

Technical Brief: Designing and Selecting Latrines

Sanitation System



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1 Introduction

A sanitation system deals with human excreta from the time it is “captured” in a latrine until it is used or disposed of safely. Sanitation systems are built for people, are managed by people, and affect people’s daily lives. The latrine is the part of a sanitation system that people interact with the most. The latrine is made up of the:

- “Front-end” or the user interface: the parts that every user interacts with, including the toilet (seat or pan), slab and superstructure
- “Back-end” or excreta storage: the pit, tank or chamber used to store excreta

Latrines should be designed to meet users’ needs and preferences. The concept of designing a system or product that users like and want to use is called user-focused design. This approach can be used when designing every part of a sanitation system. User-focused design ensures that the sanitation system not only functions, but people actually use it – and continue to use it – because their needs and preferences have been met.



This Technical Brief focuses on designing and selecting latrines for people. Its aim is to assist project implementers and decision makers in choosing latrines that are appropriate and that people will want. This Technical Brief will:

- Explain the concept of user-focused design
- Describe several factors that should be considered when selecting latrine technologies
- Discuss who should make decisions
- Present some tools for evaluating different options

For more information on latrine projects, CAWST’s Technical Briefs and Fact Sheets provide details on:

- How to select, site and construct latrines
- Latrine emptying
- Sludge treatment, use and disposal
- Approaches for sustainable latrine project implementation

Please see the Guide to CAWST Sanitation Resources for a complete glossary, list of abbreviations, unit conversions, and an overview of available resources.

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CAWST focuses on the planning, design and implementation of on-site sanitation projects for low-income communities not connected to a sewer. For such communities, household or decentralized sanitation offers a hygienic and affordable solution.

CAWST's free, open content resources and schedule of international training workshops can be found at: www.cawst.org/resources and www.cawst.org/training.

Definitions

Latrine: A latrine is made up of all the parts included in the first 2 boxes of a sanitation system: user interface and excreta storage. Latrine parts include the superstructure, toilet, slab, and the pit, tank or chamber. It may also include accessories such as handrails, and a handwashing station.

Latrine technologies: The different parts of a latrine. For example, a pour flush pan, a pit, a concrete dome slab.

Toilet: The pan or seat inside a latrine into which people urinate or defecate. The word “toilet” sometimes means a ceramic cistern flush toilet. However, CAWST uses the word more broadly.

User-focused design: Also called user-centered or human-centered design. A process in which the needs, preferences and limitations of end users of a product or service are given extensive attention in each stage of the design process. The product or service is designed to fit as easily as possible into people's lives, rather than making them significantly change their behaviour to accommodate the product.

2 User-Focused Latrine Design

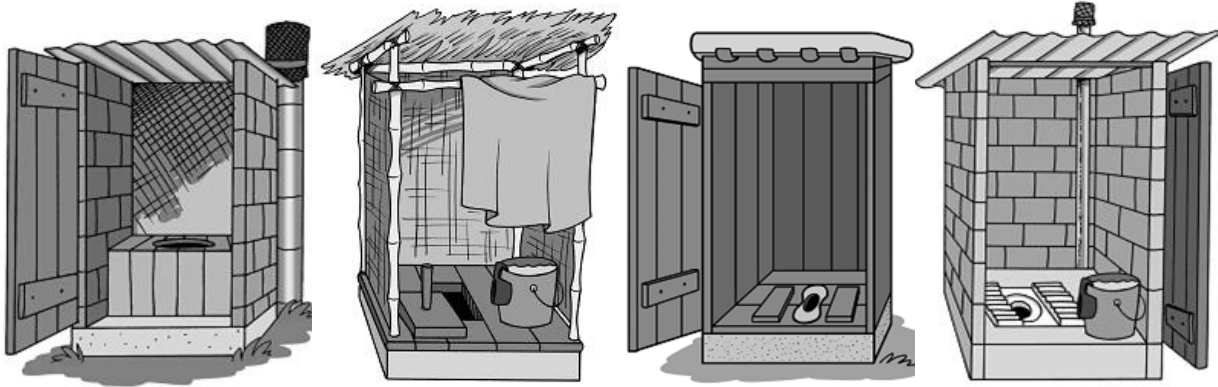
User-focused design is a process that starts with the people you're designing for and ends with new solutions that are tailored to suit their needs (IDEO, n.d.). User-focused design means always keeping the users in mind while designing the latrine.

The concept of applying user-focused design to latrines is based on research and stories describing what people want in a latrine, and how often sanitation projects do not take these things into consideration. People around the world want beautiful, clean, comfortable and smell-free latrines. They want to empty their latrine as seldom as possible. And they want convenience, safety, privacy, dignity and to feel pride in their latrine (Cairncross, 2004; Sugden, 2014; O'Connell, 2014).



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While there are some things that all people generally want, there are also specific preferences within communities or households that can be identified and addressed. There must always be a balance between something that will function properly, what people want, and what they can afford.



