

Simple pit latrines

Introduction

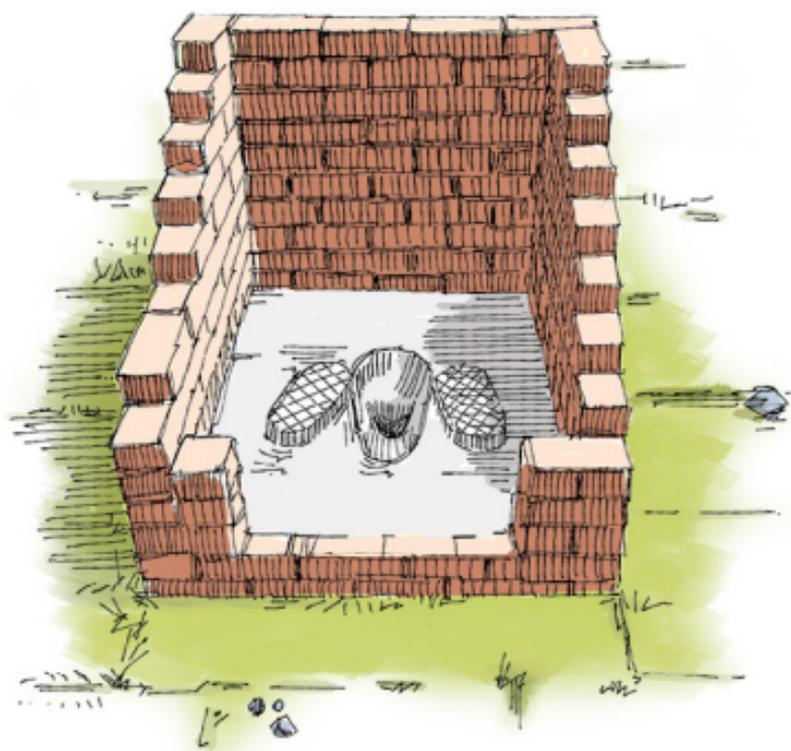
Pit latrines are one of the oldest forms of formal sanitation in the world and for many they are still the best. Pit latrines are simple to build and can be constructed using local materials and technologies.

Compared with other forms of sanitation they are relatively cheap, easy to operate and maintain and, if properly used, help prevent the spread of excreta-related diseases. means of excreta disposal.



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For most low-income communities in the developing world, the pit latrine in one form or another will be the most appropriate.

This mobile note describes how pit latrines work and the components of pit latrines. It also examines some of the main problems that can arise with this simple form of sanitation.

How do pit latrines work?

There are a number of different designs of pit latrine (sometimes called pit privies) but they all work in a similar way. Excreta, anal cleansing material and sometimes sullage and/or refuse fall into a hole in the ground where:

- faeces and other organic material decompose through bacterial action, fungal attack and consumption by other organisms. The decomposition process may take place in the presence of oxygen (aerobic) or

without oxygen (anaerobic). In most pits fresh excreta is initially decomposed aerobically but as it is covered by new layers of excreta conditions rapidly turn anaerobic;

- gases such as ammonia, methane, carbon dioxide and nitrogen are produced and released into the atmosphere where they either escape through the top of the pit or are absorbed into the surrounding soil;
- urine, other liquids and soluble material leach into the surrounding soil;
- pathogens (organisms that may cause disease) are destroyed because conditions in the pit are not suitable for their survival; and
- the residual material is compressed and compacted and slowly fills the pit.

Pit latrines ...

- can help keep people healthy as much as waterborne sewerage
- can be built by users
- use a minimum of imported materials
- can be easily maintained by users
- are low cost



Figure 1. Using a basic latrine

Simple pit latrines

The simple pit latrine is the most basic type which is essentially a large hole in the ground covered by a platform in which there is a hole through which the user excretes. The platform is surrounded by a screen to provide privacy and, shelter from the weather.

