

Technology Options

Guidelines for Communities



RSPN

Rural Support Programmes Network

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Why to Cover “insani fuzla” - Importance of the Use of Various Technological Options to Break Disease Transmission Route

Human excreta “*insani fuzla*” is one of the most dangerous source and cause of several issues viz-a-viz poor health, environmental pollution, socio economic burden and overall livelihood of human being. The simple and easiest way to protect human, especially children who are more vulnerable to diseases, is to confine “*insani fuzla*” under the ground and there are various options to do that which are discussed in this “Technology Options” guidelines.

Relationship between Poor Sanitation & Diseases

In Pakistan there are 70.54 million people who do not have access to improved sanitation. Everyday, about thousands of children, under the age of five, die in Pakistan due to diarrhoea and diseases related to water, sanitation and hygiene. Diarrhoeal diseases are costing Pakistan approximately Rs. 55 billion to Rs. 84 billion annually (Medium Term Development Framework - MTDF). These figures show that poor sanitation situation affects the health of the population, especially children. The morbidity pattern reveals high rate of water-borne and poor environment related diseases, such as diarrhea and hepatitis A, particularly among children.

What is Sanitation?

Sanitation is a means of collecting and disposing of human excreta, solid & liquid waste in a hygienic way so as not to endanger the health of individuals or the community as a whole. By adopting safe sanitary practices including health & hygiene we can save ourselves and our children from menace of diseases related to poor sanitation. A recent study suggests that hand washing with soap, particularly after contact with faeces (post-defecation and after handling a child's stool), can reduce diarrheal incidence by 42-47 percent and a 30 percent reduction in respiratory infections.

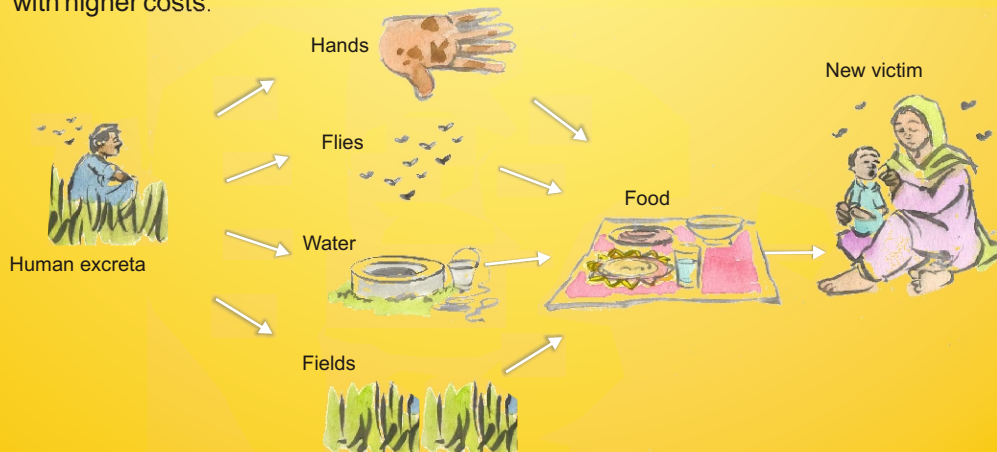
Importance of Confining Human Excreta and “Sanitation Ladder” Concept

In Pakistan, particularly in rural & peri urban areas “open defecation” is a traditional and socially acceptable practice. Limited population of rural areas is aware of fecal-oral chain that causes several diseases. Very few people know the link between human excreta and various routes it takes to infect the new victim with the water and sanitation related diseases. These routes are shown on page 2. In many parts of the country, it is a taboo to talk about “*insani fuzla*”. Government of Pakistan in collaboration with provincial governments, TMAs, NGOs and development partners are trying to sensitize the community about the problems associated with open

defecation practices through social mobilization. In areas where the successful social mobilization has triggered the behavior change, the next issue is technology option to confine the human excreta.

