

4.

1st Phase Technical Options

This chapter presents a range of technical options for 1st phase emergency implementation. It should be used to identify possible solutions for a specific situation. The final choice of option should be decided upon only after CONSULTATION with the intended users.

4.1 Immediate action

Once the outline programme design or rough action plan has been produced, immediate actions should be implemented to stabilize the current situation and prevent rapid deterioration as a result of disease transmission. A range of technical options for immediate action in the 1st phase of an emergency are presented in this chapter.

The priority for 1st Phase options is, undoubtedly, speed of implementation. It is essential that technologies to contain excreta can be installed rapidly. Options may have limited socio-cultural acceptability due to the need for speed but, wherever possible, members of the affected community should be consulted regarding the distribution and type of facilities to be implemented. Efforts should be made to separate facilities by sex and to address any major cultural practices or beliefs relating to excreta disposal. If this is not done there is a real danger that facilities will not be used at all.

Selected options are likely to have limited sustainability, since they are designed for use in the immediate emergency phase only. It is important, however, that likely, future excreta disposal options are considered at this

stage to ensure that immediate measures do not have a detrimental effect on longer-term solutions.

4.2 Managing open defecation

In the initial stages of an emergency, areas where people can defecate, rather than where they cannot, should be provided immediately. If there is insufficient time to construct appropriate facilities this may mean, in extreme circumstances, the setting up of open defecation areas. These should be located where excreta cannot contaminate the food chain or water sources.

Where there is a large and rapid influx of people into an area one of the immediate steps that must be taken is to prevent indiscriminate defecation (see Box 4.1). It is also likely that it will be necessary to instigate a clean-up operation where workers with wheelbarrows and lime are employed to clean the area of faeces. This must, however, be accompanied by the provision of areas where people are allowed to defecate and must be actively enforced with appropriate hygiene messages.

Box 4.1.

Preventing indiscriminate open defecation

In Tanzania during the 1994 Rwandan refugee crisis one approach adopted in the immediate emergency phase was to employ sanitation workers whose primary task was to forcibly prevent people defecating in certain areas around the refugee camp – and to direct them to alternative areas or facilities. This was especially important on the lakeside of the camp to prevent faecal contamination entering the lake which was the main water source, and was accompanied by a clean-up operation and the provision of open defecation areas.

Such an approach had to be managed carefully to avoid conflict within the affected population and was accompanied by appropriate hygiene promotion, highlighting the need to prevent water contamination at the earliest possible stage.

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In some emergency situations it may be perfectly acceptable for the affected population to practice open defecation. Indeed, in some cultures defecating in the open is preferred to using a latrine. Where people are accustomed to open defecation it may be appropriate to continue this, providing there is adequate space and vegetation to allow people to find an appropriate defecation space so that the risk of disease transmission is minimized. People should, however, be encouraged to use the 'cat' method whereby a shallow indent is made and faeces are covered with soil.

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

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 also possible to use internal partitions to provide more privacy and encourage greater use.

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.

Advantages: Rapid to implement; minimal resources required; minimizes indiscriminate open defecation.

Constraints: Lack of privacy for users; considerable space required; difficult to manage; considerable potential for cross-contamination of users; better suited to hot, dry climates.

In extreme situations it may be necessary to make temporary open defecation fields by just marking off areas with tape. However, this is rarely necessary and the lack of privacy may make them ineffective. It is nearly always possible to at least surround an area in plastic sheeting or fabric and dig a few shallow trenches.

Whilst simple in concept and construction, the operation of defecation fields requires careful control to ensure they are used as intended to keep health risks to a minimum. Attendants will need to be recruited and provided with training to encourage effective use of the trenches and to encourage handwashing following use. A network of public health promoters will also be needed to sensitize the population on the importance of using the fields. It is rare that these fields will be used by everyone, as privacy will be a major issue and, therefore, they should only be instigated if the risks are significant and if there is no other rapidly implemented alternative.

Location of defecation fields

The location of the field must be discussed with the population. The field should be at least 30 metres from dwellings but located as centrally as possible to the people who are going to use them (within 100 metres of shelters if possible). They should be on land sloping away from the camp and surface water sources, the field should be surrounded by a drain so that surface water cannot enter and to prevent any runoff from the field contaminating other areas. Whilst an open field is easier to manage, the affected population may prefer a site with trees, and bushes to provide privacy. Consideration should be given to the direction of prevailing winds, to reduce the nuisance caused by odour. Areas subject to flooding or containing running water should be avoided. The soil should be easy to dig so that faeces can be buried. The defecation field should be provided with adequate surface drains to prevent surface water running across them from above – and to collect and contain any seepage of liquid effluent.