Components

The pit

The larger the pit, the longer it will take to fill up. The size of pits varies widely around the world. In some areas the pits are only a metre deep. These tend to fill very quickly and are usually only of a temporary nature. In other places the pit may be 10 to 15m deep and take a long time to fill. The plan size of the pit (the size looking down on the hole from above) also varies. Some are less than 0.5m wide whilst others are 2 to 3m wide. Typically pits are 2.5 to 4m deep and 1 to 1.5m wide.

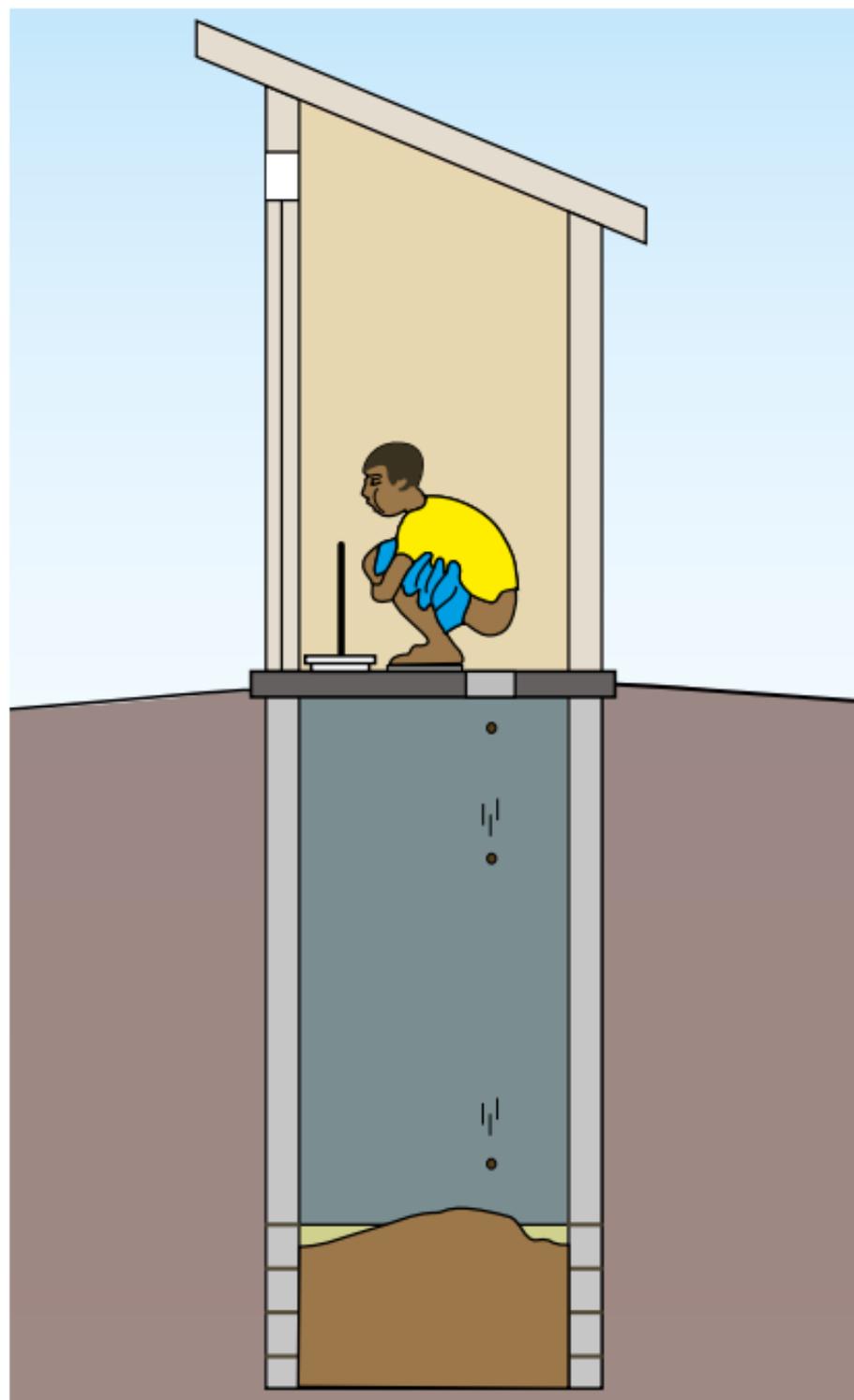


Figure 2. A simple pit latrine

There are a number of factors affecting the time taken to fill a pit. As a general rule, a pit 3m deep and 1.5m square will last a family of six about 15 years. A pit is considered full when the contents are within 0.5m of the surface. The shape of the pit is not too important. Normally they are rectangular, square or circular.

