Introduction to Excreta Disposal, Drainage and Hand Washing Facilities
Excreta Disposal, Health and Survival

Sanitation

Hygiene Promotion

Fingers
Flies
Field
Fluid

Face/mouth/future victim

Safe water
Phases of an emergency

Immediate Emergency

Stabilization

Recovery

For the purposes of excreta disposal, these phases can be reduced into two.

First Phase: Immediate emergency (days to several weeks up to three months)

Second Phase: Stabilisation and recovery (months to years)
Key Design Criteria

Coverage:
- 20 people per latrine.
- Sex segregation is 3 for female: 1 for male.
- Trench latrine is maximum 100 people per
- 3.5m length X 1m deep X 300mm wide trench.

Location:
Minimum 6 metres from dwellings (for pit latrine) and maximum 50 metres.

Pit Depth: Minimum 1.5 metres above the water table.

Accumulation rates ອາດາະນາ

Solid: 0.5 litres/person/day in emergency (<0.15m³/person/year in stable situation)

Liquid: 0.8 litres/person/day (1.3 litre/day if water used for anal cleansing). If people wash in latrines the accumulation rate could be 8-10l/p/d
FAMILY OR COMMUNAL TOILETS?

<table>
<thead>
<tr>
<th><strong>First Phase</strong></th>
</tr>
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<tbody>
<tr>
<td>Open Defecation</td>
</tr>
<tr>
<td>Shallow Trench Latrine</td>
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<tr>
<td>Deep Trench Latrine</td>
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<tr>
<td>Shallow family latrine</td>
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<tr>
<td>Bucket latrines</td>
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<tr>
<td>Packet Latrine</td>
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<tr>
<td>Chemical Toilet</td>
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</tbody>
</table>

<table>
<thead>
<tr>
<th><strong>Second Phase</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td>• Simple Pit Latrine</td>
</tr>
<tr>
<td>• Ventilated Improved Pit (VIP) latrine</td>
</tr>
<tr>
<td>• Borehole latrines</td>
</tr>
<tr>
<td>• Pour flush latrine</td>
</tr>
<tr>
<td>• Septic tank</td>
</tr>
<tr>
<td>• Aqua privies</td>
</tr>
<tr>
<td>• Wastewater treatment system</td>
</tr>
<tr>
<td>• Latrines for institution</td>
</tr>
</tbody>
</table>
Options for emergency

| Pee poo bag | Individual, single-use biodegradable bags for point-of-use sanitation that are buried or properly disposed
  | • Bags typically inside reusable buckets
  | • Brand names: Peepoo, Wagbag |
|---|---|
| Bucket Latrine | Elevated temporary structure over large container or tank that can be lined with large, replaceable plastic bag |
| Chemical Toilet | Portable prefabricated sanitation units with watertight excreta-holding tank, containing a chemical solution to aid digestion and reduce odor |
| Trench latrine | Narrow trenches with temporary privacy structure; waste covered daily with soil. |
Trench latrine
Recommendations for Sanitation in Improvised Settlements and Cholera Prone Areas

• **The Sphere standard** of 50 people per latrine for emergency situations should be used for the immediate term, with the aim of decreasing to the Sphere minimum standard for excreta disposal of 20 people per latrine.

• Chemical toilets should be used in the immediate term where available.
• If chemical toilets are not feasible, trench latrines or temporary pit latrines should be constructed immediately.
• Elevated latrines should be considered for areas where digging of latrines is not possible or acceptable or areas with high water table or prone to flooding.
• Residents of internally displaced persons (IDP) settlements should be engaged in choosing among appropriate alternatives.
• Existing practices should be further investigated to identify other feasible alternatives (e.g., are people in improvised settlements using toilets in minimally damaged buildings in the vicinity?)
• Further investigation of the local feasibility and local acceptability of packet and bucket latrines should be undertaken.
• Health communication materials should contain information about latrine use and care (in local languages), and provisions made to communicate with non-literate populations.
• Longer term sanitation solutions should be investigated further to help prevent occurrence of cholera and other infectious diseases.
• Regardless of the type of sanitation facility installed, handwashing stations should be installed at every sanitation facility.
Latrine Construction Process

- Determining Location
- Pit excavation/disposal system
- Laying of slab and foundation
- Superstructure construction
- Hand washing Facilities Construction
- Operation and Maintenance arrangement
- Monitoring arrangement