Operation of defecation fields

Users need to be encouraged to use the strips furthest away from the entrance; to cover their own excreta with earth; and to wash their hands afterwards. To ensure the sanitary use of the field:

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- provide full-time supervision in the form of paid attendants;
- provide anal-cleansing materials and methods for their safe disposal; and
- provide handwashing facilities.

Each field should have at least two people present at all times to guide the individual to the right area and ensure that other areas of the field are not used. Marking tape and paint can be used to mark out the zones, make signs to direct people to the correct area for defecation and post other simple messages on any suitable board or surface. A 200l plastic barrel with fitted tap can be situated at the entrance of the area for handwashing. Soap or ash should also be provided for effective handwashing. If neither is available, the barrel can be filled with a 0.05% chlorine solution. A 0.05% solution is made by adding half a tablespoon (7.5g) of High Test Hypochlorite HTH (70% active chlorine) granules, or 15g of bleaching powder (approx. 35% active chlorine), to 10l of water. It may be necessary to provide extra handwashing facilities depending on the numbers of people using the field. (See Chapter 8 for details of handwashing options.) All excreta should be covered with soil as soon as possible to prevent the breeding of flies and reduce odours. If the users do not cover their faeces then the attendants should.

Where water is used for anal-cleansing, a container of water should be supplied at the entrance to the field, together with small pots for individual use. This can be managed by the attendants along with the handwashing facilities. Where solids are used, the appropriate material may also need to be provided along with receptacles to collect soiled material. These materials should then be buried or burned and not deposited where they will create a health hazard.

4.3 Shallow trench latrines

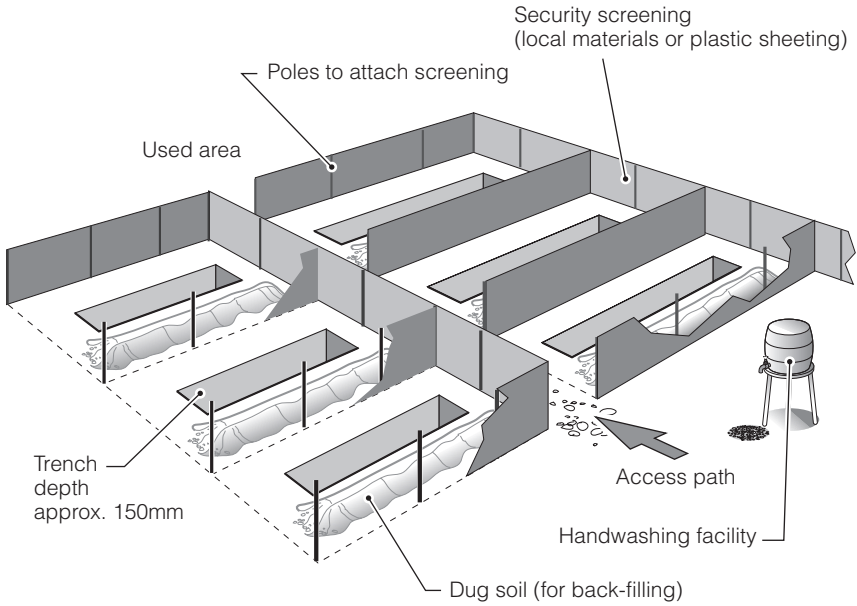
A simple improvement on open defecation fields is to provide shallow trenches in which people can defecate. This allows users to cover faeces and improves the overall hygiene and convenience of an open defecation system. Trenches need only be 200-300mm wide and 150mm deep, and shovels may be provided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

Divide the field into strips 1.5m wide with access paths. Use strips furthest from the entrance first. When a section of trench has its bottom layer fully covered with excreta it is filled in. 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. It may be appropriate to have a number of trenches open at the same time. A rule of thumb is to allow 0.25m² of land per person per day. This means 2,500m² per 10,000 people per day, or nearly two hectares per week. Men's and women's areas should always be separated.

Where possible make the plastic sheeting or bamboo-mat walls higher than a standing person to ensure complete privacy.

Advantages: Rapid to implement (one worker can dig 50m of trench per day); faeces can be covered easily with soil.

Constraints: Limited privacy; short life-span; considerable space required.