The lining

The sides of holes in the ground may collapse if not supported. Soils close to the surface are particularly vulnerable because they are much looser than deeper soils. In fact, one of the main causes of pit latrine failure is the collapse of the soil close to the surface causing the platform to fall into the pit.

It is important, therefore, that soils liable to collapse are supported by a lining. The top metre of a pit must always be lined, but the decision as to whether to line the rest will depend on local soil conditions.

The cover slab

A slab is necessary to cover the pit and to provide a place for the user to excrete. For the user, this is probably the most important part of the pit latrine and therefore great care should be taken over its design and construction. The slab is placed directly on top of the pit lining about 15cm above the surrounding ground level. It is elevated above the surrounding ground to prevent surface water from entering the pit.

If surface water entered the pit it could erode its walls and fill the pit with water. Should this happen, it would overflow, carrying the pit contents to surrounding areas.

The slab is commonly flat with a hole near the centre. The hole is provided with a lid for safety (to stop young children accidentally falling into the pit), to reduce odour and to help prevent flies from breeding in the pit. Flies and smell

tend to be more of a problem in shallow pits containing water than deep ones that are dry. If a household cannot afford a cover slab, a smaller, concrete sanitary platform (a SanPlat) can be used over a platform made from logs and compacted mud. This will offer some of the benefits of a concrete slab covering the entire hole.

Sometimes a seat (or pedestal) is provided.

The design of a simple reinforced concrete slab is a basic structural problem for an engineer, but when that slab forms a critical part of a latrine, the design criteria widen to include issues of economics, maintenance, sustainability, health, gender, culture, and user preference as well as construction factors.

Size, shape and surface finish need to be considered alongside strength.

Defecation is often a private activity and subject to cultural constraints. Being able to go to the toilet in a pleasant, private and clean location is valued by many societies and so the slab needs to meet the user's needs and preferences. It should be strong and offer a secure platform over the vault.

The strength of a slab can be tested by four people standing on it (see Figure 5). If it holds steady, it can be put in place.

People will want to be able to use the latrine without getting their feet wet or their clothes dirty, so the slab should be able to be cleaned easily.

People will want to be sure that the slab will not break or tip, causing them to fall into the vault. They should also be able to use the latrine without tripping or slipping. Discouraging snakes, spiders and scorpions is another health and safety issue.