The community has choice of options to move from basic and simple excreta disposal mechanism to relatively complex mechanism. This process is termed as “sanitation ladder” which enables communities to decide on the option that is most suited to their requirement in relation to their affordability.

The first and most vital step in the sanitation ladder, after giving up on open defecation is selection of an option which is locally suitable, culturally acceptable and economically affordable for confining of human excreta. This technology options guideline explains a set of options, from simply covering the human excreta in shallow *trench* to Pour Flush latrine. Based on affordability and other factors, one can move on the ladder from a simple to the state of the art latrine. The first option, on which all types of latrines are based, is simple “*Tati per matti dalo*” meaning that if you don't have latrine and till you construct one you should simply defecate in shallow dug “*trench*” and cover it with soil (*matti*). The next step is a low-cost simple pit latrine and so on, through to the final option, which offers both improved technology with higher costs.



Use of these guidelines

Effort has been made to keep these guidelines very simple so that community, including women, could easily understand it and make a choice for the latrines. These guidelines describe various latrine options and it steps for construction, advantages, disadvantages, type and quantity of materials, suggestive range of costs. One can select an option based on factors ranging from affordability to soil conditions and from local tradition to availability of water. The focus of these guidelines is on “sub structure” based again on the principle of confining human excreta, while the super structure is left to the community to decide from simple bamboos with used pieces of cloth sheets to fancy walls. The costs have been worked out only for “sub structure” and are only provisional as these are subject to variation from one place to another and time.

This “technology options” guidelines are expected to serve as a technical guideline for opting and the construction of the latrines in primarily rural and semi urban areas. These guidelines will eventually help in transfer of knowledge & skills to local communities and authorities for technology selection & construction. The overall objective of these guidelines is to reduce the risk of fecal-oral diseases, improve personal and community hygiene behavior and generate demand for proper latrine construction.

1. Simple Pit Latrine

Advantages

- Simple and low cost
- Suitable in water scarce area and for clayey soil
- Requires less land and no material for pit lining
- Sludge can be used for land fertility

Disadvantages

- Has odor, fly and cleanliness issues
- Limited for high water table area
- Unsuitable for high density and loose soil
- Risk of contamination through Pit for well (when pit is unlined)
- Unsuitable in soils with low permeability as the liquid portion (in case when water is used for anal cleansing) is unable to infiltrate into the soil



Steps for Construction

- Mark the size
- Excavate till required 5 feet deep and 4 feet diameter
- Prepare RCC slab with hole to cover the pit
- Construct super-structure with door

Do's

- Use local materials for sub & super structure construction
- The minimum distance between water table and base of the pit should be 15 feet
- Keep the interior of the toilet (super structure) darker to keep the flies away

- Add ash after use to control the smell
- Wash hand with soap after use

Don'ts

- Do not use large quantity of water for washing
- Do not build pit near water source (minium safe distance is 30 feet)
- Do not use weaker materials for slab so that it does not break

Cost of sub-structure only: Size of sub – structure: 4 feet diameter and 5 feet depth

Material Type	Quantity	Unit Rate	Estimated Cost in Rs.
Cement in bags			
Sand in cft			
Crush in cft			
Steel in kg			
Total			1630*

* This cost may vary with place and time



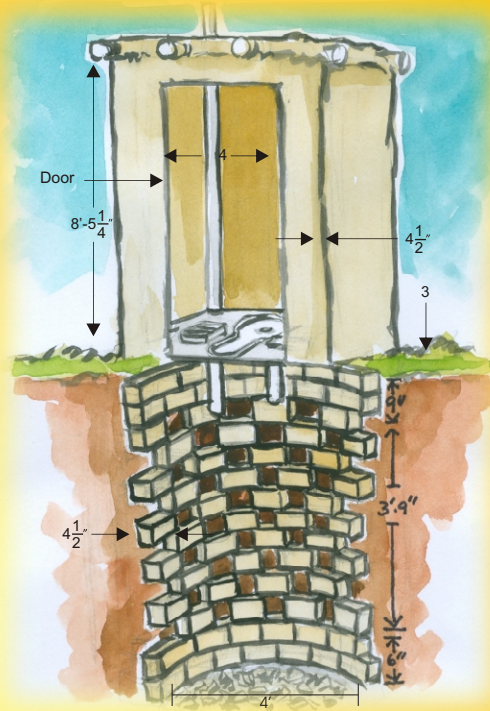
2. Ventilated Improved Soakage Pit Latrine

