



Realising safely managed sanitation in Bhutan



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For more information: www.snv.org/sector/water-sanitation-hygiene

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For more information visit: www.snv.org/project/ssh4a-bhutan

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Photos ©SNV/Tashi Dorji: (Cover) Training masons on FSM and construction of ATPs | **(P11)** Aerial view of Y junction connected to two pits

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Contents

List of abbreviations	1
Background	2
Introduction	3
Regulatory framework	3
Current situation	4
Pit emptying occurrences	5
What do we know?	5
What do we not understand?	7
Safely managed sanitation	8
Technology options	8
Safe containment options	8
Intervention logic	9
Alternating twin pits	10
Upgradeable offset pit latrine	11
What else?	11
References	12

Figures

Figure 1: SSH4A model for phase 1 districts	2
Figure 2: SSH4A model for phase 2 districts	2
Figure 3: JMP sanitation service levels	4
Figure 4: Toilet ownership by wealth quintiles (WQ)	4
Figure 5: Most common pit configurations	5
Figure 6: Pit dimensions	5
Figure 7: Aerobic vs anaerobic digestion zones	6
Figure 8: Sanitation services chain	8
Figure 9: Intervention matrix	9
Figure 10: Overview of onsite sanitation technologies	10
Figure 11: Toilet with alternating twin pits	10

List of abbreviations

BCC	Behaviour Change Communication
BFL	Beyond the Finish Line
FSM	Faecal Sludge Management
HSF	Household sanitation facility
JMP	WHO/UNICEF Joint Monitoring Programme
NEPA	National Environment Protection Act of 2007
ODF	Open defecation free
RSAHP	Rural Sanitation and Hygiene Programme (of the Government of Bhutan)
SSH4A	Sustainable Sanitation and Hygiene for All (rural sanitation programme of SNV)

Background

Beyond the Finish Line (BFL) is a five-year multi-country programme (2018-2022) that is being implemented by SNV in Bhutan, Lao PDR, and Nepal as part of the Australian Government’s Water for Women Fund. It builds on the 2008-initiated Sustainable Sanitation and Hygiene for All (SSH4A) programme. The programme in Bhutan is led by SNV together with the Public Health Engineering Division of the country’s Ministry of Health. It is implemented with district authorities, national civil society partners, and small-scale private sector actors in collaboration with the Institute for Sustainable Futures, University of Technology Sydney and CBM Australia.

Building on the tested and proven SSH4A approach, the project contributes to the improved health conditions and well-being of communities in eight rural districts, and accelerates gender equality, social inclusion, and safely managed services within Bhutan’s national Rural Sanitation and Hygiene Programme (RSAHP).

This learning paper explains the current sanitation situation in the SSH4A programme districts and, thereafter, explores and discusses options to work towards safely managed sanitation.

Sustainable Sanitation and Hygiene for All¹

SNV’s Sustainable Sanitation and Hygiene for All (SSH4A) programme supports local governments to lead and accelerate progress towards district-wide sanitation and hygiene services with a focus on institutional sustainability and learning. Developed since 2008, SSH4A is implemented as part of government-led rural sanitation programmes across 19 countries in Africa and Asia.

The SSH4A approach recognises two different phases each with four integrated components supported by performance monitoring and learning. The four phase 1 districts of Chukha, Dagana, Punakha, and Zhemgang focus on increasing area-wide sanitation and hygiene access and usage for all.

The four phase 2 districts of Lhuentse, Pemagatshel, Trashigang, and Samtse consolidates the gains of Phase 1, with a focus on transitioning to a service delivery model that ensures long-term access to safely managed services.¹

Figure 1: SSH4A model for phase 1 districts **Figure 2: SSH4A model for phase 2 districts**



¹ Visit the SNV website to learn more about the SSH4A approach: <https://snv.org/product/sustainable-sanitation-and-hygiene-all-ssh4a>

Introduction

In 2012, the Ministry of Health in Bhutan adopted the SSH4A approach as the basis for the national approach, RSAHP. 'Historically, Bhutan has had low levels of improved sanitation coverage...

In 2010, the official percentage of access to sanitation was 89%, but actual access to hygienic toilets was estimated at 54%. The remainder of toilets were unimproved facilities, many of which were not in use.²

The Government of Bhutan's vision is for all its citizens to have access to improved sanitation facilities by 2022.³ As of date, there is no baseline or targets for safely managed sanitation. Nevertheless, toilets will fill up and their contents will need to be safely managed to avoid faecal waste ending up in the environment.