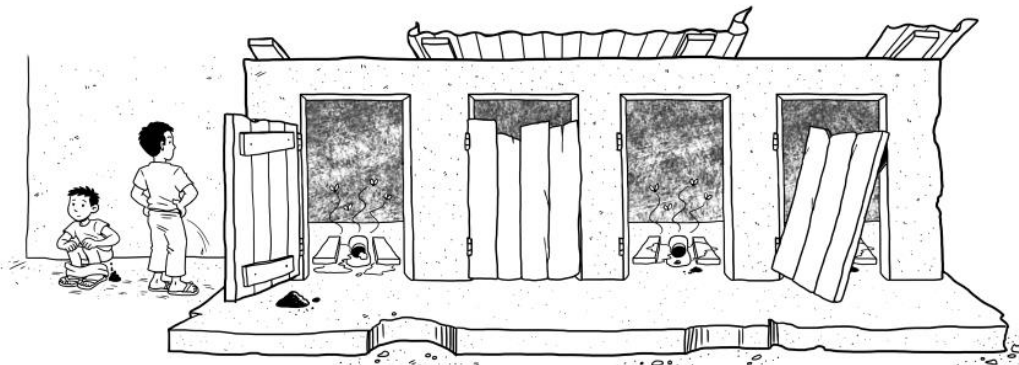
Designing a latrine must be based on many factors

Changing behaviour is difficult. The closer a latrine matches people's needs and preferences, the less convincing they will need to use the latrine. As a result, there will be less behaviour change support needed within the project. Latrines designed to have as few and as small modifications to people's current behaviour as possible, make it much easier for them to adopt it. If major changes are required to their behaviour, fewer people will change, and more effort will be required to promote the new behaviour.



Considering the people is a critical first step in designing a latrine. A person's experience involves everything they see and touch, as well as how they feel when using the latrine. Somebody will only like and use a latrine if it is safe, socially and culturally acceptable, comfortable, easy to clean, and adequate for their needs.

Unsuccessful sanitation projects have shown that if latrines do not suit people's needs, and often more importantly their preferences, then they will not be used. If latrines are not used by everyone, they are not effective for protecting public health.



Latrines that do not meet people's needs and preferences will not be used

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You must really know the users. There are many ways to do this. It may include discussions, interviews, focus groups, and just spending time with the people. Getting to know your users includes understanding who will be using the latrine (such as men, women, children, and people who have disabilities). It also means understanding many social and cultural preferences:

Some people

- Defecate in the open
- Defecate in or near water
- Defecate in or near the home
- Squat
- Use water for anal cleansing
- Defecate and urinate with others

But others

- Defecate in a sheltered place
- Use a dry place
- Defecate far from the home
- Sit
- Use solid material for anal cleansing
- Defecate and urinate as a solitary experience

(Adapted from Pickford, 1995)

Local beliefs and practices must also be taken into consideration. For example, in some cultures:

- People are not to be seen entering or leaving a latrine
- People need to practice ritual bathing before and/or after defecation
- People are not allowed to defecate near sacred places or other people's property
- People refuse to handle human excreta or use urine as fertilizer on crops
- People want to protect or hide their feces to prevent others from using them in witchcraft
- People do not want to mix their excreta with other people's
- People believe that spirits reside in the ground; therefore, digging a hole and defecating on them is unacceptable
- People believe that defecation should be done in the open, not inside structures
- A woman may not use same latrine as her son-in-law or father-in-law



Designing a latrine with the users in mind, and letting households choose which latrine they want to build, may result in a different latrine for each household. But the chances of people liking and using their latrines are much greater!

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People's needs and preferences will not only influence the parts chosen for inside the latrine. They will also influence choices about other components of the sanitation system – such as the excreta storage method, if and how the latrine is emptied, sludge treatment, and how the sludge is used or disposed of. These parts of the sanitation system will also affect a user's satisfaction with the latrine. If not immediately, then within a few years. Implementers and communities need to know how to safely deal with full latrines when that time comes. If users do not know what to do when their latrine is full, or if latrine emptying is not convenient or affordable, they may abandon their latrine at that time.

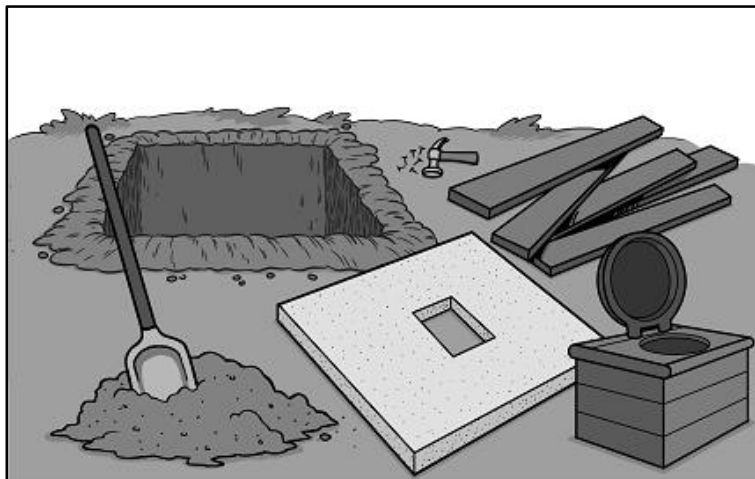
See CAWST's Technical Brief: Introduction to Sanitation for more information about the entire sanitation system.



