6 SANITATION

SUMMARY:

- The vast majority of urban households have substandard and unsanitary facilities for disposal of human waste – so we need to provide hygienic and safe sanitation that offer privacy and are affordable to all.
- No one method is appropriate for all conditions – so we have to consider different methods for storage and disposal of waste.
- The pit latrine is cheap and effective (where ground conditions are suitable), and is the only realistic affordable on-plot option for most households.
- Communal facilities will serve households who do not have access to an on-plot facility. Some say that these are culturally unacceptable – but there is no alternative.
- The key to successful communal facilities is effective management:
  - by community-based organisation (CBOs)
  - by private operator
  - by local authority/water company
- It is important to focus on simple technologies that meet basic needs and are affordable. Planning high-tech systems means that the needs of the vast majority will not be met.
- Public education programmes that promote good sanitation practice must be implemented to go alongside the construction of facilities.

Introduction

6.1 This section discusses the safe and hygienic disposal of human waste - excreta and urine. Human waste is distinguished from other solid and liquid wastes which are disposed of by other means.

6.2 It is one of the four main elements that need to be addressed to promote the environmental health agenda

6.3 The term *sanitation* is sometimes used to include ***solid waste management*** – this is discussed separately.

➲ 4 – Environmental Health ➲ 5 – Water Supply ➲ 7 – Solid Waste Management ➲ 8 - Drainage

The problem

6.4 The vast majority of urban households in South Sudan have inadequate and unsanitary facilities for disposal of human waste. Only very few have facilities that are hygienic, free of odour and offer privacy. Most households have to make do with sub-standard facilities; and a significant number have access to no facilities and have to use open space.

6.5 This has a serious impact on environmental health:

- Open defecation presents a major health risk through encouraging breeding of pathogenic (causing disease) micro-organisms;
- Direct contact with excreta transmits disease, a serious risk with young children;
- Poorly-constructed pit latrines and cess pits contaminate surface water and shallow aquifers, especially during the rainy season;
- Contamination can 'flow back' into the piped water system through cracks and joints when the pressure drops, so contaminating the 'safe' water supply.

6.6 In addition, the lack of proper toilet facilities affects the dignity of many people by offering no privacy.

6.7 The challenge is therefore to provide hygienic, safe, sanitation facilities that offer privacy and are affordable to all. Solutions that address the needs of just a few ignore the needs of the vast majority.

Range of solutions

6.8 There is no one solution to sanitation, no single method that will be appropriate for all conditions. So urban sanitation will comprise many different types of toilet facility using different methods of storage and disposal. Key factors are:

- ***Ground conditions:*** These may determine what methods are technically possible and cost-effective.
- ***Availability of water:*** Some methods require little or no water and so are suitable for areas deprived of plentiful supply; others require large quantities of water that can make them expensive to operate.
- ***Affordability:*** Costs vary significantly – technologically sophisticated methods will be unaffordable to the vast majority of households.

Definitions

Sewage: Human waste (excreta and urine).

Sewer: Pipe that carries sewage, often placed under ground.

Sewerage: piped network of sewers that carried sewage from toilets to treatment or discharge.

Sludge: solid matter remaining after removal of liquid from sewage.

Sullage: liquid waste comprising sewage diluted in water.

6.9 When planning sanitation, the ***method of sewage storage/disposal*** is more important than the type of toilet facility. There are three main types of method for sewage storage/disposal (see Figure 1):

- ***Waste seepage:*** In permeable ground conditions, liquid waste from the sewage can seep (or percolate) into the surrounding soil, leaving solid matter (or *sludge*) in the base of the receptacle. The sludge needs to be removed on a regular basis to maintain efficient operation of the facility.

  The most common types of facility that use seepage are:

  - ***Pit latrine:*** The most common type - it is relatively simple to construct and widely affordable. It requires no water – and performs better if kept as dry as possible (reduces odour, breeding of insects etc).
  - ***Septic tank:*** A multi-chamber tank (brick or concrete) that allows settlement and biological degradation of solid waste, while the liquid waste passes through and percolates into the surrounding soil, often into an underground soak-away. It requires water. This is a high quality, expensive option – most suitable for institutional developments.

- ***Holding tank***: In impermeable ground conditions, seepage or percolation of liquids is not possible. A holding tank is used to store the sewage (liquid and solids) for regular collection and disposal elsewhere. The tank can be a pit latrine-type structure, lined with brick & cement, plastic sheeting or oil drums; or it can be a larger tank, made of brick & cement or concrete, more like a septic tank.

  The volume of waste stored is greater than the seepage method (since all liquid is retained) and it therefore requires emptying more frequently than the seepage method.