Although the level of access to improved sanitation in Bhutan at national level is higher than in many other developing countries in terms of coverage (78%),⁴ it is generally of poor standard with various management issues.⁵ The 2020 National Sanitation and Hygiene Policy⁶ expresses under policy objective 1 – 'achieve universal coverage and access to sustainable services for all' – the intention to ensure safely managed sanitation services for all. However, it does not provide a specific timeframe.

Authorities in the RSAHP districts have demonstrated improved capacity to create open defecation free (ODF) communities and districts, but have yet to fully progress beyond ODF status and move towards safely managed services. To respond to the challenges of safely managed sanitation and sustain and build on post-ODF sanitation gains requires further innovative approaches, guidance, and capacity-building efforts.

Regulatory framework

Bhutan's Constitution mandates that the government has the responsibility to preserve, conserve, and improve the environment; prevent pollution; secure ecologically balanced sustainable development; and enable a safe and healthy environment.

Environmental sustainability is an essential element of Bhutan's development philosophy of 'Gross National Happiness' and so specific policies and laws have been developed to preserve Bhutan's natural resources. The National Environment Commission plays a critical role in monitoring and enforcing these laws.

The 2019 National Waste Management Strategy illuminates that waste management measures in general have not been effectively implemented due to limited resources, lack of capacity of urban authorities (*Thromdes*), districts (*Dzongkhags*), and implementing agencies, and lack of awareness and cooperation among the general public.⁷

The National Environment Protection Act of 2007 (NEPA) sets the overarching legal framework for environmental protection and management in Bhutan. Based on the NEPA, a series of sector-specific strategies, policies, acts, and regulations have been drafted. The Waste Prevention and Management Act 2009 and the Waste Prevention and Management Regulation 2012, including its 2016 Amendment, should be providing the legal framework for faecal sludge management (FSM) related activities. However, management of onsite sanitation (including FSM and wastewater discharges) is not covered by the legislation.

Bhutan's strategic goal, as expressed in the 2019 National Waste Management Strategy, is to move towards 'Zero Waste Bhutan by 2030'. Although strongly focusing on solid waste management, but not providing any specific targets for FSM, the strategy provides some insight into interventions proposed to improve wastewater management in the districts.

² SNV, 'Sustainable Sanitation and Hygiene for All (SSH4A) in Bhutan', *Systems change case study*, The Hague, SNV, 2020, <https://snv.org/assets/explore/download/202010-sanitationhygiene-systems-change-case-study-bhutan.pdf>, (accessed 1 October 2021), p. 2.

³ Kuensel, 'Zero open defecation and improved sanitation for all by 2022', *Kuensel Online*, Thimphu, Kuensel, 2020, <https://kuenselonline.com/zero-open-defecation-and-improved-sanitation-for-all-by-2022/>, (accessed 10 December 2021).

⁴ UNICEF and WHO, *Progress on household drinking water, sanitation and hygiene 2000-2017. Special focus on inequalities*, New York, UNICEF, 2019, <https://www.unicef.org/reports/progress-on-drinking-water-sanitation-and-hygiene-2019>, (accessed 1 October 2021).

⁵ Royal Government of Bhutan, *National Sanitation and Hygiene Policy 2020*, Thimphu, Royal Government of Bhutan, 2020, p. 4.

⁶ Royal Government of Bhutan, 2020, p. 8.

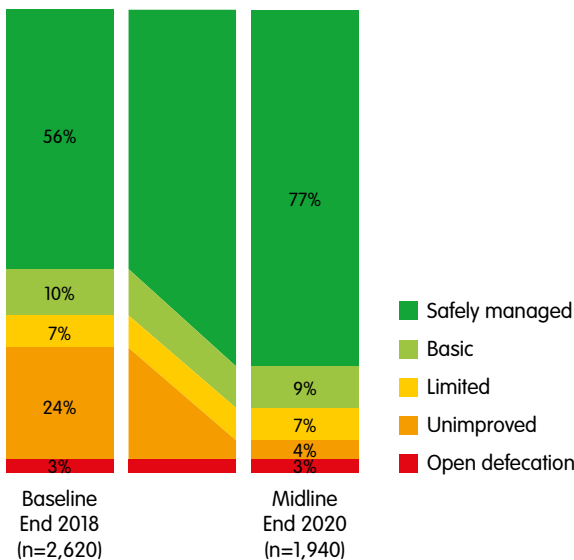
⁷ The National Waste Management Strategy 2018 was launched by Her Majesty The Gyaltsuen Jetsun Pema Wangchuk last 2 June 2019.

FSM Guidelines for the Rural Sanitation and Hygiene Programme were published in November 2019 by the Ministry of Health to guide stakeholders to implement safe management of faecal waste in rural areas. Suitable pit emptying methods for different types of toilets are explained, however, no guidance is provided on what to do with the collected faecal waste.