Design Tip

To increase the sustainability of the sanitation system over the long term:

- Consider the entire sanitation system while designing the latrine in the first place
- When the time comes, ensure that people are equipped to empty their latrines and have a way to treat, use or dispose of the sludge



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3 Selecting Latrine Technologies

A latrine is made up of the user interface (the “front-end”), and a place to store the excreta (the “back-end”). There are numerous technologies that may be combined to design a latrine. The latrine parts that need to be selected include the following:

- Toilet inside a latrine into which people urinate or defecate
- Slab for a person to stand on while using the latrine
- Superstructure to provide people privacy and shelter from the weather
- Accessories that people may need inside the latrine, such as anal cleansing materials, handrails, or a place to wash menstrual pads
- Handwashing station to use afterwards
- Pit, tank or chamber to store the excreta



An overview of technology options for each latrine part are described in the following CAWST resources:

- Technical Brief: Sanitation System – User Interface (toilet, slab, superstructure, accessories)
- Technical Brief: Sanitation System – Excreta Storage (pits, tanks and chambers)
- Technical Brief: Handwashing
- Sanitation Fact Sheets (pits, tanks and chambers)

Any combination of latrine parts will have particular advantages and limitations. There are five main criteria that should take into consideration when deciding which latrine technologies are most suitable for a local context:

1. People’s needs and preferences
2. Environmental and technical factors
3. Local materials, products and skills
4. Economic factors
5. Health and safety

In addition, other factors must also be considered, such as:

- The implications of a technology choice on other components of the sanitation system
- Regulatory environment the supports the implementation of the latrine technology

Each of these criteria are described in the following sections. This list of criteria is not exhaustive and others which are important to the stakeholders can also be added.

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3.1 People's Needs and Preferences

People's opinion about the latrine will affect its adoption and consistent use. They may have specific ideas about what toilet, superstructure, or pit, tank or chamber they want.

Guiding questions to consider when designing a latrine from the perspective of the user are given below:

- Is there a squatting pan or a seat?
- Is the toilet dry or does it use water to flush?
- Is urine diversion required, and are people willing to use it?
- What anal cleansing materials are used?
- Is the latrine accessible for all users, including children, the elderly, sick and people with disabilities?
- Does the latrine meet girls and women's needs for menstrual hygiene management?
- Is the latrine constructed with good quality materials?
- Do people feel safe when walking to and using the latrine?
- Is the latrine easy to use?
- Is the latrine easy to clean and maintain?
- Will people feel proud of their latrine?
- Are people willing to handle or use the sludge?



3.2 Environmental and Technical Factors

Selecting appropriate latrine parts will depend on the local environmental factors (such as groundwater and soil conditions) and technical factors (such as how the latrine works).

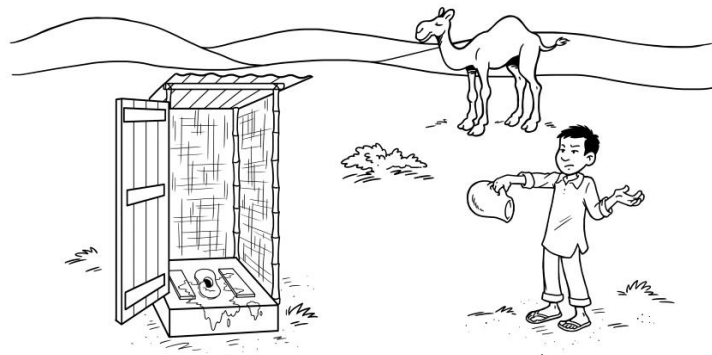
Guiding questions to help consider the environmental and technical factors include the following:

- What are the soil and groundwater conditions?
 - The more distance between the latrine and the groundwater table, the lower the risk of contamination. The bottom of a latrine pit should be at least 2 metres above the highest annual groundwater level (Franceys et al., 1992). A latrine that allows liquid to infiltrate into the soil (like a pit latrine or septic tank) is not recommended if there is a high groundwater table.
 - Ground conditions may make it difficult to dig a latrine pit or construct a tank or chamber belowground. This may be due to rocky ground, clay or compacted soils, or soils that collapse into the excavation.



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- How well does the latrine work under the soil and groundwater conditions?
 - For example, pit latrines dug in clay soils will fill more quickly since very little liquid will infiltrate into the ground.
- What are the drinking water sources and how close are they located to the latrine?
 - The greater the horizontal distance between the latrine and the drinking water source, the lower the risk of contamination. 10 metres is the minimum distance and 30 metres is often recommended. For example, if the drinking water source is less than 10 metres away from the latrine, then a pit latrine design should not be used and other latrine design should be considered.
- How many other latrines are located in the community?
 - In densely populated areas, there is an increased risk of contaminating groundwater from too many latrine pits or septic tanks in a small area. In this situation, other latrine designs that do not infiltrate liquid into the soil should be considered.
- Can the latrine operate in the local environmental conditions (e.g., high or low temperatures, drought, floods)?
 - For example, latrine pits should be designed larger in cold climates due to the slowing down of biological processes in low temperatures, the lack of infiltration into frozen ground, and the uneven settling or piling up of frozen excreta.
 - For example, latrines should be designed so that they do not fill with water in areas that experience frequent or seasonal flooding.
- Is there enough space to construct the latrine?
 - Space limitations restrict the types of latrines that can be installed. For example, if there is no space to dig a new latrine when it becomes full, then the latrine must be designed to be emptied.
- Is there reliable and sufficient access to water in all seasons?
 - For example, pour flush latrines need water to hygienically flush the excreta into the pit, tank or chamber.