Superstructure

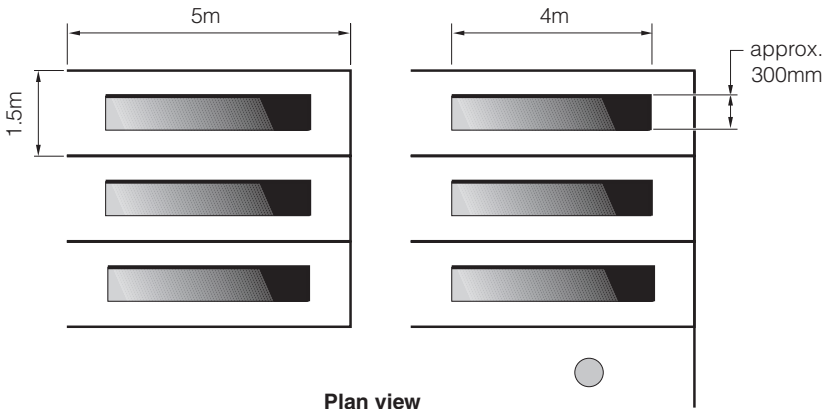


Figure 4.1. Shallow trench latrines

4.4 Deep trench latrines

Deep trench latrines are often constructed in the immediate stage of an emergency and will be appropriate if there are sufficient tools, materials and human resources available. These involve the siting of several cubicles above a single trench which is used to collect the excreta. However, care should be taken not to provide too many latrines side by side. The recommended **maximum** length of trench is 6m, providing **six cubicles**.

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. There are a number of different pit-lining materials that can be used including concrete, bricks, blocks, sandbags, and timber (see Section 7.3).

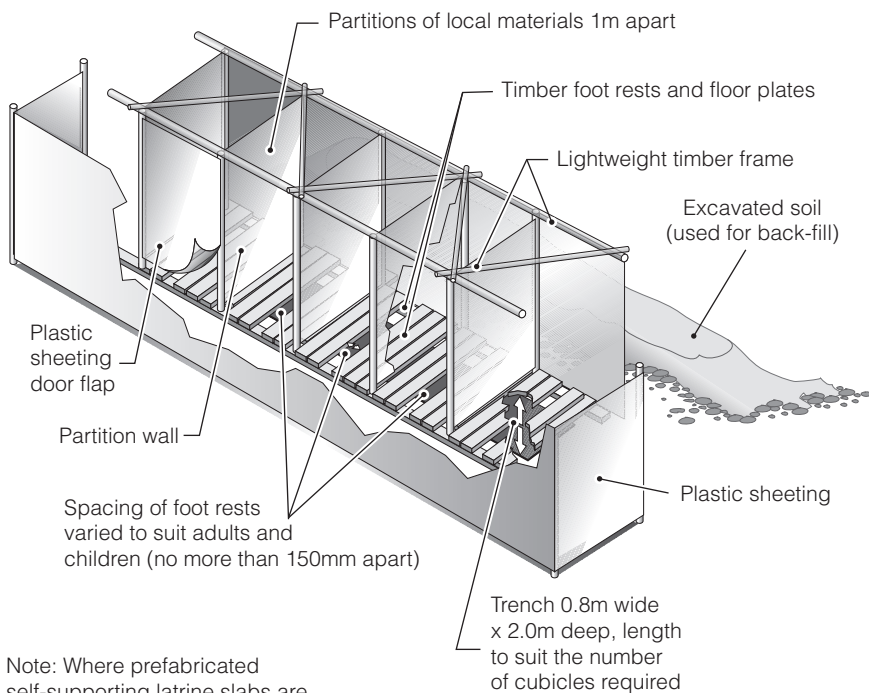
After the trench has been dug, the quickest option is to put self-supporting plastic slabs straight over the trench. If slabs are not available, then wooden planks can be secured across the trench until proper wooden or concrete slabs can be made (see Section 7.4). The trench should be covered with planks leaving out every third or fourth plank, which is where people defecate. Planks should overlap each side of the trench by **at least 15cm**. Ideally, all designs should be discussed with the community beforehand – and should take into account the safety of women and children and elderly or disabled people.

The latrine superstructure can be made from local materials, such as grass matting, cloth or wood, or plastic sheeting (though this often makes the interior very hot). The emphasis should be on using materials which are readily available and that can be applied rapidly. Some agencies have rapid-response kits for slabs and superstructures which can be used where there are few resources locally. Section 7.6 contains information on superstructure options.

Advantages: Cheap; quick to construct; no water needed for operation; easily understood.