Current situation

At the onset of the BFL programme there was no government data available on safely managed sanitation services as defined by the WHO/UNICEF Joint Monitoring Programme (JMP).⁸ The SSH4A programme, however, has been measuring access and use of safely managed sanitation service levels in the eight programme districts since 2018. The overall situation in these districts at the end of 2020 versus the baseline is depicted in Figure 3.⁹ This shows an increase in safely managed sanitation services from 56% in 2018 to 77% at the end of 2020.

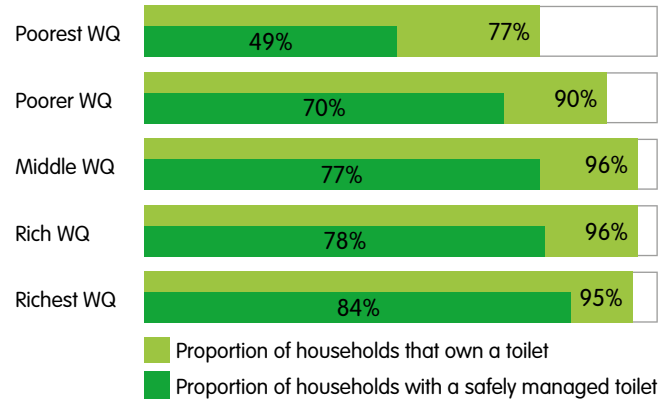
Figure 3: JMP sanitation service levels^{10, 11}



Data collected at the end of 2020 also revealed some inequalities in access to sanitation between the rich and the poor. Whereas 95% of the richest households owned a household sanitation facility (HSF), the corresponding figure for the poorest households was only 77%, with 13% of the

poorest households defecating in the open and 10% using someone else’s toilet (sharing).

Figure 4: Toilet ownership by wealth quintiles (WQ)¹²



However, this also revealed incremental overall improvements for all wealth quintiles in comparison to the 2018 baseline.

The 2020 data showed no major differences between female-headed households and male-headed households with respect to toilet ownership or sanitation service levels. Toilet ownership stood at 95% for male-headed households and at 91% for female-headed households.

Toilet ownership among households with a person with a disability was the same as that among the total population. However, the quality of the household sanitation facilities (HSF) tended to be better among households with people with disabilities; 94% of them were using a safely managed sanitation facility versus 79% for the total population.

The survey also found that by 2020:

- 92% of the HSF were pour-flush toilets and 4% of the HSF were pit latrines without a slab. The latter classify as unimproved.
- 91% of the HSF were connected to a seepage or leakage pit without closed bottom, of which 84% were connected to a single offset pit and 7% to a single direct pit positioned under the HSF. Only 9% of the HSF were connected to a watertight holding tank.

⁸ WHO/UNICEF, 'Sanitation', WHO/UNICEF JMP website, <https://washdata.org/monitoring/sanitation>. (accessed 3 October 2021).

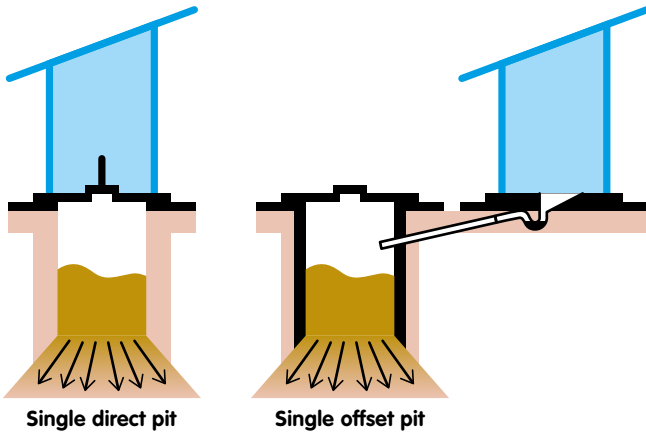
⁹ Information is based on service level data collected in seven out of eight districts. No data could be collected in Samtse district as a direct result of COVID-19 imposed travel restrictions.

¹⁰ SNV in Bhutan, 'Mid-Term Performance Monitoring Report: Bhutan', Part A: Household level impact indicators, Thimphu, SNV Bhutan, 2021.

¹¹ SNV in Bhutan, 2021.

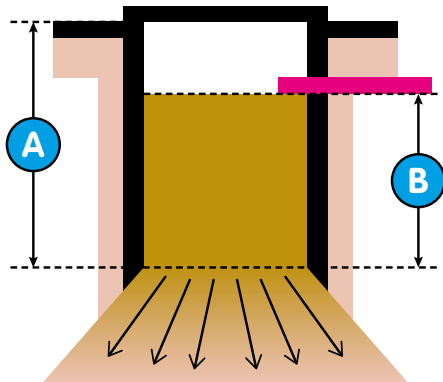
¹² SNV in Bhutan, 2021.