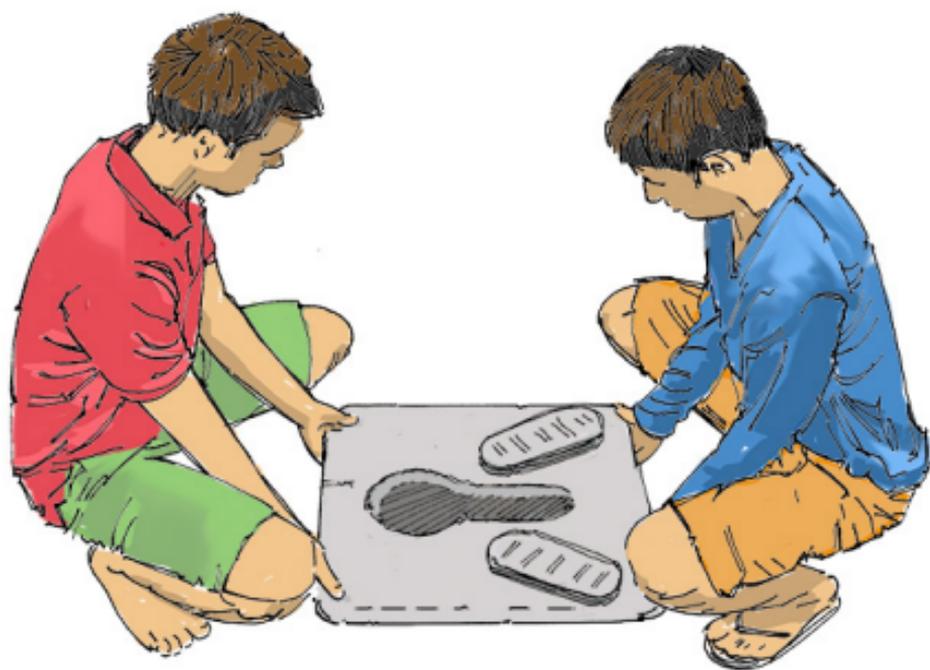


Figure 3. A SanPlat

The mound

The cover slab is surrounded by a mound of soil. This is to seal the space between the lining, the cover slab and the ground. It can also prevent any rainwater from the roof of the toilet building entering the pit.

The mound is usually made from the soil excavated from the pit.

The toilet building

The toilet building (or 'superstructure') is primarily constructed to provide privacy for the users. It could be made of bricks and mortar with a solid roof and a window or just a few pieces of cloth fastened to a few sticks of wood. In some communities buildings are not constructed at all. The design of the building can be adapted to suit the requirements of the user.