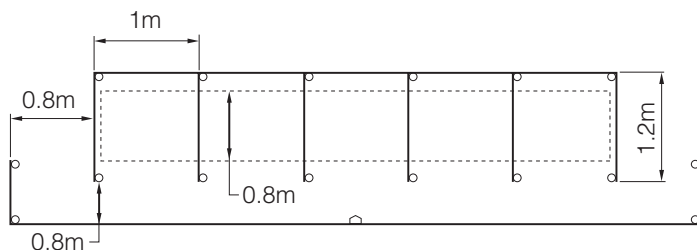
Constraints: Unsuitable where water-table is high, soil is too unstable to dig or ground is very rocky; often odour problems; cleaning and maintenance of communal trench latrines are often poorly carried out by users.

See **Appendix 4.1** for a bill of quantities for a deep trench latrine.



Note: Where prefabricated self-supporting latrine slabs are to be used in place of timber cubicle sizes may need to be adjusted to fit slab width (e.g. 0.8m)

Superstructure



Plan view

Figure 4.2. Deep trench latrines

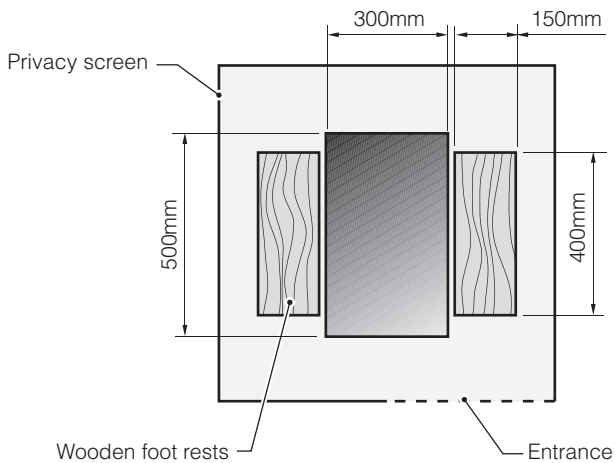
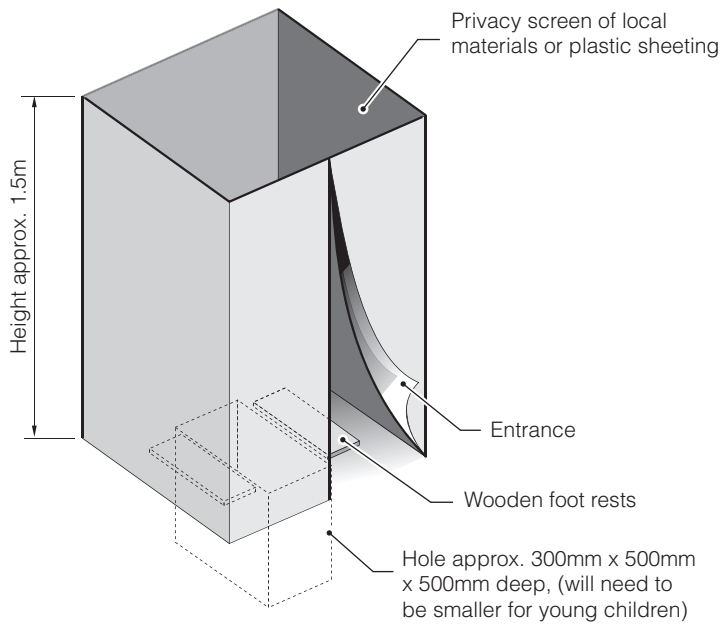
4.5 Shallow family latrines

In some emergency situations it may be more appropriate to provide shallow family (rather than trench) latrines. This is 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. This latrine should be 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.

Conventional family pit latrines will be the preferred option in most cases (see Section 5.1) but, where time and environmental conditions do not allow this, shallow family latrines provide an immediate short-term option.

Advantages: Increased privacy; rapid to implement; reduced labour input from agency; allow people to actively participate in finding an appropriate solution.

Constraints: Community must be willing and able to construct family latrines; difficult to manage siting and back-filling of pits; large quantity of tools and materials required.



Plan view of latrine

Figure 4.3. Shallow family latrines

4.6 Bucket latrines

In situations where there is limited space it may be appropriate to provide buckets or containers in which people can defecate. These should have tight-fitting lids and should be emptied at least once a day. Disinfectant may be added to reduce contamination risks and odour. Containers can be emptied into a sewerage system, a landfill site or waste-stabilization ponds. This measure will only be appropriate where there are no other immediate action options and users find the method acceptable; it is, therefore, not used in most situations.

Advantages: Defecation containers can be easily procured and transported; once containers are provided only the final disposal system need be constructed; can be used in flooded areas or where the water-table is very high.

Constraints: Many people find the method unacceptable; large quantities of containers and disinfectant are required; extensive education regarding final disposal is required; disposal site must be fairly close to homes to minimize transportation needs; containers may be used for alternative purposes.