Advantages

- Water can be used for cleansing & flushing
- Simple and low cost
- Minimized odor, fly and insects issues
- Suitable in water scarce area
- Requires less land and easy to build

Disadvantages

- Difficulty in construction in rocky and high water table areas
- Unsuitable for high density area
- Unsuitable in soils with low permeability as the liquid portion (in case when water is used for anal cleansing) is unable to infiltrate into the soil



Steps for Construction

- Mark the size
- Excavate 5 feet deep and 4 feet diameter pit
- Lining of the pit with honey combed masonry
- Prepare RCC slab and install WC & P-trap to cover the pit
- Install vent pipe
- Put brick ballast in the bottom of the pit
- Construct super-structure with door

Do's

- Use PVC vent pipe for air circulation
- The top of the vent has to have a wire gauze on top
- The minimum distance between water table and base of the pit should be 15 feet

- Use lining for loose and un-consolidated soil (when water is used for anal cleansing, the use of brick lining or concrete rings in the pit would strengthen it against collapse)
- Approximately $\frac{3}{4}$ portion from bottom of sub structure should be honey combed and $\frac{1}{4}$ portion from top should be lined
- Pit should be a minimum of 30 feet from the existing well

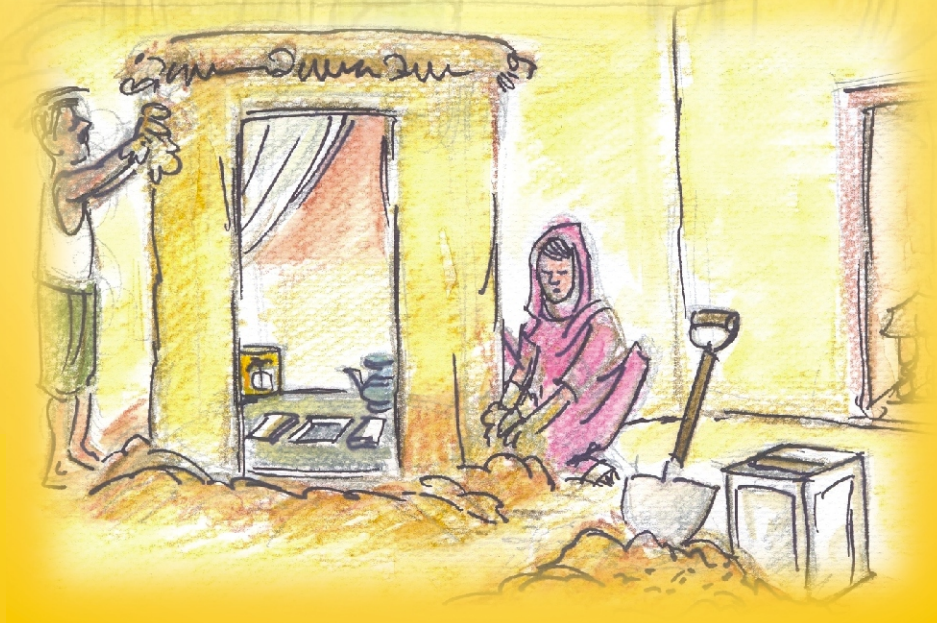
Don'ts

- Do not use large quantity of water for flushing
- Do not build pit near water source
- Do not use weaker materials for slab so that it does not break