Calculation of Pit Size

\[ V = (N \times S \times D) + 0.5A \]

Minimum size for pit is suggested 1.5 m depth with 1 – 1.2m in diameter

N = No of Users
S = Sludge Accumulation rates (liter/person/year)
D = Design life (years)
A = Pit base area (M2)

Suggested Sludge accumulation rates

<table>
<thead>
<tr>
<th>Waste deposited and condition</th>
<th>“S” accumulation rate (l/p/y)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Stable Situation</td>
</tr>
<tr>
<td>Wet condition, degradable anal material is used.</td>
<td>40</td>
</tr>
<tr>
<td>Wet condition, non-degradable anal material is used.</td>
<td>60</td>
</tr>
<tr>
<td>Dry condition, degradable anal material is used.</td>
<td>60</td>
</tr>
<tr>
<td>Dry condition, non-degradable anal material is used.</td>
<td>90</td>
</tr>
</tbody>
</table>
**Determining Location**

**Pit excavation/disposal system**

**Laying of slab and foundation**

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**Pit excavation**

The suggested shape of pit is cylinder

\[ V = \pi r^2 h \]

\[ \pi = 3.14 \]

\[ r = \text{radius} \]

\[ h = \text{high (means the depth of the pit)} \]

**Sample**

\[ V = 0.09 \text{ m}^3, r = 0.4 \text{ m} \]

\[ 0.09 = (3.14 \times (0.4)^2) \times h \]

\[ 0.09 = 3.14 \times 0.16 \times h \]

\[ 0.09 = 0.5024 \times h \]

\[ h = \frac{0.09}{0.5024} = 0.17 \text{ m} \]
Concrete Slab

1 part of cement: 2 part of sand : 3 or 4 parts of aggregate

<table>
<thead>
<tr>
<th>Thickness (mm)</th>
<th>Steel diameter</th>
<th>Spacing of steel Bars (mm) for minimum slab span</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>1m 1.25 m 1.5m 1.75 m 2m</td>
<td></td>
</tr>
<tr>
<td>65</td>
<td>6 150 150 125 75 50</td>
<td></td>
</tr>
<tr>
<td>8</td>
<td>250 250 200 150 125</td>
<td></td>
</tr>
<tr>
<td>80</td>
<td>6 150 150 125 75</td>
<td></td>
</tr>
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<td>250 250 250 200 150</td>
<td></td>
</tr>
</tbody>
</table>

Pit Lining

<table>
<thead>
<tr>
<th>Soils that require lining</th>
<th>Soils doesn’t require lining</th>
</tr>
</thead>
<tbody>
<tr>
<td>Soft sand and Gravel</td>
<td>with significant clay content</td>
</tr>
<tr>
<td>Unconsolidated Soil</td>
<td>Most consolidated sedimentary rocks</td>
</tr>
<tr>
<td>Filled land</td>
<td>With high proportion of iron oxide (laterites)</td>
</tr>
<tr>
<td>Compressed mud stone and shales</td>
<td></td>
</tr>
</tbody>
</table>

Lining Materials

- Wood
- Bricks/stone
- Concrete blocks
- Mud blocks
- Bamboo
- Tyre
- Oil Drum
- Ferro cement
- Iron sheet
- Concrete ring
- Etc.
Superstructure Materials

- Wood
- Bamboo
- Steel/PVC pipe
- Pre-fabricated Materials (rapid latrine)
- Other local available materials
Sphere Standards for excreta disposal

Safe disposal of human excreta creates the first barrier to excreta–related disease, helping to reduce disease transmission through direct and indirect routes. Safe excreta disposal is, therefore, a major priority and in most disaster situations should be addressed with as much speed and effort as the provision of a safe water supply. The provision of appropriate facilities for defecation is one of a number of emergency responses essential for people’s dignity, safety, health and well-being.

