementation of construction, hygiene promotion, operation and maintenance activities, contingency planning, and monitoring and evaluation.

Assessment

An assessment identifies the key problems or issues related to sanitation, and the needs arising from those problems. It is common to use a check list such as the one shown in Table 11.1 to make sure the correct data is collected. Once identified, these needs can be prioritized. This process is summarized in Figure 11.2.

Community participation

In the first hours or days of an emergency, the affected population may be too traumatized to participate. After this however, they will rapidly come to terms with their situation, and involving them in the decision-making and the construction of facilities is a positive move that will empower them, and encourage self-reliance. Involving the community can contribute to the restoration of dignity and hope, and will reduce the dependency syndrome. Consultation about preferences will also result in a greater take-up and use of facilities and hygiene messages, helping to reduce the spread of sanitation-related diseases.

Community participation is essential in non-emergency situations, especially where household latrines are being promoted.

Health statistics

The need for intervention should not be assumed by aid agencies, but is commonly assessed by disease rates and/or death rates. Critical statistics are shown in Table 11.2. Essentially, a CMR (crude mortality rate) greater than 1 constitutes an emergency situation where immediate intervention is recommended.

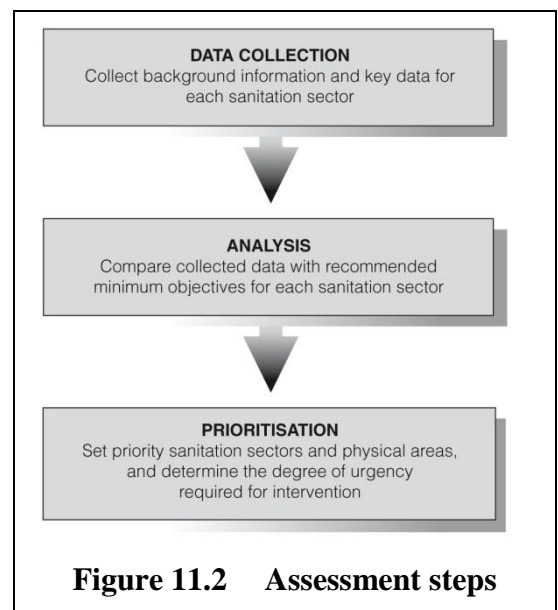


Table 11.1 Twenty questions for rapid assessment

1. What is the estimated population and what is the population density?
2. What is the crude mortality rate (number of deaths per 10,000 people per day) and what are the main causes of mortality and morbidity?
3. What are the current beliefs and traditions concerning excreta disposal especially regarding women and children's excreta? (Do men and women or all family members share latrines, can women be seen walking to a latrine, do children use potties, is children's excreta thought to be safe?)
4. What material/water is used for anal cleansing? Is it available?
5. Is soap available?
6. Are there any existing facilities? If so are they useable and used, are they sufficient and are they operating successfully? Can they be extended or adapted? Do all groups have equal access to these facilities?
7. Are the current defecation practices a threat to health? If so, how?
8. What is the current level of awareness of public health risks?
9. Are there any public health promotion activities taking place? Who is involved in these activities?
10. What health promotion media are available/accessible to the affected population?
11. Are men, women and children prepared to use defecation fields, communal latrines or family latrines? What about disabled people and those who are elderly, are they able to use these facilities?
12. Is there sufficient space for defecation fields, pit latrines etc.?
13. What is the topography and drainage pattern of the area?
14. What is the depth and permeability of the soil, and can it be dug easily by hand?
15. What is the level of the groundwater table?
16. What local materials are available for constructing latrines?
17. Are there any people familiar with the construction of latrines?
18. How do women deal with menstruation? Are there materials or facilities they need for this?
19. When does the seasonal rainfall occur?
20. Whose role is it normally to construct, pay for, maintain and clean a latrine (men, women or both)?

Should you get involved?

External agencies should not interfere unless specifically invited to do so, and then only if it is safe to intervene. You have to decide if you are the right organisation to take on the task. Most organisations have specific skill areas and if yours doesn't match the specific problem it is probably best to leave it to others that do.

Analysis

By comparing the current situation (from your assessment) with minimum standards you can decide what needs to be done and where your priorities lie. Generally minimum standards for emergency intervention are guided by Sphere.

Table 11.2 Health indicators for emergency intervention

Crude mortality rates in emergencies		Indicative acceptable incidence rates in camps for displaced persons or refugees	
Crude mortality rate (CMR) - Deaths/10,000/day	Severity of emergency	Disease	Incidence rate (in cases/10,000/week)
Up to 0.5	‘Normal’ or non-emergency rate	Diarrhoeal diseases total	60
< 1	Stable and under control	Acute watery diarrhoea	50
1 - 2	Very serious situation	Bloody diarrhoea	20
2 - 5	Emergency / Out of control	Cholera	Every suspected case must be acted upon
> 5	Catastrophic		

Minimum standards and guidelines (Sphere)

Sphere (which is a title to reflect its worldwide application, not an acronym) aims to introduce considerations of quality and accountability to humanitarian responses. Its philosophy is based on two core beliefs:

- those affected by disaster or conflict have a right to life and dignity and, therefore a right to assistance; and
- all possible steps should be taken to alleviate human suffering arising out of disaster or conflict.