Figure 5: Most common pit configurations



- The average age of the HSF was slightly short of 6 years with more than one third (37%) of the HSF being more than 10 years old. Averages per district varied from 4 years in Dagana (phase 1 district) to 8.3 in Pemagatshel (phase 2 district).
- The average depth (marked as A on figure 6) of the pits was some 2.4 metres with only small differences between the districts. Effective depth (B) is expected to be around 2 metres.

Figure 6: Pit dimensions



Pit emptying occurrences

At the end of 2020, only 1% of the pits/tanks had been emptied (18 out of a total sample size of 1,850 toilets). In two phase 1 districts (Dagana and Zhemgang) none of the sampled households reported having emptied their HSF.

Even in Punakha, with some 50% watertight holding tanks or septic tanks, less than 4% of the pits/tanks had been emptied. This is surprising as properly constructed watertight holding tanks or septic tanks require emptying at regular intervals.

Homeowners, tenants or their relatives were responsible for emptying 89% of the 18 emptied pits or tanks. The remaining 11% were emptied by a manual sweeper or mechanised service provider. On average the pits/tanks had been emptied just under two years ago.

The small proportion of emptied pits (1%) makes most of the other information collected during the household surveys (e.g., whether someone had to enter the pit during emptying, use of safety equipment, destination of faecal sludge, etc.) unreliable or at least difficult to extrapolate to the entire population because of reduced statistical power.

What do we know?

The programme makes use of an elaborate monitoring system that collects and analyses detailed information on a range of indicators that provide insight in whether the facilities are safely managed or not. One could therefore assume that it is relatively easy to calculate the volume of sludge that accumulates in a pit or tank during the design life of an HSF.

The volume of the sludge that will accumulate over the design life of the HSF can be calculated with the following formula: **Vs = R x P x N**

Where:

- Vs = approximate volume of sludge that will be produced (in m³)
- R = estimated sludge accumulation rate per person per year
- P = the average number of people using the toilet over its design life
- N = the design life of the pit (in years)

If the pit size is known then the same formula can also be used to calculate the time it takes for the pit to fill up. The June 2018 SNV in Bhutan learning brief 'Estimating Safely Managed Sanitation in Bhutan'¹³ provides insight into the estimated pit fill times of different types of pits (dry pits, wet pits, and septic tanks).

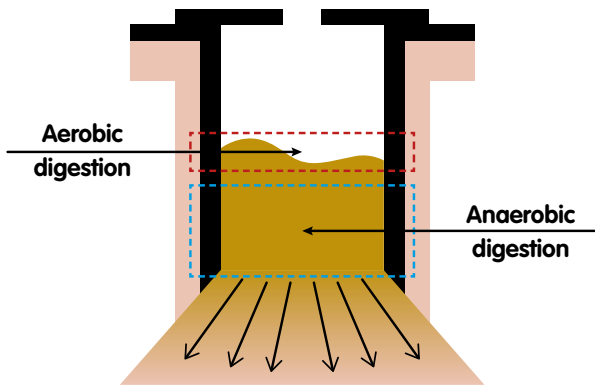
¹³ SNV in Bhutan, 'Estimating Safely Managed Sanitation in Bhutan', *SNV learning brief*, The Hague, SNV, 2018, <https://snv.org/assets/explore/download/2018-BT-estimating-safely-managed-sanitation-snv.pdf>, (accessed 16 October 2021).

Sludge accumulation rates

If it is assumed that the average person produces approximately 100 litres of faeces every year (250-300 grams per day). This is much greater than the average accumulation rate in the pit latrines of 40-60 litres per person per year. This means that a significant degree of volume reduction occurs in the pit latrines as a result of biological breakdown, compaction, and leaching.

Both aerobic and anaerobic processes contribute to the breakdown and removal of biodegradable organic matter in faecal sludge. Aerobic digestion occurs in the top layer of a pit where the faecal sludge is in contact with air. Anaerobic digestion occurs in deeper layers of the pit where the faecal sludge is not in contact with air. As older pit contents are covered over by new layers of sludge, oxygen supply is limited and anaerobic biological processes dominate.

Figure 7: Aerobic vs anaerobic digestion zones



The SNV in Bhutan learning brief revealed that sludge accumulation rates for dry pits and wet pits are similar at 25-40 litres per person per year (l/p/y). To calculate the pit fill rates a safety factor of 150% was applied to give a design sludge accumulation rate of 40-60 l/p/y.