Cost of sub-structure only: Size of sub – structure: 4 feet diameter and 5 feet depth

Material Type	Quantity	Unit Rate	Estimated Cost in Rs.
Bricks for pit lining with honeycomb (Nos)			
Cement in bags			
Sand in cft			
Crush in cft			
Steel in kg			
Total			3830*

* This cost may vary with place and time



3. Pour Flush with Twin-Soakage Pit Latrine

Advantages

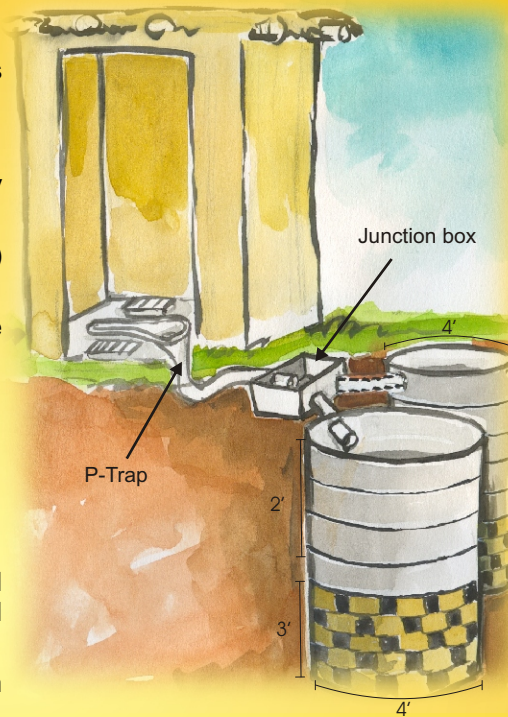
- Suitable for areas where water is available
- Suitable for less populated area
- Reduce smell and insect control by water seal
- Dried sludge (minimum one year old) can be used as manure
- The soak pit can be connected to more than one latrine in the neighborhood

Disadvantages

- It is not recommended in water logged area
- Blockage of junction box and connecting pipes due to use of solid materials
- Not recommended soakage pit in impermeable soil
- It is not recommended in impermeable soil
- Risk of contamination through pit to well
- Requires more land

Steps for Construction

- Mark the size
- Excavate 5 feet deep and 4 feet diameter pits
- Lining the pit with honeycombing
- Prepare RCC slab to cover the pit
- Construct junction box at suitable location in between super structure and pits
- Install WC & P-trap as shown in the above picture
- Install vent pipe as shown in the above picture



- Put brick ballast in the bottom of the pit
- Construct super-structure with door

Do's

- Prepare size of junction box 1 feet square
- The minimum distance between two pits is to be approximately 3 feet
- The minimum distance between water table and base of the pit should be 15 feet
- The minimum distance between pit and well should be 30 feet
- The pit could be lined with burnt clay, honey comb or pre-cast rings with inbuilt slots
- In case of high water table area, the pits should be raised above the ground level and also provide 3 ft wide compacted earth filling around the pit
- Desludging of pit could be done within minimum of 18 months of use
- Junction box to have round edges

Don'ts

- Do not remove dry sludge before 18 months of non usage
- Do not allow laundry waste (soap, detergent etc) into septic tank as it kills bacteria and stops the process of decomposition
- Do not use both the soakage pits simultaneously
- Never connect to an open drain

Cost of sub-structure only: Size of sub – structure: 4 feet diameter and 5 feet depth

Material Type	Quantity	Unit Rate	Estimated Cost in Rs.
Bricks (stone masonry can be used also if bricks not available) can be used) (Nos)			
Cement in bags			
Sand in cft			
Crush in cft			
Steel in kg			
Total			7660

* This cost may vary with place and time - Note: stone masonry can also be used

4. Septic Tank with Soakage Pit/Sewer Line

Advantages

- Suitable where water is available
- Recommended for thickly populated area
- Can be connected to more than one latrine in the neighborhood
- Less risk of water contamination
- Reduce smell and insect control by water seal