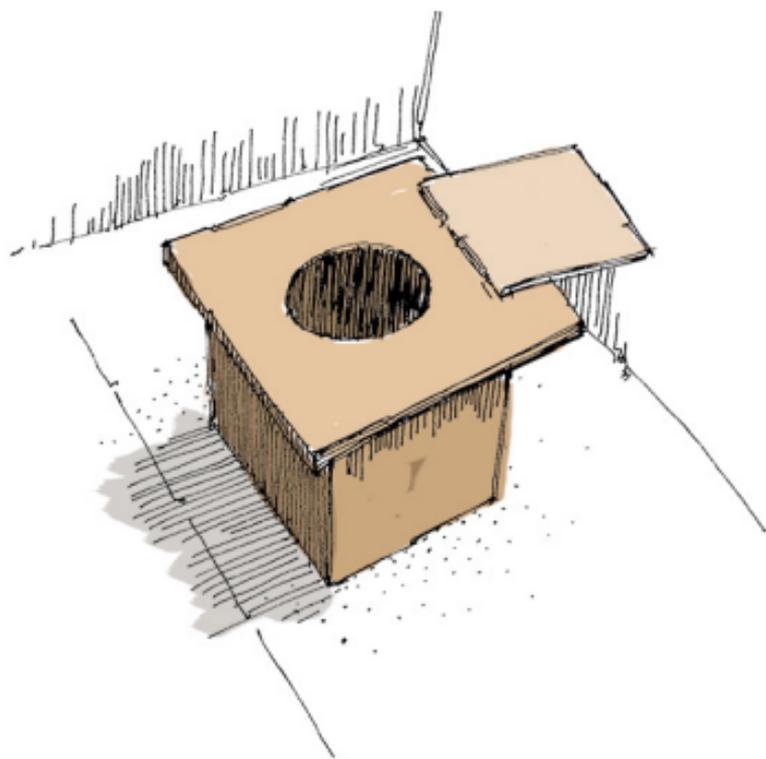


Figure 4. A simple wooden latrine seat

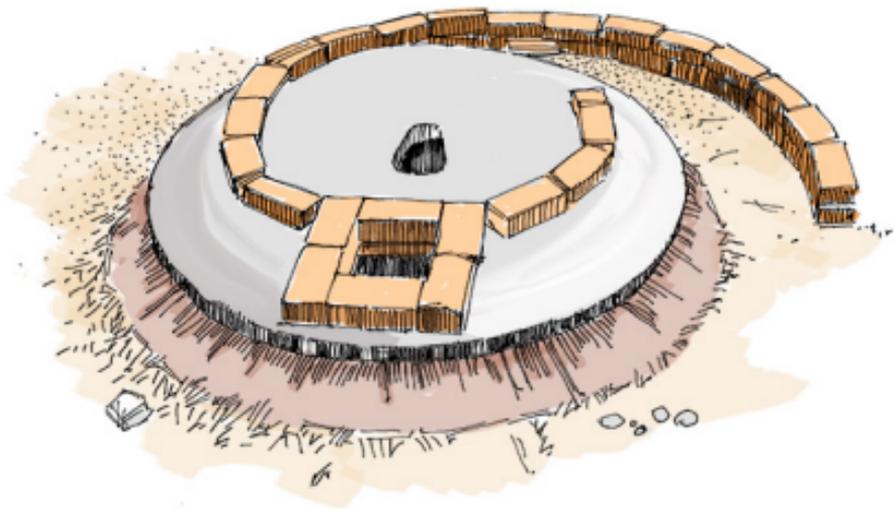


Figure 5. A latrine under construction

Problems with simple pit latrines

Pit latrines are still used widely around the world despite the fact that many politicians and engineers disapprove of them, preferring more expensive high technology options (such as sewers).

For many of the world's rural and urban poor they will remain the most appropriate sanitation option for many years to come. In some places, however, simple pits have a bad reputation due to:

- poor design and construction and inappropriate materials causing pits to collapse before they are full;
- bad odours;
- nuisance from flies and mosquitoes (and sometimes cockroaches);
- lack of privacy, especially for women, because simple pits have to be constructed away from the house;
- difficulty in digging large pits because of poor ground conditions; and
- difficulty with emptying pits once they are full.

Often these problems can be overcome with good design, construction and operation but sometimes they cannot.

For situations such as these and where the community no longer has the confidence to use simple pits, other solutions must be sought.



Figure 6. Four men test the strength of a latrine slab

Hole covers

Covers for the hole in the slab when the latrine is not in use helps to reduce odour and keeps flies away from the latrine.