Still and Foxon compared a number of studies showing a range of median pit filling rates, from as low as 21 l/p/y to as high as 64 l/p/y.¹⁴ They concluded that a pit filling rate of 40 l/p/y is reasonable, and that designing pit emptying

cycles for a maximum of 60 l/p/y is conservative.

The SNV in Bhutan learning brief explained that although the faecal sludge loading rates for dry and wet pits appear to be similar, the efficiency of anaerobic processes in reducing solids is superior to that of aerobic processes. Still and Foxon explain that a greater amount of non-degradable residue is generated during aerobic digestion and eventually accumulates in a pit latrine. As wet pits are predominately anaerobic this could explain why accumulation rates are typically lower than for dry latrines.

When the data collected during the midline survey is used, the calculated pit fill times range from 6.5 (40 l/p/y) to 9.8 years (60 l/p/y). This is based on a pit of 1.57 cubic metres (1 metre internal diameter and an effective depth of 2 metres), an average family size of four people, and sludge accumulation rates of 40 and 60 l/p/y.

In the SSH4A districts, the average age of the HSF was less than 6 years: a plausible explanation for why most pits have not filled up to date. However, as explained above, pits are likely to fill up after 6.5 years, so it is likely that a proportion of pits may already (or soon) require emptying.

The average age of the pits that had been emptied was 11 years. As the average time that had lapsed since the last time the pits were emptied was 1.8 years the average age of the pits at the time of emptying was 9.2 years.

Reverse calculations show that the sludge accumulation rate would be 43 litres per capita per year (family size of four) if an average pit of 1.57 cubic metres were to last 9.2 years. However, it must be noted that the midline data implies that most toilets fill up slower than this. Whereas 14% of the HSF were older than 10 years, only 3% of them had been emptied.

It is a rather complex science to determine accurate sludge accumulation rates as this is influenced by a wide range of factors. User behaviour affects the make-up of faeces, the amount of urine that goes into a pit, the presence of solid or liquid waste in the pit and the presence of chemical or biological agents in the pit that could suppress or enhance degradation. Also, a range of geophysical and climatic factors, as

¹⁴ D. Still and K. Foxon, *Tackling the Challenges of Full Pit Latrines. Volume 2: How fast do pit toilets fill up? A scientific understanding of sludge build up and accumulation in pit latrines*, Pretoria, Water Research Commission, 2012, https://www.ircwash.org/sites/default/files/1745_volume_2.pdf 2018, (accessed 3 October 2021)

well as biological processes, influence sludge accumulation and degradation. Furthermore, sludge accumulation rates decrease over time. All of these factors mean that it is incredibly hard to predict when a pit needs emptying.

Considering the above, the following conclusions can be drawn:

- The vast majority of families (92%) use a pour-flush toilet.
- Most toilets (91%) are connected to a single pit: either direct pits (7%) or offset pits (84%).
- Toilets appear to fill up very slowly as only 1% had been emptied at the time of the midline survey.
- The pits that had been emptied so far were emptied on average 9.2 years after construction. However, only 3% of toilets older than 10 years had been emptied.

Furthermore, there are no service providers available in rural Bhutan to empty toilets that have filled up. In the absence of professional emptying services and due to a strong averseness by families to emptying their own toilets, other alternatives will have to be considered.

What do we not understand?

Why is it that only 1% of all HSF had been emptied at the time of the midline survey? Considering that 14% of the HSF were older than 10 years and that calculations reveal that pits are expected to fill up somewhere between 6.5 years (40 l/p/y) and 9.8 years (60 l/p/y), one would expect that a larger proportion of the HSF would have been emptied at least once.

Reviewing the end 2020 midline survey a number of questions come to mind:

- Why has a larger proportion of pits not filled up so far?
- How long will it take for the majority of pits to fill up?

These are relevant questions that need to be answered when developing an intervention strategy to work towards safely managed sanitation.

In discussions with the SNV in Bhutan WASH team, it was concluded that it would be very unlikely that the collection of additional data (for example through household surveys, focus group discussions, key informant interviews, etc.) would help answer these questions.

It was therefore decided to move forward on the assumption that all toilets will fill up at some time and that measures need to be in place to take appropriate action when that situation occurs.

Going forward, it might still be worth the effort to collect pit volume information to gain better and more reliable insights into pits and pit fill rates. This would ideally include an investigation into whether wet pits and/or septic tanks overflow into the environment (e.g., into open drains) as this is a common reason for low filling rates. This type of information would be very valuable to the programme in Bhutan and the broader global sector discourse.

Safely managed sanitation

Safely managed sanitation is defined as the use of an improved sanitation facility that is not shared with other households and where human excreta are safely disposed of onsite or transported and treated offsite.