Disadvantages

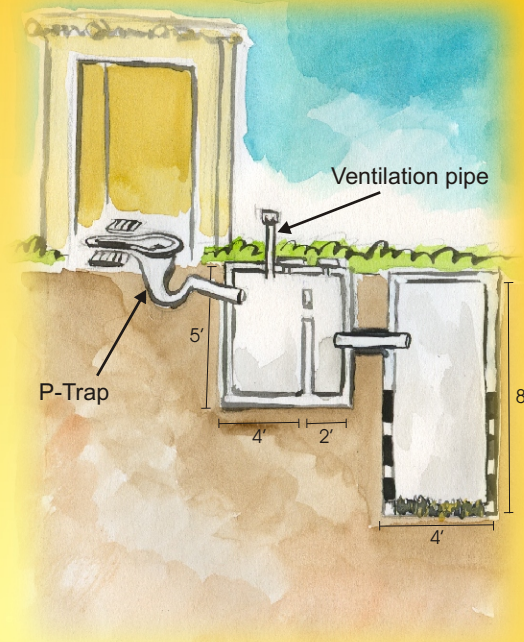
- Not recommended for high water table area and
- Requires more space
- Higher cost

Steps for Construction

- Mark the size
- Excavate as per diagram
- Lining the tank
- Prepare RCC slab to cover the tank
- Install WC & P-trap
- Install vent pipe
- Construct soakage pit for effluent
- Construct super-structure with a door

Do's

- The septic tank could be made of brick or stone masonry or RCC with the aim that it should be water tight with at least two compartment, first compartment should be twice the length of second compartment
- P trap must be used for water seal to control the smell
- Effluent water should be disposed off in a soakage pit or sewer line



- Remove the sludge from the septic tank upon filing (approximately 10 years)
- Septic tank and soakage pit should be 30 feet from the existing well

Don'ts

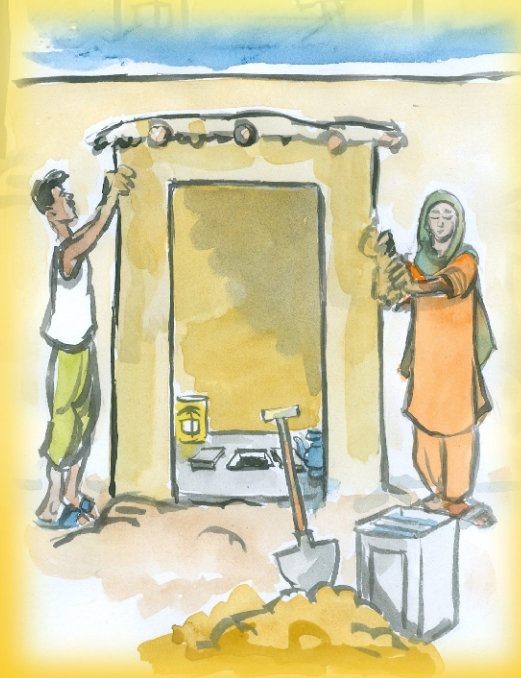
- Allow laundry waste (soap, detergent etc) into in septic tank as it kills bacteria and stops the process of decomposition
- Dispose off wastewater and sludge from septic tank to open space or drain as it pollutes environment
- Build single compartment septic tank as it hinders primary treatment

Cost of sub-structure only:

Size of sub – structure: 4x6 feet and 5 feet depth

Material Type	Quantity	Unit Rate	Estimated Cost in Rs.
Bricks (Nos.)			
Cement (Bags)			
Sand (Cft)			
Crush (Cft)			
Steel (Kg)			
Soak pit cost (as in design two).			
Total			11430*