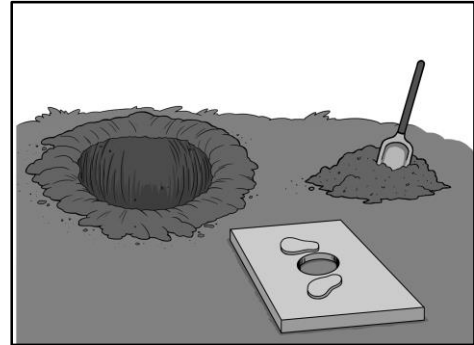


For more information on environmental and technical factors, see CAWST's Technical Brief: Siting Latrines and Technical Brief: Latrines in Challenging Environments.

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3.3 Local Materials, Products and Skills

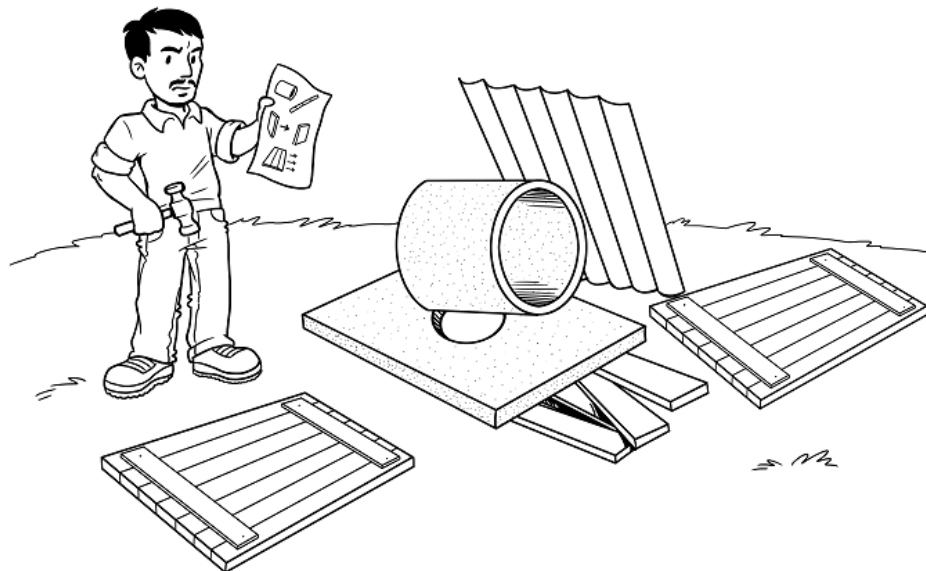
Some latrine technologies will be more suitable than others depending on what materials, products and technical skills are locally available. Some households may be able to construct parts of the latrine themselves (e.g., digging the pit, building the superstructure), while other households may need (or prefer) to hire labourers or skilled craftspeople to construct the latrine. Some latrines may need to be designed by skilled professionals or constructed by skilled craftspeople (e.g., chambers, slabs, biogas reactors). There may be a local business producing latrine products, such as concrete slabs and rings for lining pits.



If the technical skills required to produce a high-quality product are not available or cannot be developed locally, then the latrine technology may not be appropriate and other options should be assessed. The same is true for operating, maintaining and emptying latrines.

Guiding questions to help consider the latrine in terms of local materials, products and services include the following:

- Are materials available locally for constructing, maintaining and repairing the latrine?
- Is the supply chain reliable?
- Do local people have the technical skills for constructing, maintaining and repairing the latrine?
- What training is needed to improve the level of local technical skills?
- Who will help a user if they have a problem or question?



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3.4 Economic Factors

Latrines are not free for implementers or users. Latrine costs can vary widely in different contexts and settings. Local factors need to be taken into account, such as what materials, products and skills are available in the community. As well, some latrine technologies (like pour flush pit latrines and septic tanks) are more expensive than others to build and maintain since they require more material and skilled construction. The following table shows a range of initial and ongoing costs for some common latrines types.

Initial and Ongoing Costs for Different Latrine Types¹

Latrine Type	Initial Costs Per Latrine (US\$ in 2011)	Ongoing Costs Per Person Per Year ² (US\$ in 2011)
Pit latrine with impermeable slab often made from local materials	7-26	1.5-4
Pit or ventilated improved pit (VIP) latrine with concrete slab and superstructure	36-358	2.5-8.5
Pour flush pit latrine or septic tank latrine with concrete slab and concrete or brick-lined pit/tank	92-358	3.5-11.5

¹ Costs based on latrines used in Burkina Faso, Ghana, India and Mozambique.

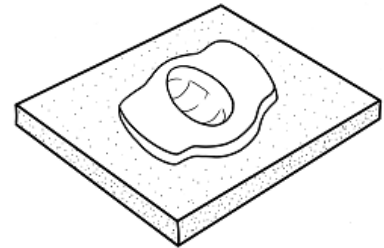
² Includes operation and maintenance, pit emptying (VIP, pour flush and septic tank latrines), and direct support through project implementation.