Safely managed sanitation services may be provided via piped sewer systems or onsite facilities such as pit latrines or septic tanks. There are three main ways to meet the criteria for having a safely managed sanitation service:

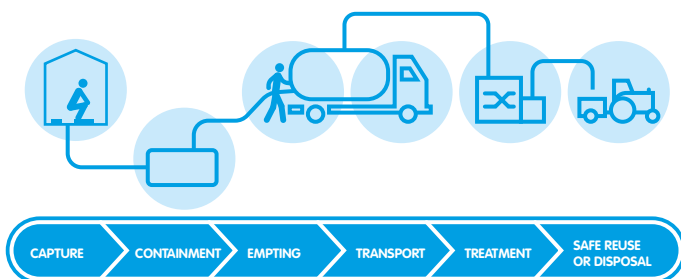
1. Human excreta are treated and disposed of in situ (safely disposed in situ);
2. Human excreta are stored temporarily and then emptied and transported for treatment offsite; or
3. Human excreta are transported through a sewer with wastewater and then treated off-site.

Safely managed sanitation

According to UNICEF, human waste needs to be safely managed across the entire sanitation service chain. However, the extent of the sanitation service chain varies widely per context: in urban settings, the full chain may be required, including emptying, transportation, treatment, and disposal of faecal sludge; whereas in remote rural settings, latrine pits are often covered and replaced when full, with no requirement for the other parts of the sanitation service chain (figure 8).¹⁵

The absence of mechanised faecal sludge emptying service providers in rural Bhutan makes it impossible for the faecal waste from onsite facilities to be removed from the premises and transported for treatment and disposal elsewhere. It is believed that up to 95% of rural Bhutanese households are not accessible by vacuum tanker trucks. For that reason, for the foreseeable future safely managed sanitation in most of rural Bhutan can to a large extent only be realised by exploring and promoting option 1, with human excreta treated and disposed in situ (safely disposed in situ).

Figure 8: Sanitation services chain¹⁶



Technology options

The project, together with the Public Health Engineering Division of the Ministry of Health and UNICEF, developed informed choice material that is used to promote appropriate sanitation technologies. Posters, such as the one shown here, have been developed for this purpose.

POUR-FLUSH TOILET

Materials Required

- 50 kg (6 Bags)
- 34 (Cft)
- 10 (Cft)
- 118 (Cft)
- 2' 3" and 4" long 15 Kg
- (1 Nos)
- 10' long 4" dia (2 Nos)
- (1 Nos)
- 10mm/8mm dia 24" long (5 Pcs)
- 86 (Cft)
- 8"x2'-6" (4 Nos)
- (2 Nos)

This material, however, has unfortunately not always translated into the adoption of the promoted technology options.

Safe containment options

According to WHO, containment refers to the container, usually located below ground level, to which the toilet is connected.¹⁷ These include containers that are designed for either:

- containment, storage, and treatment of faecal sludge and effluent (e.g., septic tanks, dry- and wet-pit latrines, composting toilets); or
- containment and storage (without treatment) of faecal sludge and wastewater (e.g., fully lined tanks, container-based sanitation).

The key principle is that the products generated from the toilet are retained within the containment technology and/or discharged into the local environment in a manner that does not expose anyone to something that can cause harm to human health. Sludge and liquid effluent

¹⁵ UNICEF, 'What do safely managed sanitation services mean for UNICEF programmes?', *WASH Discussion Paper*, New York, UNICEF, 2020, <https://www.unicef.org/media/91321/file/2020-DP3-UNICEF-SMSS-Discussion-Paper.pdf>, (accessed 10 November 2021)

¹⁶ IRC, 'IRC's Faecal Waste Calculator', IRC website, The Hague, IRC, <https://www.ircwash.org/tools/faecal-waste-flow-calculator>, (accessed 10 November 2021).

¹⁷ WHO, *Guidelines on sanitation and health*, Geneva, World Health Organization, 2018, <https://www.who.int/publications/i/item/9789241514705>, (accessed 10 November 2021).

(blackwater) should not enter the environment where it could directly expose users and the local community to faecal pathogens.

With regards to containment options, there is no one-size-fits-all technology. They need to be context specific, taking into consideration population density, hydrological conditions (e.g., potential for groundwater contamination), life-cycle costs combined with affordability considerations and financing options, operation and maintenance requirements, and the availability of pit emptying services.

Safe management of faecal waste such as emptying, transport, treatment, and disposal is challenging in rural areas, thus should be avoided as much as possible. This, however, depends particularly on groundwater conditions.

In the programme districts, groundwater is not used as a source for drinking water. Almost all households (98%) have access to gravity-fed piped water from protected springs or mountain streams. This implies that the leaching of faecal matter into the subsoil does not lead to bacteriological contamination of drinking water sources. Therefore, a permeable technology such as a wet-pit that leaches directly into the subsoil will be an acceptable option in most locations.