Excreta disposal standard 1: Environment free from human faeces

- The environment in which the affected population lives is free from human faeces
- All excreta containment measures, i.e. trench latrines, pit latrines and soak-away pits, are at least 30 metres away from any groundwater source. The bottom of any latrine or soak-away pit is at least 1.5 metres above the water table
- In flood or high water table situations, appropriate measures are taken to tackle the problem of faecal contamination of groundwater sources
- Drainage or spillage from defecation systems does not contaminate surface water or shallow groundwater sources
- Toilets are used in the most hygienic way possible and children’s faeces are disposed of immediately and hygienically
Sphere Standards for excreta disposal

Excreta disposal standard 2: Appropriate and adequate toilet facilities

- Toilets are appropriately designed
  - way as to minimise security threats to users
  - degree of privacy
  - easy to use and keep clean and do not present a health hazard
  - allow for the disposal of women’s menstrual hygiene materials and provide women with the necessary privacy for washing and drying menstrual hygiene materials minimise fly and mosquito breeding

- maximum of 20 people use each toilet
- Separate, internally lockable toilets for women and men are available in public places, such as markets, distribution centres, health centres, schools, etc.
- Toilets are no more than 50 metres from dwellings
- Use of toilets is arranged by household(s) and/or segregated by sex
- All the affected population is satisfied with the process of consultation and with the toilet facilities provided and uses them appropriately
- People wash their hands after using toilets and before eating and food preparation
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Location: the hand washing facility should be located near the food preparation facilities, canteen and defecation place.

Materials: it should has soap, ash, mud, or other hand washing agents and hygienic materials for drying hands after washing.

Access: Should be easy to use and access by all population group including children, elderly and disable. Also has good access to clean water.

Use: if the water used by the facilities is not safe drinking water, the users should be made aware that the water is not safe for consumption and only used to wash hand
Facilities samples for Hand Washing

The little invention provides running water for hand washing for practically no cost at all. Except for the bottle no special materials, tools, or skills are required.

- **dipper with a hole**
- **cistern with valve**
- **hollowed fruit**
- **recycled container**
- **'conventional' tap**
- **with a bowl**

Drawing by: Jose Zezezpegu
Drainage

Prevent erosion
Prevent pollution of water source
Prevents vector breeding and other diseases caused by standing water

• Approx. 2% of slope is needed, means 2 meters drop every 100 meters of drainage

Disposal Technical options

Disposal into water courses
Directly dispose to the river or stream

Infiltration techniques
Using soakaway pit to infiltrate the water into the soil

Evaporation techniques
Using shallow pool to let the water evaporate (impermeable soil)

Evapotranspiration techniques
As irrigation water for plants
The purpose of surface water drainage is:
1. To remove water safely and effectively from living areas and hence improving the living environment.
2. To prevent standing water, flooding and erosion.
3. To ensure that vehicular and pedestrian access is possible at all times, particularly for access in medical emergencies.
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Drainage
Sphere Standards for Drainage

Sphere Standards for Drainage

Surface water in or near settlements may come from household and water point wastewater, leaking toilets and sewers, rainwater or rising floodwater. The main health risks associated with surface water are contamination of water supplies and the living environment, damage to toilets and dwellings, vector breeding, and drowning. Rainwater and rising floodwaters can worsen the drainage situation in a settlement and further increase the risk of contamination.

Drainage standard 1: Drainage work
People have an environment in which health risks and other risks posed by water erosion and standing water, including stormwater, floodwater, domestic wastewater and wastewater from medical facilities, are minimised.

Water point drainage is well planned, built and maintained. This includes drainage from washing and bathing areas as well as water collection points and hand washing facilities.

There is no pollution of surface water and/or groundwater sources from drainage water.

Shelters, paths and water and sanitation facilities are not flooded or eroded by water.

There is no erosion caused by drainage.
Solid waste management

Immediate response

Activities should be prioritised according to present and future health hazards of different waste types and sources. Activities are likely to focus on clearing of existing scattered waste and managing waste from households and markets.

On-site household disposal

Suitable where space is not too limited and where waste has a high organic content (as it will decompose and reduce in volume). Also useful in areas where access is difficult.

Pits should be 1m deep and be frequently covered with ash/soil to prevent access to waste by insects and rats, and to reduce odours.

Community pits

Must be located within 100m walking distance of any household (SPHERE Guidelines).

As a rough guide, 50 people will fill 1m³ of a pit each month, depending on generation rates and density.

These are rapid to implement and require little operation and maintenance. Note that some people may object to walking 100m to deposit waste.

Collection and storage

In some situations on-site, community pits may be a suitable medium-term solution, whilst in others it will be necessary to devise ways of removing and disposing of waste. This will usually involve the following:

- storage in the house;
- deposition at intermediate storage point; and
- collection and transport to final disposal.

In the home, plastic bags or a small container with a lid make suitable storage containers.
Intermediate solutions

Community issues

Consultation. It is useful and important to consult potential users of a waste management system before and during design and implementation.