- ***Water-borne sewerage***: This involves connecting water-flush toilets to a network of sewers that carries the sewage (often by pumping) to a treatment plant located some distance away. This method minimises the risk of human contact with excreta, prevents flies, and avoids contamination of groundwater.

  But it is very expensive: the high construction cost and recurrent O&M costs mean that it is unaffordable to all but a very few; and the system needs a large numbers of house connections to make it technically feasible. It remains a long-term aspiration – but more affordable solutions need to be employed in the meantime.

Treatment of sewage

6.10 A treatment works is required for the safe and effective disposal and treatment of sewage and sludge removed from pits, holding tanks and septic tanks. Sewage and sludge are removed from the pit or tank by a vacuum tanker truck, which transports it to the treatment facility.

6.11 There are numerous types of treatment, with varying levels of technical sophistication. ***Waste stabilization ponds*** are most common low-cost, low-maintenance system and will be the best option for most cases. They provide good treatment of pathogenic (causing disease) material and the treated effluent can be re-used as fertilizer.

6.12 The site for the treatment works needs to be selected carefully. The site must conform to technical specifications relating to ground conditions and location, to ensure that it can be developed for the safe and sanitary treatment of waste; and it must have a road access suitable for tanker trucks.

6.13 It will usually be located outside the urban area and away from habitation, as it is considered to be an unpleasant 'neighbour'. In practice, a well-managed treatment works gives off very little odour, and can be integrated into the urban area – this is common in developed countries.

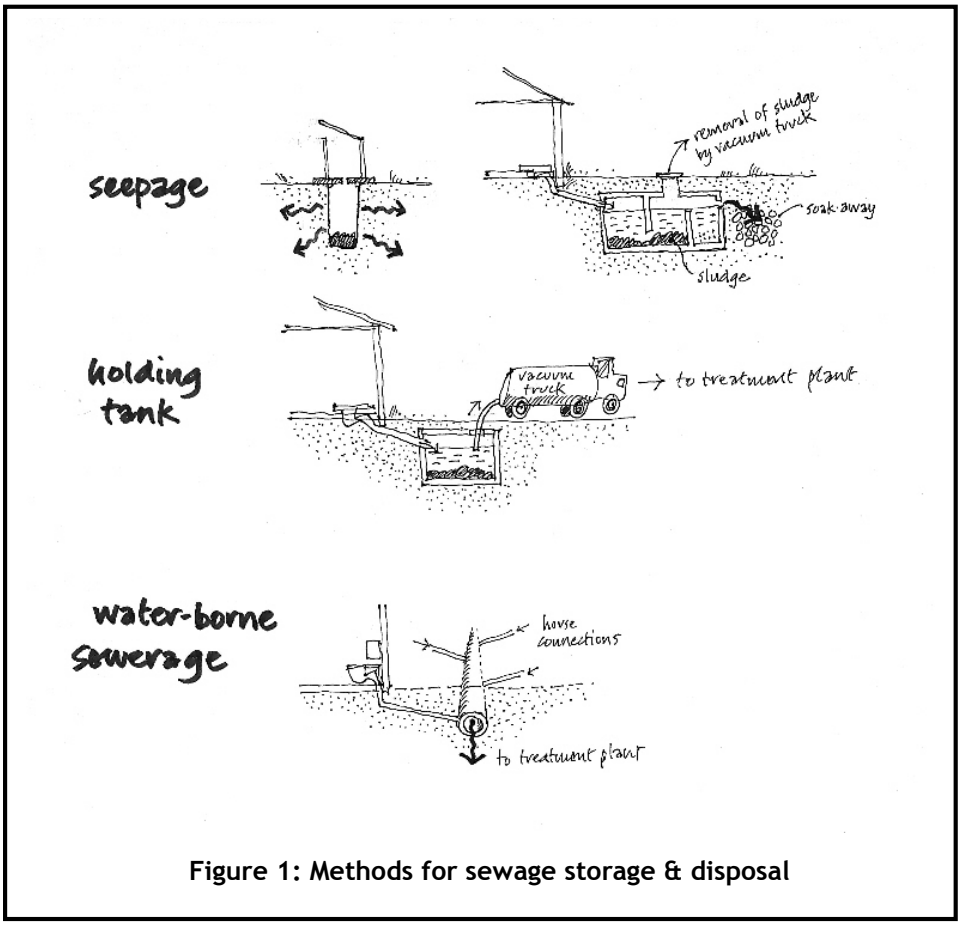

Figure 1: Methods for sewage storage & disposal

Communal facilities

6.14 The ideal is for every household to have their own on-plot latrine. But in many cases this will not be possible because of unsuitable ground conditions and/or of cost. So some way has to be found to provide safe and hygienic facilities for those who cannot have their own individual facility.