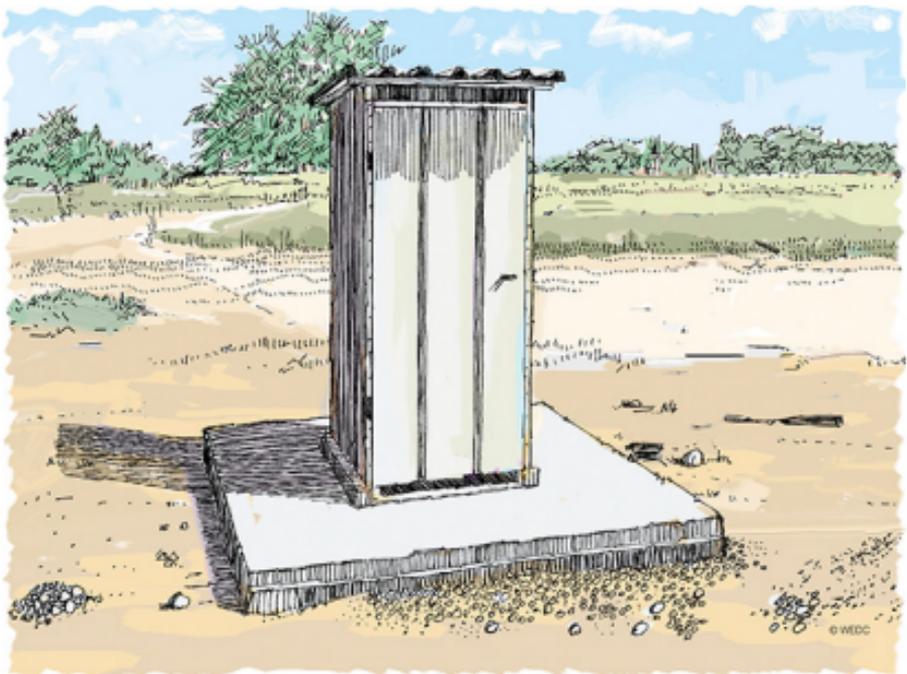


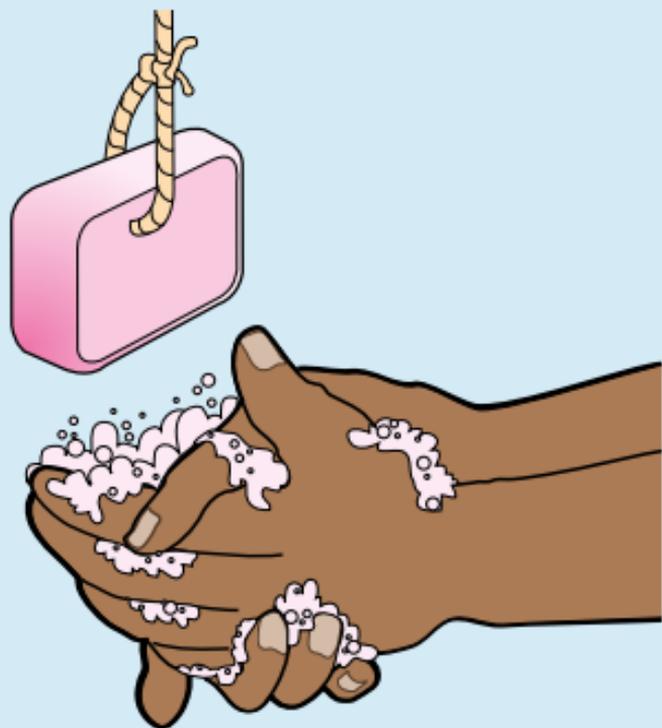
Figure 7. A simple pit latrine superstructure situated over a concrete slab

Cleanliness and health

Even a well-constructed latrine can spread disease unless it is kept clean.

The excreta of small children should be cleared up and put in a pit latrine until they can use the latrine properly themselves. Children's excreta are very infectious.

Everyone should wash their hands thoroughly with soap after using the latrine.



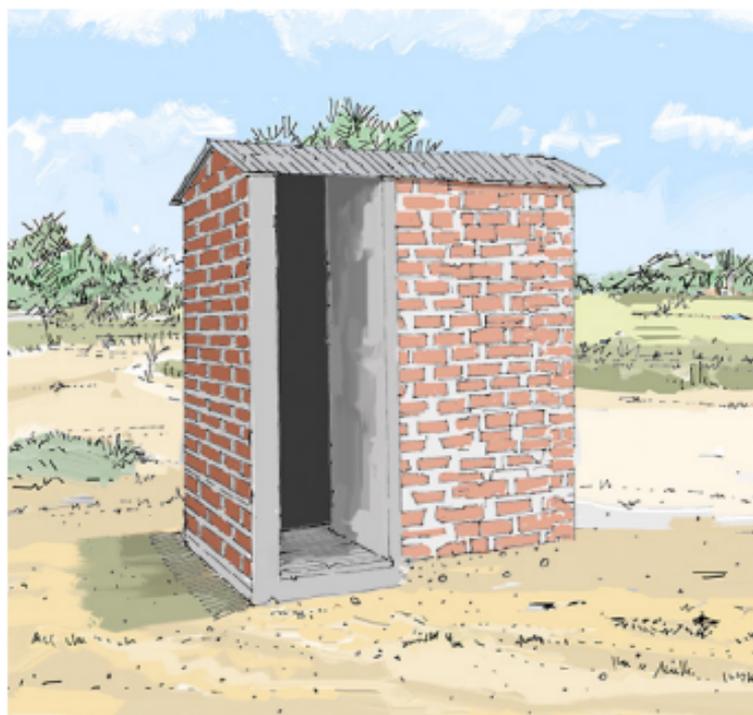


Figure 8. The superstructure can be constructed using a variety of materials



Figure 9. A circular concrete slab which can be rolled once cured is relatively easy to move from where it is constructed to its location over the pit.

Other types of pit latrines such as borehole latrines, pour-flush latrines and ventilated latrines are discussed in subsequent mobile notes.

This note is also available in print from <http://wedc.lu/wedc-guides>

About this note

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