Sphere articulates these beliefs through a Humanitarian Charter and Core and Minimum Standards. These are published in a handbook whose latest edition was published in 2011 can be accessed from the internet at www.sphereproject.org.

The standards describe what people should have as a minimum for their health and dignity whilst providing a level of accountability for those supporting them. Emergency situations vary greatly and these objectives should always be viewed in the broader context of local conditions and adapted accordingly.

Minimum Standards format

All the standards follow the same format:

- **Introduction** – sets out the major relevant issues
- **The standard** – a general and universal statement, qualitative in nature, specifies the minimum levels of attainment in humanitarian response. They are applicable in any disaster situation.
- **Key actions** – practical actions *suggested* to attain the standard. Not all key actions may be applicable in all contexts.
- **Key indicators** – serve as signals that show whether a standard has been attained. They provide a way of measuring the results of key actions but relate to the minimum standard, not the key action.

- **Guidance notes** – context specific points to consider when aiming at reaching key actions and indicators. They provide advice on practical difficulties, benchmarks, priority setting and cross-cutting themes. They do not provide guidance on how to implement activities.
- **Appendices, references and further reading** – provides additional information to support implementation and sources of further information.

Now look at the minimum standards for sanitation in your copy of the document.

Implementation and management

After the planning and design, the actual work or implementation of the programme can begin. In reality however, work may already have begun on many aspects of the activity plan. When managing the overall implementation of a programme, there are key issues that need to be regularly monitored to ensure that the activities can continue as planned. This is often a matter of **logistics**, or “getting the right thing to the right place at the right time”. It is also about the proper management of staff and resources, ensuring there is sufficient funding to cover the cost of the programme, and that the work keeps to the agreed financial budget.

Implementation by milestones

This is an effective management technique that breaks down the work into manageable chunks that can be assigned to individual staff members with a relatively short time frame. Each chunk can have a milestone table developed for it. This can be reviewed on a daily basis to assess progress and re-evaluate as necessary. An example is shown in Table 11.3.

Delays in procurement are inevitable, and should be factored into the activity plan. This is called **contingency planning**, or preparing for rapid changes in the current conditions. Contingency planning reviews the assumptions you have made in your design, and asks ‘what if?’ an alternative scenario develops.

Key management tasks

Other key management tasks are as follows:

- Human resources
- Material resources
- Health and safety
- Finances

Table 11.3 Example hygiene promotion milestones for a refugee camp

Selected milestones	Who	When	Current status and comments
One hygiene promoter per eight hundred people and one supervisor recruited from refugee population	MSF health and sanitation staff	26/03	Recruitment process successfully completed on time(target achieved)
All hygiene promoters trained and able to demonstrate good understanding of key issues involved	MSF health and sanitation staff	09/04	Training limited so far but on-going (amended date: 11/06)
All section leaders to have shovel, pick and hoe, and five buckets per street	MSF logistics and hygiene promotion team	16/04	Delays due to logistical procedures – awaiting approval (amended date: 04/06)
All households visited by hygiene promoters to promote good hygiene practice and family garbage pits, and to explain family latrine option and give technical advice	Hygiene promotion team	07/05	Approximately 75% of households visited so far (amended date: 15/06)
All school classes to have received basic hygiene education	Hygiene promotion team and teachers	07/05	Only 50% of school classes so far due to difficulties in co-ordination with teachers (amended date: 04/06)
All schools to have handwashing facilities	Hygiene promotion and water supply teams	14/05	No action has been undertaken due to delays by water team (amended date: 18/06)
All latrines to be maintained and kept clean	Hygiene promotion team and community	28/05	All domestic latrines well-maintained and cleaned by community
All households to have access to appropriate communal or family waste pit	Hygiene promotion team and community	28/05	Approximately 75% of households have access (amended date: 11/06)

Monitoring

Despite the emergency nature of the situation, continuous monitoring and regular evaluation should still take place to ensure that the programme is proceeding as intended, and maximizing its resources. In a situation that is evolving rapidly it is well worth regularly revisiting the initial programme plans, to analyse the progress and to assess how it may be adjusted or improved. Regular review can also remind staff of what they are doing, and why they are doing it, and to learn from mistakes, improving performance.

Monitoring is the systematic and continuous collecting and analysing of information about the progress of a piece of work over time. Ideally, monitoring should be carried out by the programme staff as part of their routine work, and should be built into the programme from the outset. Monitoring indicators that are easily measured will have been identified in the implementation plan. Simple examples would be: mortality rates

- number of toilets provided
- Money spent
- Number of users per day

Other less directly measurable aims, such as the uptake of hygiene messages or levels of participation can be monitored through **proxy** indicators such as the number of people, (particularly women or other marginalized groups), attending meetings. Indicators are likely to be very specific and hardware-based (i.e. numbers of latrines) in the early stages of an emergency.

Evaluation

Evaluation is the process of comparing actual programme outcomes with those intended. For this reason, it is usually performed at the end of a programme, often by outside experts who are not closely involved with the implementation, allowing them a fresh perspective. On a longer term programme, a funding agency may request an interim evaluation or mid-term review, assessing progress towards these outcomes.

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June 2012

ANNEX A