(WASHCost, 2012)

Successful cost recovery is an important part of latrine and project sustainability. Implementers need to figure out who is financially responsible for which costs and how the following costs can be covered:

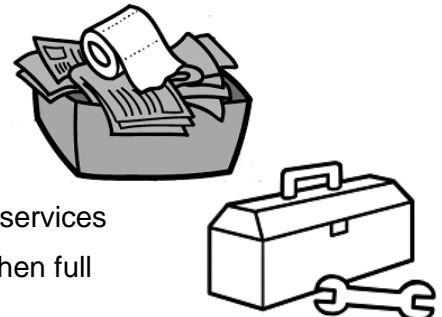
- Initial costs (also called capital costs) to construct the latrine:

- Toilet
- Slab
- Superstructure
- Handwashing station
- Pit, tank or chamber



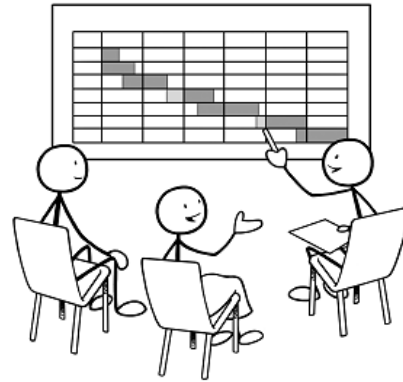
- Ongoing costs (also called recurrent or operating costs) to operate and maintain the latrine:

- Anal wiping materials
- Cleaning supplies
- Water for flushing and anal cleansing
- Repairs or replacement parts
- Latrine emptying, sludge treatment and/or disposal services
- Digging a new pit if the latrine will not be emptied when full



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- Implementation Costs:
 - Running the project (e.g., staff, office space)
 - Promoting latrines and creating demand
 - Educating people about how to use the technologies
 - Provide ongoing support for users (may go beyond the life of the current project)



It is important to consider both the ability and the willingness of the households to pay for the initial and ongoing costs. Households and communities must be able to pay the ongoing costs of operating and maintaining the latrine and overall sanitation system. However, some form of cost sharing is usually required to make the high initial cost of constructing a latrine affordable to the poor. Latrines are often subsidized so that users contribute a portion of the initial costs, whether it is money, materials or labour.

Guiding questions to help consider the economic factors of a latrine include the following:

- What are users *able* to pay for?
- What are users *willing* to pay for?
- How will poor or vulnerable households who cannot afford the latrine be included?
- Are there opportunities for economic benefits, for example using urine as a fertilizer, or creating a pit emptying business?
- Can the project implementer cover the full costs of latrine implementation, including project planning and administration, promotion and education activities, product manufacturing and distribution, monitoring for improvement, and evaluation?

3.5 Health and Safety

Latrines, whether designed and constructed well or poorly, have an impact on people's health and the environment. For instance, if latrines are not kept clean, people may come into contact with excreta, or may not use the latrine at all. Latrines, especially communal or public latrines, can be a place of abuse, particularly for women and children. People using the latrine should feel safe and personally secure from harm or attack. If latrines contaminate groundwater, drinking water sources may be contaminated with fecal pathogens and people may become sick. When emptying latrines, manual workers have possible health and safety risks such as contacting excreta and collapsing pits, while communities may be exposed to spilled sludge.



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Guiding questions to help consider the health and safety risks of a latrine include the following:

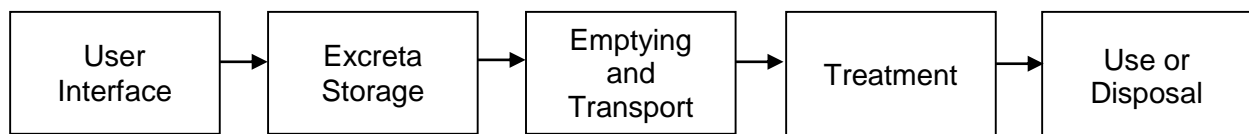
- Does the latrine prevent human contact with the excreta?
- Does the latrine prevent flies and animals from contacting the excreta?
- How will local and downstream drinking water sources be protected from possible contamination?
- If the latrine technology is implemented at scale, could there be wider negative environmental impacts?
- Is the latrine slab solid and safe for users to stand on?
- Will people, especially women and children, be safe while accessing and using the latrine?
- Is the latrine safe to empty using manual or mechanical methods?
- How well does the latrine treat the sludge to make it safer to handle when emptying?
- How will the community and environment be protected when full latrines are emptied?
- If excreta is used for agriculture or other purposes, how well is the sludge treated to make it safe to handle and use?



3.6 Implications on Other Sanitation System Components

All components of the sanitation system must be considered when selecting an appropriate latrine, including latrine emptying and sludge transportation, treatment, use and disposal.

Sanitation System



The technology selected for one latrine part will impact which technologies are suitable for other latrine parts. No part of a latrine can be considered in isolation. Each part affects the entire sanitation system, as shown in the following examples.

- **User Interface:** The type of toilet and anal cleansing materials used will influence the pit, tank or chamber technology that is possible. For instance, pour flush toilets are very common in Asia and are generally desired by households. A latrine pit or septic tank can be connected to a pour flush toilet, but composting and dehydrating latrines can only be used with dry toilets.
- **Latrine Emptying:** Some latrine technologies, like septic tanks and aqua privies, are designed to be emptied periodically. For other latrine technologies, like pit latrines, people need to decide whether to empty the pit to reuse it or dig a new one. How often latrines will be emptied will influence the size of the pit, tank or chamber. Pits that will be emptied manually (with shovels and buckets) should not be more than 1.5 metres deep (for safety).