* This cost may vary with place and time



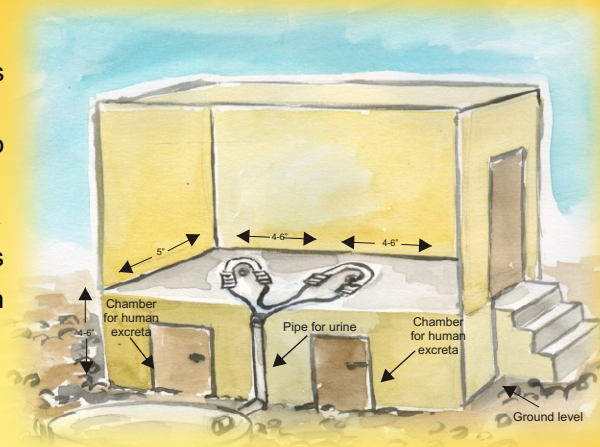
5. Eco-San Urine Diverting Latrine

Advantages

- Suitable where water table is high
- Uses less water (as no flushing is involved)
- Efficient with less pollution risk
- Minimized odor, fly and insects
- Urine used as nutrients in fields

Disadvantages

- Higher cost
- Requires more space
- Handling of dry sludge after some time



Steps for Construction

- Mark on ground with 4 feet width and 5 feet length two chambers
- Excavate the group for foundation and construct 4 feet 6 inches high walls from the ground level
- Leave open spaces for doors in front of both the chambers of 2 feet width and 4 feet high. This will be used to empty the chambers which are full with human excreta after a gap of 18 months since last use
- Use strong and solid materials (concrete, wood etc) for slab on both the chambers. Leave two holes in the centre of each chamber for defecation which can be fitted with WC seat
- Build stairs and ramp for access to the latrine
- Use any suitable materials for construction of compartment with door for access on top of the slab for privacy
- Make separate arrangement for collection of urine as shown in the picture

Do's

- The vault is made above the ground level
- Construct an entrance door at the side for removal of dried sludge
- Dispose of urine in a separate pit
- Provide vault with vent pipes
- Use ash after use of latrine as it reduces smell

Don'ts

- Don't build single compartment vault
- Don't dispose the sludge in an unsafe manner or place
- Don't dispose dried sludge before 18 months of last use

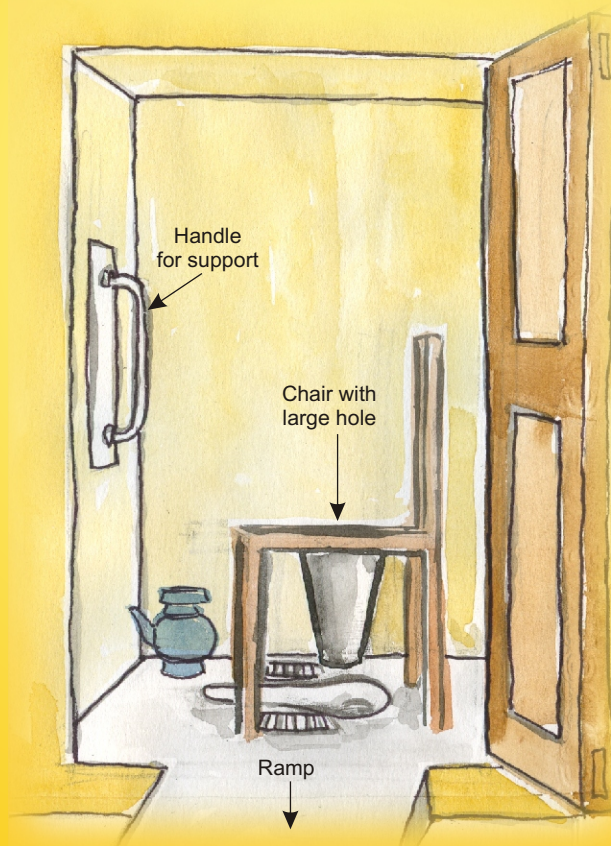
Cost of sub-structure only:

Material Type	Quantity	Unit Rate	Estimated Cost in Rs.
Bricks (stone masonry can be used also if bricks not available), No's			
Cement, Bags			
Sand			
Crush			
Steel (3/8 inches)			
Total			14170*

* This cost may vary with place and time

6. Disable Persons and Use of Latrine

- Ensure that there is no hindrance in accessing the latrine
- Make a ramp for access to the latrine and ensure that floor is not slippery
- Make necessary arrangements for safety and comfort. Fix a handle on the wall for support as shown in the picture
- Use a specially designed chair with hole for defecation as shown in the picture
- Ensure that soap and water are conveniently accessible for use
- The latrine door should be wider than ordinary doors so that a disabled person can easily enter the latrine



Check List/Characteristics to Choose the Preferred Type of Latrine for Different Soils and Water Availability

This will help in choosing the type of latrine based on water table, soil type and availability of space and water. Try to opt for the latrine type which as maximum tick (✓) against it. (X = not recommended)

Type	Water table 20 ft	Water source within 30 ft	Soil type			Water not available	No space within house area
			Clay	Silty	Sandy		
Dry Pit	X	X	✓	✓	X	✓	X
VIP	X	X	X	✓	X	✓	X
Pour Flush	X	X	X	✓	✓	X	✓
Septic Tank with soakage pit	X	X	X	✓	✓	X	✓
Eco San	✓	✓	✓	✓	✓	✓	X

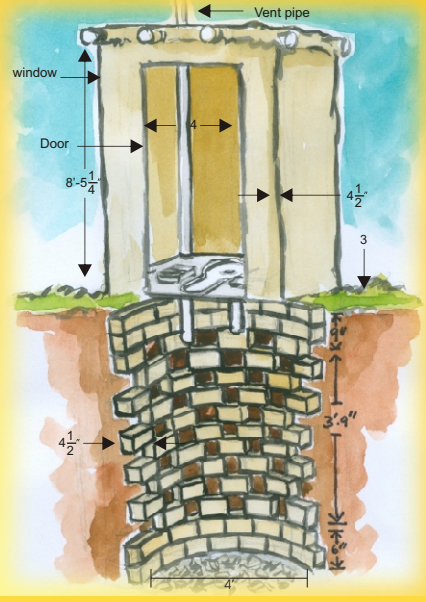
The following table shows the minimum distance requirement for septic tank and soakage pit.

Items	Septic Tank Feet (Meters)	Soak away Feet (meters)
Buildings	5 (1.5)	10 (3)
Property boundaries	5 (1.5)	10 (3)
Water wells	33 (10)	100 (30)
Streams	25 (7.5)	100 (30)
Cuts or embankments	25 (7.5)	100 (30)
Water pipes	10 (3)	50 (15)
Paths	5 (1.5)	10 (3)
Large trees	5 (1.5)	10 (3)