4.7 Packet latrines

In some emergency situations relief agencies have provided disposable packet latrines. These are plastic packets (similar in appearance to a plastic bag) in which the user can defecate; the packets contain a blend of enzymes which assists the breakdown of the excreta, and must be disposed of in a safe place. There are various commercial options available containing different chemicals to absorb liquids, aid organic decay and neutralize odours. These are sometimes referred to as 'flying' latrines since the packets can be thrown into a disposal pit or container. Effective management of a system using packet latrines is crucial, and requires ongoing monitoring and appropriate hygiene promotion. Appropriate disposal sites must be developed immediately and an active campaign initiated to inform community members. Basic consultation with the community is necessary before implementing such a system.

Advantages: Lightweight and easy to transport; may be used where space is severely limited or in flooded areas.

Constraints: Method may not be acceptable to affected population; final disposal site must be clearly marked, accessible and used.

4.8 Chemical toilets

Chemical toilets (known as 'porta-loos') are portable sanitation units that consist of a sit-down toilet (e.g. in South America) or a squatting pan (e.g. in South Asia) placed above a water-tight excreta-holding tank, which usually contains a chemical solution to aid digestion and reduce odour. This is contained in a single prefabricated plastic unit with a lockable door. They range in quality from very basic units to luxury units which come complete with warm-water handwashing facilities.

Chemical toilets have been adopted as temporary solutions where pit latrines or septic-tanks are unsuitable or unacceptable. The initial charge of chemical is adequate for 40 to 160 uses, depending upon the model. Floors are typically made from non-absorbent material, and the finish is easily cleanable. There is often a means of ventilation through a screened pipe which extends above the roofline.

There are several considerations that should be taken into account when implementing this solution. The siting of the toilets is important as they must be serviced and desludged regularly to prevent overflow. This means that the toilets must be located in an area that can be accessible to a big truck. However, another important consideration is that because of their strong smell, especially when they are being cleaned, it may not be preferable to locate them close to public thoroughfares or close to areas where people are living. The toilets must also be positioned on a very flat surface to avoid them tipping over. An example of their application is described in Box 4.2.

Advantages: Portable; hygienic; minimized odour; can be mobilized rapidly.

Constraints: High cost; difficult to transport; unsustainable; regular servicing and emptying required; uncommon outside Europe, North America and parts of Latin America.

Box 4.2.

**Chemical toilets deployed in flood response
in the Dominican Republic**

The use of chemical toilets was chosen as the first-phase excreta disposal option in flood response in the Dominican Republic in 2003, as they were mobile and could be quickly deployed once local suppliers were identified. The toilets arrived approximately two days after people arrived in the shelters and supplemented latrines already at these sites. Chemical toilets at displaced centres were a rapid and effective solution, as was the initial period of installation in the communities where all latrines were either flooded or destroyed.

In this case, two types of chemical toilets were used – one which had a separate urinal for men and one with a box seat. In these particular toilets, prior to use the excreta-holding tank is charged with a mixture of water (between 30 and 100 litres) and chemical concentrate. The chemical is a solution of sodium



hydroxide or another approved chemical. Its purpose is to disinfect, to neutralize offensive odours and to convert waste into sludge that can be deposited into a sewer without any adverse effects.

The chemical toilets were cleaned every other day and were used for longer than originally planned because the second-phase intervention (the construction of twin-pit dry latrines) had taken longer to implement than originally planned.

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Lessons Learned: Various problems were encountered – a main disadvantage was that the use of the toilets ended up being a relatively expensive solution, especially when the use lasted longer than originally expected. Siting was also an issue as the latrines needed to be in a location that was accessible to the cleaning/desludging truck, such as near a roadway or thoroughfare.

Hygiene promotion issues included providing an adequate amount of toilet paper for all people, in order to maintain hygienic conditions. Some people were afraid that using the toilet seats would transmit disease. Other problems were related to social aspects of communal toilet use, with families not wanting to share with other cultural groups (e.g. Haitian families) and with families wanting to move the toilets into their home for their own use.

In the future, provision for damage in the contract or insurance should be taken out to cover against unexpected accidents, such as the units being vandalized and burned down in Los Solares. Insurance against theft and vandalism should be discussed with the local supplier. Also, the agency should not have left the toilets in the communities for as long as it did. The slow removal was compounded by the slow start-up of the raised compost-latrine programme and, in some cases, people preferred the chemical toilets and didn't want them to be taken away. The community should have been involved from the onset of the implementation process and beneficiaries should have been informed of how long the toilets would be used for, and the staging/phasing of excreta disposal provision in the community.