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- **Sludge Treatment, Use or Disposal:** Some communities wish to use human excreta as a soil amendment in agriculture. In this case, the latrine technology selected needs to reduce the risk of transmitting pathogens and ensure that the excreta is safe to use and handle. Biogas, composting or dehydrating latrines can treat the excreta and would be more appropriate than a pit latrine. Urine diversion can also be considered with any latrine if the household is interested in using urine as a fertilizer.

3.7 Regulatory Environment

Latrine technologies should be aligned with local and national standards. Your sanitation project may get support from government institutions. Government support is important to help you achieve scale up and sustain latrine use over the long-term.

Guiding questions to help assess the regulatory environment include the following:

- What are the local and national regulations for latrines?
- Does the latrine technology meet the local and national regulations?
- Is the local or national government involved in promoting sanitation, building latrines or subsidizing latrines?
- Does the government promote a particular latrine technology or implementation approach?
- Are there any centralized sanitation services that may be potential partners, such as sewerage services, pit emptying services, or sludge and wastewater treatment facilities?



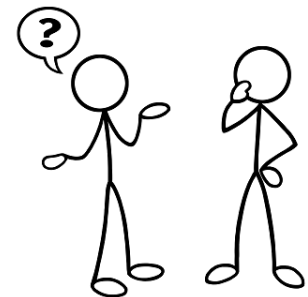
There may be centralized sanitation services you can partner with
(Credit: AKVO, nd)

4 Who Decides?

Decision making around sanitation system design and latrine technology selection can take place at many levels, ranging from government officials and politicians to project implementers and community organizations.

However, the people who will own and use the latrine should make many of these decisions for themselves. This will help to ensure that the sanitation system is appropriate, wanted and valued. Participating in the decision making process also helps to give people a sense of ownership of the problem and responsibility for their decisions.

While community outsiders should not prescribe models of sanitation systems, we do believe that the community should have someone to advise them on technical aspects. That person would help people choose appropriate technologies for them based on key criteria such as user needs and preferences, technical and environmental factors, affordability (initial and ongoing costs), and excreta handling requirements. We believe that this advice will:



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- Enable the community to choose the most appropriate technologies for them (including those they may not have been aware of)
- Result in a higher quality of sanitation service which is more likely to be acceptable and therefore sustained
- Ensure that people understand the implications of their choice and are prepared for the ongoing maintenance or cost requirements
- Result in the use of sanitation technologies that are technically sound and truly reduce the risk of disease

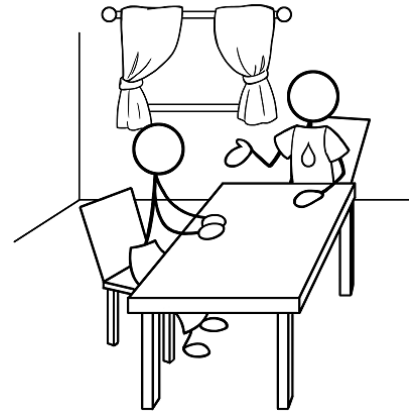
CAWST's experience with household water treatment and safe storage (HWTS) implementation has made us confident that implementers can provide this type of technical advice while still leaving control in the hands of the users, where it belongs.

5 How Do You Decide?

There is no single, right way to make decisions. They are often made practically based on the information and resources available. Decision making can be a formal process undertaken by the stakeholders (such as project implementers, regulators and users) or be done informally by individuals.

Underlying any decisions about latrines should be the users. This is the process of user-focused design: considering the users' needs and preferences when designing and selecting every technology.

Various decision making tools are available to help identify a sanitation system that is best suited for the local context. They can be used to help compare different sanitation options against criteria which are important to the stakeholders. They can also be used to understand users' needs and preferences, and design latrines together.

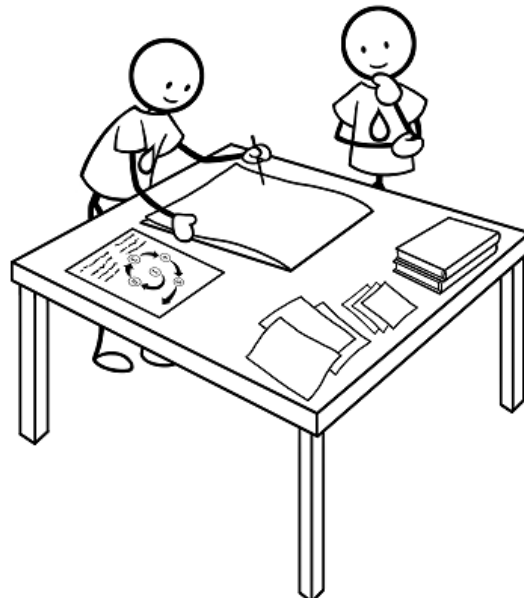


There are generic decision making tools commonly used as part of project planning which can also be used to assess latrine technologies. The Matrix Scoring Tool, Weighted Matrix Scoring Tool and Ranking Line Tool are described in the following pages. These tools are participatory activities which encourage the involvement of different stakeholders in a group process. They are designed to build self-esteem and a sense of responsibility for one's decisions. Experience shows that when everyone contributes to the decision making process, people feel more ownership of the problem and develop more appropriate solutions for their situation.