Education. It is important for participating communities to understand how good solid waste management can be achieved and can benefit their health.

Transport

When selecting suitable vehicles, waste generation rates and densities need to be considered along with:

- areas they need to access (e.g. narrow alleys or uneven paths); and
- distance between collection and disposal points.

For example, a wheelbarrow could collect waste from approximately 50 individuals before requiring emptying.
Sphere Standards for Solid waste management

Solid waste management is the process of handling and disposal of organic and hazardous solid waste which, if unattended appropriately, can pose public health risks to the affected population and can have a negative impact on the environment. Such risks can arise from the breeding of flies and rodents that thrive on solid waste.

Solid waste management standard 1: Collection and disposal

- All households have access to refuse containers which are emptied twice a week at minimum and are no more than 100 metres from a communal refuse pit.

- All waste generated by populations living in settlements is removed from the immediate living environment on a daily basis, and from the settlement environment a minimum of twice a week.

- At least one 100-litre refuse container is available per 10 households, where domestic refuse is not buried on-site.

- There is timely and controlled safe disposal of solid waste with a consequent minimum risk of solid waste pollution to the environment.

- All medical waste (including dangerous waste such as glasses, needles, dressings and drugs) is isolated and disposed of separately in a correctly designed, constructed and operated pit or incinerator with a deep ash pit, within the boundaries of each health facility.
Sphere Standards for Hygiene promotion

Affected men, women and children of all ages are aware of key public health risks and are mobilised to adopt measures to prevent the deterioration in hygienic conditions and to use and maintain the facilities provided.

Hygiene promotion standard 1: Hygiene promotion implementation

All user groups can describe and demonstrate what they have done to prevent the deterioration of hygiene conditions.

All facilities provided are appropriately used and regularly maintained.

All people wash their hands after defecation, after cleaning a child’s bottom, before eating and preparing food.

All hygiene promotion activities and messages address key behaviours and misconceptions and are targeted at all user groups.

Representatives from all user groups are involved in planning, training, implementation, monitoring and evaluation of the hygiene promotion work.

Care-takers of young children and infants are provided with the means for safe disposal of children’s faeces.
Hygiene promotion standard 2: Identification and use of hygiene items

Women, men and children have access to hygiene items and these are used effectively to maintain health, dignity and well-being.

All women and girls of menstruating age are provided with appropriate materials for menstrual hygiene following consultation with the affected population.

All women, men and children have access to information and training on the safe use of hygiene items that are unfamiliar to them.

Information on the timing, location, content and target groups for an NFI distribution is made available to the affected population.

The safety of affected populations and staff is prioritised when organising an NFI distribution.

The disaster-affected population has access to and is involved in identifying and promoting the use of hygiene items to ensure personal hygiene, health, dignity and well-being.
**Sphere Standards for Hygiene promotion**

**Basic hygiene items:** A basic minimum hygiene items pack consists of water containers (buckets), bathing and laundry soaps, and menstrual hygiene materials.

<table>
<thead>
<tr>
<th>Item</th>
<th>Quantity</th>
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</thead>
<tbody>
<tr>
<td>10–20 litre capacity water container for transportation</td>
<td>One per household</td>
</tr>
<tr>
<td>10–20 litre capacity water container for storage</td>
<td>One per household</td>
</tr>
<tr>
<td>250g bathing soap</td>
<td>One per person per month</td>
</tr>
<tr>
<td>200g laundry soap</td>
<td>One per person per month</td>
</tr>
<tr>
<td>Acceptable material for menstrual hygiene, e.g. washable cotton cloth</td>
<td>One per person</td>
</tr>
</tbody>
</table>

**Menstrual hygiene:** Provision must be made for discreet laundering or disposal of menstrual hygiene materials.

**Special needs:** Some people with specific needs (e.g. incontinence or severe diarrhoea) may require increased quantities of personal hygiene items such as soap. Persons with disabilities or those who are confined to bed may need additional items, such as bed pans. Some items may require adaptation for sanitary use (such as a stool with a hole or commode chair).

**Additional items:** Existing social and cultural practices may require access to additional personal hygiene items. Subject to availability, such items (per person per month) could include:

- 75ml/100g toothpaste
- one toothbrush
- 250ml shampoo
- 250ml lotion for infants and children up to 2 years of age
- one disposable razor
- underwear for women and girls of menstrual age
- one hairbrush and/or comb
- nail clippers
- nappies