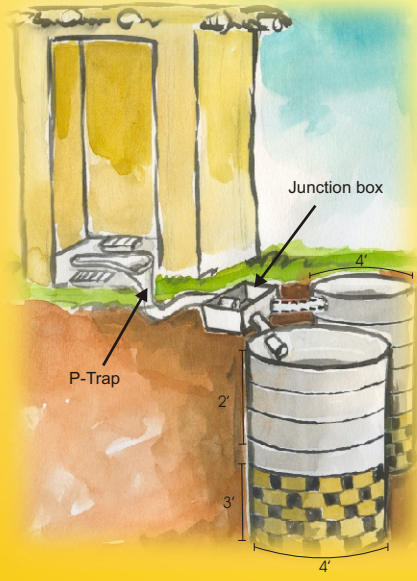
1. Simple Pit Latrine



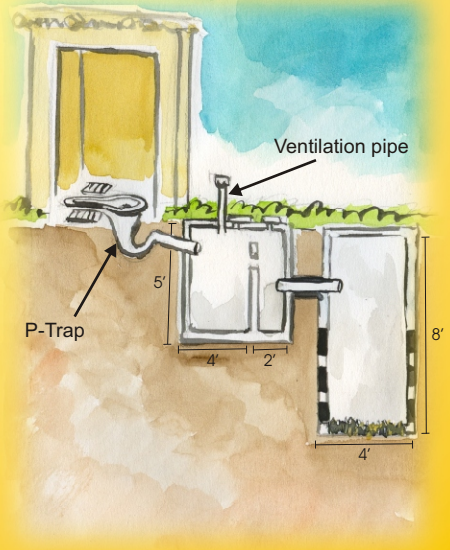
2. Ventilated Improved Soakage Pit Latrine



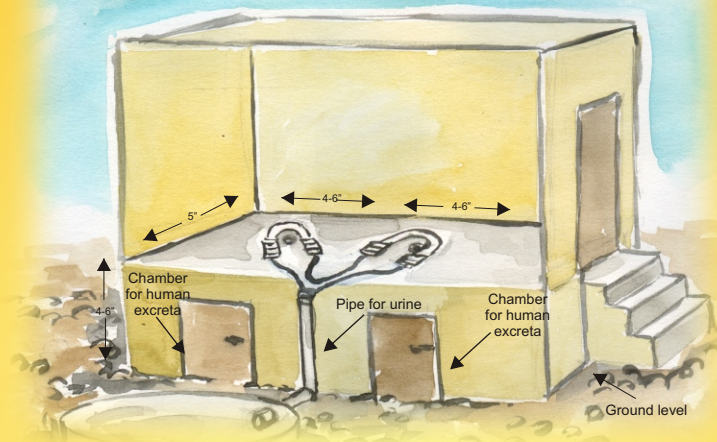
3. Pour Flush with Twin-Soakage Pit Latrine



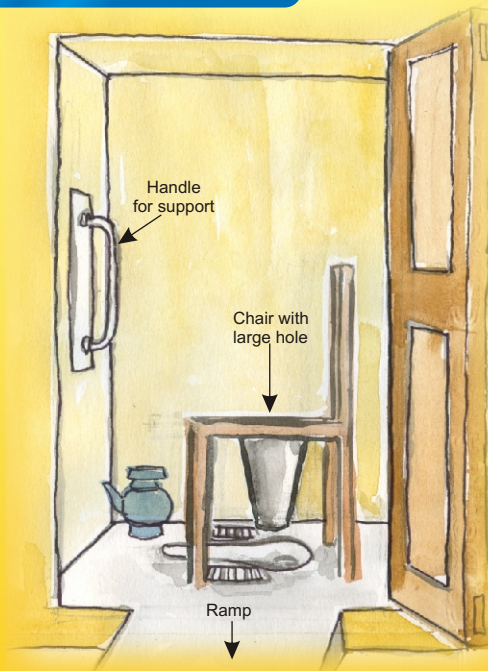
4. Septic Tank with Soakage Pit/Sewer Line



5. Eco-San Urine Diverting Latrine



6. Disable Persons and Use of Latrine





Wash Hand with Soap After Latrine Use

PIEDAR

30 years
wsp
water and
sanitation program



unicef



RSPN is thankful to all partner organizations and individuals for their technical support and guidance which enabled us to develop and finalize the “Technology Options Guidelines for the Communities” in this final shape. Partner organizations include: Ministry of Environment Government of Pakistan, Water & Sanitation Program South Asia World Bank, UNICEF, Plan Pakistan and Pakistan Institute for Development Action Research (PIEDAR).

We are also thankful to the staff and community activists of Rural Support Programmes who participated in the review meetings and enriched the contents by bringing the communities' perspective to these guidelines. Without their valuable comments it would have been difficult to come up with these guidelines.

Please send us your valuable comments and suggestions to improve these guidelines on below given address. Thank you.



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