As well, there are decision making tools created specifically for sanitation. The following resources were developed by various organizations to help project implementers and decision makers select an appropriate latrine technology:

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- Eawag developed the document the Compendium of Sanitation Systems and Technologies (Tilley et al., 2014), and its online version, the e-Compendium. The Compendium presents detailed information about sanitation technologies for each component of a sanitation system. It also includes sanitation system templates that can be used to design a system, and the e-Compendium has an online tool for combining technologies into a complete sanitation system.
- The Concerted Municipal Strategies Methodological Guide No.4: How to Select Appropriate Technical Solutions for Sanitation (Monvois et al., 2010) promotes the entire sanitation chain, including user experience, latrine emptying and excreta transportation, treatment, use and disposal. The Guide uses a three-step process to select technologies that are adapted to the local context and provides questionnaires, decision tables and technical fact sheets.
- WASHTech (2013) developed the Technology Assessment Framework (TAF) to objectively assess criteria and help select appropriate water and sanitation technologies, including latrines. TAF uses questionnaires to screen and assess the applicability and sustainability of a specific technology within a local context. The tool asks guiding questions to help assess 16 different criteria including social, technical, economic, environmental, skills and knowledge, as well as legal, institutional and organizational.
- WASTE (2011) developed a Sanitation Decision Support Tool that tries to reduce bias in decision making and help determine the best options suitable for the local situation. The tool promotes the entire sanitation system, including user interface, latrine emptying and excreta transportation, treatment, use and disposal. The tool can be used on an individual level, but it is also practical to start a discussion with a group or show decision makers alternatives to more common solutions. The tool is currently available in paper form and being adapted by AKVO into an online tool.
- WEDC (2013) created a guide to sanitation selection that uses a decision tree to help select an appropriate latrine technology. The tool focuses mainly on environmental and technical factors.



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Matrix Scoring Tool

What Is It? This tool places the different latrine options side by side on a table or matrix to compare them. Participants rate them against various agreed-upon selection criteria, usually with a simple scoring system, and then total their respective ratings. The totals indicate which latrine options appear to be best choices.

Why Use It? Matrix scoring provides a way to score and compare different things against the same criteria. It enables intuitive preferences to be quantified in a logical manner. The matrix can be posted and visible to all so that the activity can be done in a participatory manner. The visual nature of the tool facilitates comparative scoring of the choices, even by participants who would not otherwise understand how to use spreadsheets.

How To Use It

1. Agree on what subject and options to discuss. For example, 'What latrine technology are we going to promote in our community?' Draw or write each option on a separate card. This is called an options card.
2. Agree on criteria for scoring the options. This will depend on what is important to the participants. For example, criteria for prioritizing ways of selecting a latrine technology may be: 'Less expensive', 'Easy to use', 'Easily accessible by all users', 'Fit with local beliefs and traditional practices' and 'Beneficial use of excreta'. The selection of criteria for scoring is a very important part of this process. Help the participants to discuss and agree to the criteria and allow enough time for this part of the process.
3. Draw a matrix – a big rectangle with rows and columns. The number of columns is the same as the number of options cards plus one more, the leftmost one, for the criteria.
4. Put one option card at the top of each column, except the leftmost one.
5. Put the criteria in the leftmost column, each to its own row, starting with the second row from the top.
6. Agree to a scoring method. For example, numbers 1–10, where 1 is very low and 10 is very high.
7. Give each option a score for each of the criteria. Participants can use beans or stones, or write in their scores for each criterion and this is totalled. Using beans or stones to 'vote' allows participants to make changes easily during discussion and provides a visual of what the scores are.
8. Add up the scores and write the total score under each option. It is OK to give the same score to different options.
9. When the matrix is finished, encourage the participants to discuss what the matrix shows. Talk about whether the matrix makes sense or whether there should be further discussion or the weighing-in of expert opinion. Sometimes the results will not be acceptable to the group, but it can provide insights to further refine the decision making process or identify where they need to adapt their project implementation.

(Adapted from International HIV/AIDS Alliance, 2006)

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Weighted Matrix Scoring Tool

What Is It? This tool is a version of the Matrix Scoring Tool. Agreed-upon weights or multipliers are assigned to each criterion to take into account their relative importance to each other. This helps prioritize options according to the criteria that participants think are most important.

Why Use It? Weighted matrix ranking is most useful if there are many criteria and some are much more important than others. If there are only three or four criteria of roughly equal importance, then the Matrix Scoring Tool will be more useful.

How To Use It

There are at least two ways to do this, after following the previously mentioned steps outlined in the Matrix Scoring Tool.

Option 1: Where the 'voting' system is by beans or stones, discuss before 'voting' the relative importance of each criteria so the group can get a sense of such. Participants are then given the same amount of beans and are free to budget them in as many or as few of the choices and criteria they deem important.

Option 2: If 'voting' is by conventional scoring, the groups will agree first on the relative weights of the criteria. For example, one criterion will have a weight of 0.2, another 0.3, and a last one 0.5 for a total of 1.0. These weights are written beside their respective criterion.

'Voting' then proceeds as usual. The scores for each criterion are then multiplied by its weight before the scores are totalled under each option. Optional: A computer spreadsheet (e.g., Excel) connected to a projector can be used to do the calculations.