Manual pit emptying of fresh (wet) faecal waste should be avoided as much as possible as untreated sludge poses very high risks to people’s health and the environment. Even though single pits (direct as well as offset pits) that ensure hygienic separation of human excreta from human contact, are classified as improved sanitation by JMP, they are unpleasant and potentially hazardous to empty manually.

Mechanised emptying services do not extend beyond the capital of Thimphu and a small number of urban centres. As a result, rural households may have to empty the pit themselves (or pay someone else), with a high risk of faecal exposure by those handling the faecal sludge and subsequently by others living nearby. Furthermore, faecal sludge is often dumped into nearby fields, drains, water bodies, or open spaces.

Some relevant considerations:

1. Promote toilet designs that meet basic sanitation criteria but that over time can be easily upgraded to meet safely managed sanitation criteria (e.g., from single pit to alternating twin pits).
2. Encourage and support the construction of toilets that are appropriate to local conditions.
3. Do not promote toilets that require frequent emptying in areas where professional pit emptying services will not become available in the foreseeable future.
4. Pits can be safely emptied manually if their contents have been left to decompose for some two years.
5. Actively promote alternative toilet designs such as alternating twin pits that can be safely emptied by its owner.

Intervention logic

The choice for a suitable onsite sanitation technology is dependent on many factors, however, for the sake of simplicity it is suggested to use the following two critical determinants:

1. Availability of (affordable) pit emptying services; and.
2. Risk of groundwater pollution.

This could result in the services versus risk matrix shown in Figure 9. The eight SSH4A districts fit in quadrant 1: no (or low) risk of groundwater pollution and no pit emptying service available.

Figure 9: Intervention matrix

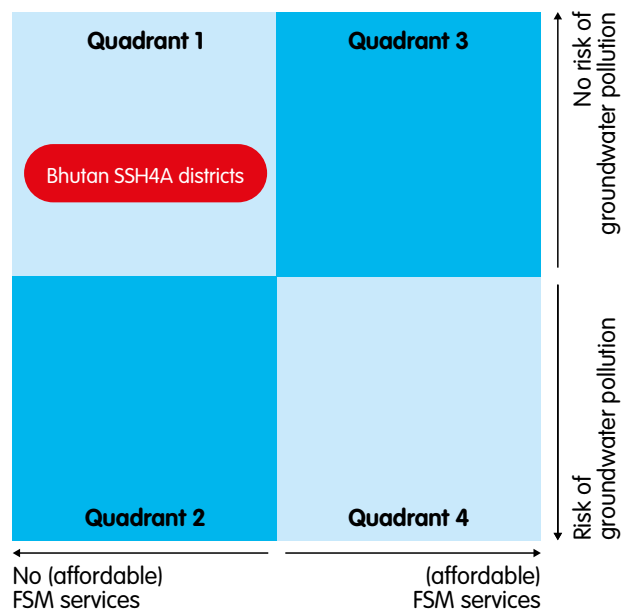


Figure 10 provides an overview of the types of onsite sanitation technologies that fit the situation depicted in the four quadrants.

The preferred options for the eight SSH4A districts are identified in the first column (quadrant 1). The main principle for the selection of appropriate sanitation technologies in these districts is to avoid the need for emptying of fresh human excreta. Except for sequential twin pits and septic tanks, which both require frequent emptying, most other technologies would be fit for purpose in these districts. The alternating twin pits configuration comes up as the most appropriate option.

Alternating twin pits

The alternating twin pits technology consists of a pour-flush toilet connected to two offset pits. The blackwater (faeces, urine, and water used for flushing) is collected in one pit and allowed to slowly infiltrate into the surrounding soil.

When the first pit is full, it will be left alone, and the second pit will be used. By the time the second pit is full the content of the first pit should be safe enough to be removed manually and reused, much like compost, to improve soil conditions and fertilise crops.

The two pits can be conservatively sized (less than 1 metre in depth) as under normal conditions the (decomposed) content of a pit can be safely removed after two years.

This option has been widely promoted by the project, for example through the informed choice material, but also through the DIY (Do It Yourself) poster on safe pit emptying and disposal of toilet waste. However, so far only 1% of the households have opted for this type of technology.