6.15 The answer is the ***communal toilet block*** with the following features:

- Separate facilities for male and female users;
- Integrated shower and washing facilities;
- A caretaker employed to ensure cleanliness and correct usage;
- Users are charged for use to pay for the caretaker and routine O&M.

6.16 A typical communal block consists of a number of toilet cubicles (6-12 no.), draining into a seepage pit, septic tank or holding tank. Facilities for men and women can be provided back-to-back so that each enters from a different side. It also includes washing facilities, which makes the facility a more comprehensive public health facility – and experience shows that this increases user satisfaction.

6.17 Simply building a facility and leaving it to take care of itself does not work. The key to success is ***effective management*** – this can be done in three ways:

- ***Community-based organisation (CBO):*** Management is given to the local community that takes responsibility for employing attendants, collecting user charges, and overseeing O&M. The CBO may need the support of an experienced NGO. This can be through a formal contract from the local authority or water company which supplies the water and arranges disposal of waste.
- ***Private operator:*** Toilet/washing blocks can be run as a commercial operation – a well-managed facility can generate sufficient profit to interest a private entrepreneur (some commercial facilities already operate in South Sudan). These should be licensed by the local authority/water company, with some regulation of user charges to avoid exploitation.

Communal toilet/washing block in Kenya:
- 12-cubicle block
- construction cost US$ 13,000
- 2 months to complete
- income from user charges pays attendants' wages with significant profit
- 3 blocks generate US$ 1,000 profit per month
- Support from local NGO *Maji na Ufanisi*

- ***Local authority/water company:*** Management remains with the public sector. In practice, this may be the least efficient model, due to the many other activities that these agencies have to carry out.

Breaking the loop of groundwater contamination

6.18 The pit latrine is the simplest and cheapest system. It is therefore likely to be the only affordable on-plot choice for the vast majority of urban households (where ground conditions are suitable). Where these are developed in large numbers, there is clearly the risk of contamination of the groundwater, which could affect local shallow wells.

6.19 This sometimes prompts people to say that pit latrines are not acceptable and other methods must be used. This is a misplaced response, although well-intentioned. It is usually much simpler and cheaper to provide piped water supply than to provide more sophisticated sanitation systems. If a plentiful supply of piped water is available, there is no longer any need to use shallow wells – so it no longer matters if there is some contamination of the groundwater. This emphasises the interconnection between safe water supply and safe sanitation.

Appropriate technologies

6.20 ***Water-borne sewerage*** if often proposed as the solution to urban santiation. This is driven by well-intentioned objectives:

- desire for an efficient system (water-borne sewerage is undoubtedly efficient)
- promoting 'modern' urban development
- not settling for 'second best'

6.21 The reality is that the cost of water-borne sewerage makes it inappropriate for most urban areas in Africa:

- It is very expensive to construct and to operate.
- It needs a large volume of water to flush the sewage through the pipes.
- It needs a large number of connections to generate a steady flow for the system to be self-cleaning - if there are too few connections regular blockages will occur.
- Few households at present have a flushing toilet, or could afford to install one.

- Few households would be able to afford the connection cost and regular user charges.

6.22 A limited sewerage system may be appropriate in high density areas e.g. the commercial town centre - this can be a network of underground or open drains that receive waste from a number of properties and discharge it into a septic/holding tank, which is emptied on a regular basis.

6.23 If water-borne sewerage is unaffordable to the majority of the urban population, then it is essential to focus on systems that are affordable and technically acceptable for the vast majority of households.

6.24 It is interesting to note that South Africa, one of the richest countries on the continent, has embraced this approach. It is now accepted that low-technology options are the only way to reach the mass of low-income groups. This involves using different solutions to meet different needs, and includes:

- ***dry-composting latrines:*** a twin-chamber system that uses no water - when a chamber is full, it is sealed and the second chamber is used. The excreta in the first chamber is left for a few months to decompose until it is non-toxic; it is then removed and can used as fertilizer.
- ***bucket latrines:*** some cities still use bucket latrines, that are emptied on a regular basis.

Promoting good practice in sanitation

6.25 Every sanitation system depends on the discipline and care of users for keeping it clean and hygienic.

- Clean facilities encourage users to take care and keep them clean.
- Dirty facilities encourage lazy, dirty habits - in communal facilities, this can rapidly lead to vandalism, degradation and disuse.

6.26 Public health education programmes are an important part of a sanitation programme, the 'soft' investment required to complement the 'hard' investment in new facilities. These will promote good sanitation practice by teaching basic hygiene and how to reduce the risk of infection and disease - this especially important for families with young children, who are at high risk from contact with excreta.

6.27 In addition, the quality of pit latrine construction can be improved. This involves technical advice and training to contractors and individuals who want to build their own latrine; and also to ensure a regular supply of building materials, toilet slabs, pour-flush slabs etc.