(Adapted from International HIV/AIDS Alliance, 2006)

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Ranking Line Tool

What Is It? This tool involves drawing a line and placing things on it in order of their preference.

Why Use It? Using a ranking line helps to:

Put things visually and spatially in order of preference and show the reasons for the order
Resolve the sometimes varied or conflicting concerns and priorities of different people
Decide which problems are most serious or most common, and why
Illustrate how information gained during an assessment relates to each other
Select technologies according to agreed criteria – for example, the technology that is most cost effective for a community

How To Use It

1. Agree on what latrine technologies to rank.
2. Draw or write each of the technology options to be ranked on separate cards ('option cards').
3. Agree on the first reason for ranking these items. For example, the first reason for ranking the latrine technology options could be how effective participants think each one is.
4. Draw a long line. Use drawing or writing to show what the line represents – for example, effectiveness of different technologies. One end of the line should represent 'most effective' and the other end 'least effective'.
5. Discuss each option card and decide where to place it on the line. For example, if participants are ranking the effectiveness of different technologies, the most effective treatment option will be placed at one end of the line. The least effective treatment option will be placed at the other end of the line. Cards of equal ranking can be put beside each other.
6. Repeat the process for other criteria. Draw a new ranking line for each criterion.
7. When the activity is complete, discuss what the ranking lines show. For example, compare where items have been placed on different lines. Are there items that always appear high or low on the ranking lines? Relate such insights to how selection of the preferred decisions will be made.

(Adapted from International HIV/AIDS Alliance, 2006)

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6 Additional Resources

CAWST Sanitation Resources. Available at: www.cawst.org/resources

- CAWST's education and training resources are available on a variety of sanitation topics including latrine design, siting and construction; latrine parts and technologies; latrine emptying and transporting sludge; sludge treatment, use and disposal; and latrine project implementation.

Compendium of Sanitation Systems and Technologies. Tilley, E., Ulrich, L., Lüthi, C., Reymond, P. and C. Zurbrügg (2014). 2nd Revised Edition. Eawag: Swiss Federal Institute of Aquatic Science and Technology, Dübendorf, Switzerland. Available at: www.eawag.ch/forschung/sandec/publikationen/compendium_e

- The Compendium presents the concept of sanitation systems together with detailed information about sanitation technologies for each component of sanitation systems. The document targets engineers, planners and other professionals who are familiar with sanitation technologies and processes. However, it is also a useful document for non-experts to learn about the main advantages and limitations of different technologies and the appropriateness of different systems.
- The e-Compendium, is an online, interactive version of the Compendium, complete with a tool for combining technologies into a complete sanitation system. Available at: <http://ecompendium.sswm.info>

Design Kit. By IDEO.org. Available at: <http://www.hcdconnect.org/methods>

- A website devoted to human-centered design with over 50 design methods, a suite of videos, full case studies, and a chance to connect with other entrepreneurs, designers, and social sector innovators.

A Guide to Sanitation Selection. Water, Engineering and Development Centre (2013). Poster 21. WEDC, Loughborough University, UK. Available at: http://wedc.lboro.ac.uk/resources/posters/P021_A_guide_to_sanitation_selection.pdf

- WEDC provides a decision tree to help select an appropriate latrine technology.

How to Select Appropriate Technical Solutions for Sanitation. Monvois, J., Gabert, J., Frenoux, C. and M. Guillame (2010). Concerted Municipal Strategies Methodological Guide No.4. Municipal Development Partnership (MDP) and Programme Solidarité Eau (pS-Eau). Available at: www.pseau.org/fr/recherche-developpement/production/smc/six-methodological-guides

- This methodological guide promotes complete sanitation systems, presents the main categories of technical options, and provides assistance in selecting technologies that are appropriate to the local context.

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Latrine Design: Go in Peace. Sudgen, S. (2014). *Waterlines* Vol. 33, No. 3, pp 220-239.

Available at:

<http://practicalaction.metapress.com/content/q4l2807051kr4863/?p=2f1c6f9d88d641c98d6461db9dd5a866&pi=3>

- Many latrines have been built from a purely functional and economic perspective, with little consideration of what people want their latrine to be like. This paper provides clear recommendations for designing a latrine that people want to use. It considers both the engineer and the designer's perspectives. Using clear language, it explains that everybody in the world wants a comfortable, well lit, smell free, private, pleasant place to defecate, and how to achieve these preferences in a latrine design.

Sanitation Decision Support Tool. WASTE (2011). Gouda, the Netherlands. Available at: <http://waste.nl/en/product/the-sanitation-decision-support-tool>

- This support tool was designed to help practitioners decide on the best technology options suitable for the local situation. The tool addresses complete sanitation systems. An online version will soon be made available at: http://akvopedia.org/wiki/Decision_%26_Assessment_Tools

WASH Technologies Assessment Framework. WashTech (2013). Available at: www.washtechnologies.net

- WASHTech developed a Technology Assessment Framework (TAF) to objectively assess criteria and help select appropriate water and sanitation technologies, including latrines.

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CAWST (Centre for Affordable Water and Sanitation Technology)
Calgary, Alberta, Canada
Website: www.cawst.org Email: resources@cawst.org
Wellness through Water.... Empowering People Globally
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