Figure 11: Toilet with alternating twin pits

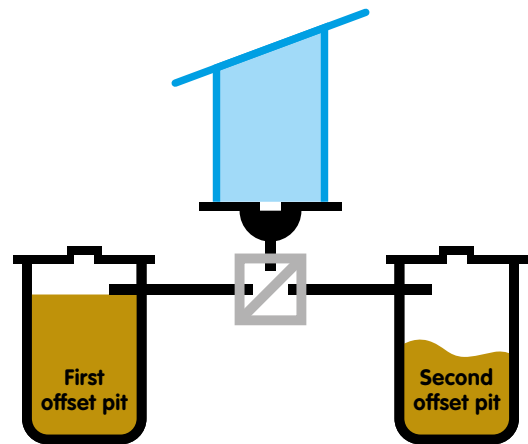


Figure 10: Overview of onsite sanitation technologies

	Quadrants			
	Quadrant 1	Quadrant 2	Quadrant 3	Quadrant 4
Emptying services	No	No	Yes	Yes
Groundwater pollution	Low risk	High risk	Low risk	High risk
Principles	Avoid emptying	Avoid emptying & avoid deep pits	Empty when full	Empty when full & avoid deep pits
Sanitation technologies				
Direct pit latrine	✓ Seal in situ when full	✓ Seal in situ when full		
Single offset pit	✓ Upgrade to twin pit configuration	✓ Upgrade to twin pit configuration	✓✓	✓
Pour-flush to biogas	✓	✓✓		
Alternating twin pits	✓✓	✓✓		
Sequential twin pits			✓	✓
EcoSan	✓	✓✓		
Urine-diverting dry toilet	✓	✓✓		
Septic tank			✓	✓✓

Upgradeable offset pit latrine

A more affordable option is to construct a toilet with a single pit that allows the easy addition of a second alternating pit at a later stage. Before the initial first pit completely fills up a second pit is installed and connected to the same toilet. Then it functions in the same way as described above for the alternating twin pits.

In this way initial investment costs are lower and therefore more manageable. This is also a great way to upgrade and extend the life of the existing 84% of toilets connected to single offset pits. It is a relatively easy and cost-effective way to move from basic to safely managed sanitation.

What else?

It takes more than just a few technology options to achieve safely managed sanitation.

The programme has been actively developing and supporting the implementation of tailor-made district intervention strategies. These strategies reflect the specific circumstances of the eight districts as well as whether it is a phase 1 or phase 2 district.

There is more emphasis on safely managed sanitation and faecal sludge management in the phase 2 district strategies. For example, the Pemagatshel district strategy recognises the need to promote alternating twin pit configurations as well as safe pit emptying practices.

Bhutan's Leave No One Behind and Post-ODF Strategy, launched on 19 November 2020 as part of the World Toilet Day celebrations, also recognises the need to:

- support households to climb the sanitation ladder to progressively achieve "safely managed" status; and
- sustain the sanitation status achieved including safe management of faecal sludge.

The Post-ODF Strategy includes clear intervention strategies for the identified issues, including key Behaviour Change Communication (BCC) messages and delivery channels.

The responsibility for health and hygiene promotion lies with the Health Assistants who receive guidance and support from the *Gewog* (sub-district) leaders. Health and hygiene promotion is done through community meetings and household visits.

On top of what is already being done, other crucial elements of the WASH system will require strengthening, such as:

Policy and legislation: Time-bound targets need to be set for universal access to improved (basic) and safely managed sanitation services. Legislation is needed for the management of onsite sanitation (including FSM and wastewater discharges) as this would provide the required clarity needed to deal with the faecal waste captured in onsite sanitation facilities.

Monitoring: Government monitoring on sanitation should be in line with JMP definitions and methodologies so that it is known what proportion of the population has access to safely managed sanitation. Ideally, sanitation monitoring should provide insight into the final destination of the faecal waste. This information will support realistic target setting and the development of appropriate intervention strategies. It would be helpful if FSM is integrated as one of the indicators in the Ministry of Health's Management Information System.

Changing behaviour and practices:

The project has developed district-specific intervention strategies including BCC activities that respond to the specific situation and context of the districts

Irrespective of whether it is a phase 1 or phase 2 district, knowledge and awareness about safely managed sanitation and the potential dangers associated with the unsafe handling of faecal sludge needs to be increased among local authorities, village leaders, and the general public. Rural households need to understand the concept of safely managed sanitation and what it takes to achieve it. They should also be aware of future requirements and related costs if and when pits fill up before investing in HSF.



Behaviour change activities need to be scheduled throughout the project period and not only during demand creation and informed choice activities. Furthermore, the capacity of village leaders and Health Assistants requires strengthening so they can continue to play a meaningful role in promoting safely managed sanitation and, where relevant, safe FSM options.

Supporting the last mile group of households: The Leave No One Behind and Post-ODF Strategy needs to be revisited and the extent to which the different strategies are indeed providing the necessary support to households who are unable to construct, access, or maintain a toilet for themselves needs to be assessed. Where necessary, amendments should be made to the district strategies to ensure that support is indeed tailored and customised so that it meets the needs of individual households.

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