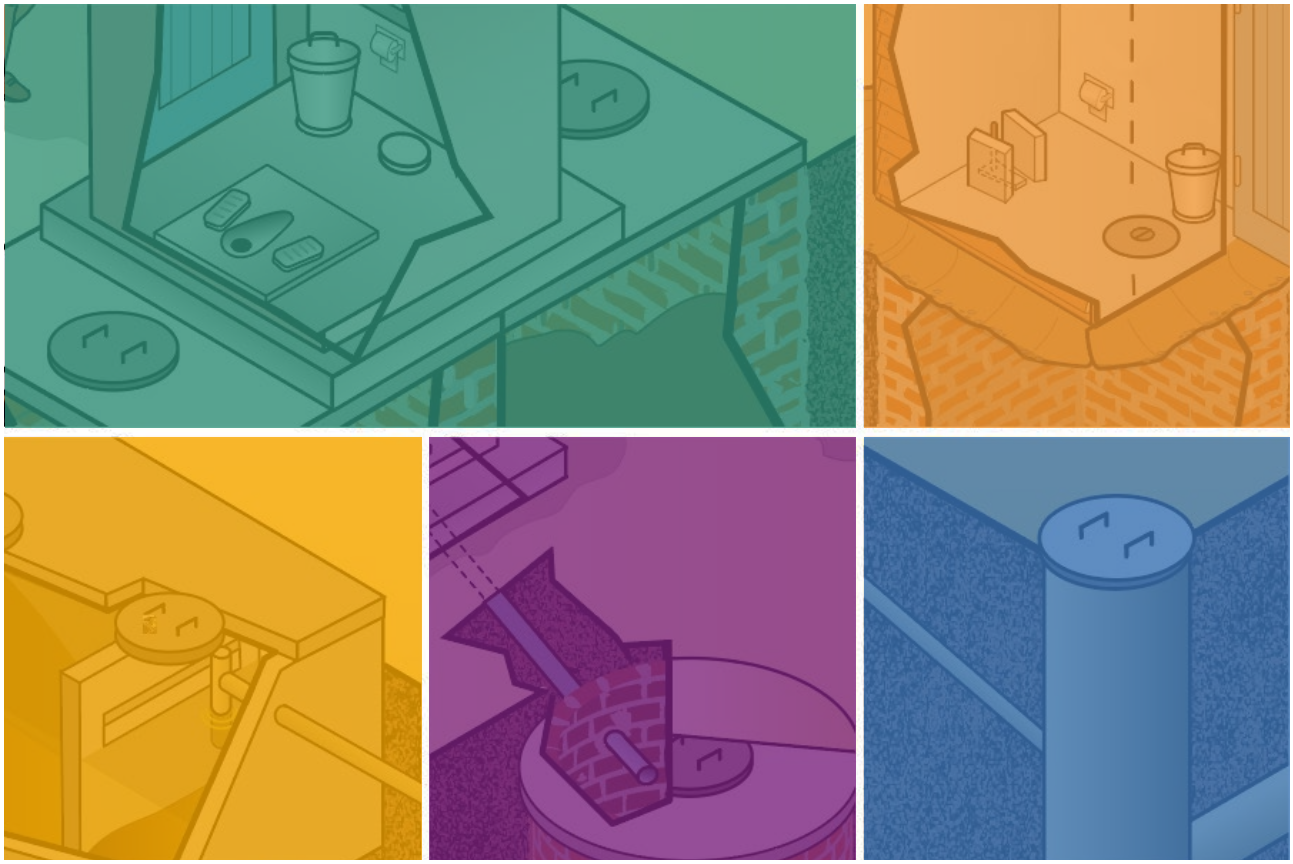
Sanitation inspections

User guide



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Contents

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Glossary

By-law	A regulation made by a local authority or corporation; a rule made by a company or society to control the actions of its members.
Centralized sewer system	A system used to collect, treat, discharge, and/or reclaim wastewater from large user groups (i.e. neighbourhood to city level applications).
Containment	Containment describes the step of collecting, storing, and sometimes treating the products generated at the toilet (or user interface). Excreta that are contained so that they do not enter the environment where they could directly expose users or the local community to faecal pathogens. Containment can include pit latrines that leach liquids directly into the subsoil or impermeable technology (i.e. septic tanks) where effluent discharges to a sewer or subsoil structures such as a soak pit or leach field. Excreta or effluent that are discharged to an open drain or water body or on-site systems that leak or overflow to the surface are not contained. A 'containment facility' is often used to describe the on-site sanitation system, which are defined below.
Control measure	Any action and activity (or barrier) that can be used to prevent or eliminate a sanitation-related hazard, or reduce it to an acceptable level.
Conveyance	Conveyance describes the transport of products from either the toilet or containment step to the treatment step of the sanitation service chain. For example, where sewer-based technologies transport wastewater from toilets to wastewater treatment plants.
Effluent	Effluent is the general term for a liquid that leaves a technology, typically after blackwater or faecal sludge has undergone solids separation or some other type of treatment.
Excreta	Urine and faeces.
Exposure	Contact of a chemical, physical or biological agent with the outer boundary of an organism (e.g. through inhalation, ingestion or dermal [skin] contact).
Exposure route or pathway	The pathway or route by which a person is exposed to a hazard.
Faecal sludge	Solid and liquid wastes removed from on-site storage containers, also called septage when removed from septic tanks
Faeces	(Semisolid) excrement that is not mixed with urine or water.
Hazard	A biological, chemical or physical constituent that can cause harm to human health.
Hazardous event	Any incident or situation that • Introduces or releases the hazard to the environment in which humans are living or working, or • Amplifies the concentration of a hazard in the environment in which people are living or working, or • Fails to remove a hazard from the human environment.
Leachate	The liquid fraction that is separated from the solid component by gravity filtration through media (e.g., liquid that drains from drying beds).
Legislation	Laws, considered collectively, as well as the process of making or enacting laws.
Local community	In this document refers to the people who live and/ or work near to, or downstream from, the sanitation system, and may be either actively or passively affected.

Off-site sanitation	A sanitation system in which excreta (referred to as wastewater) is collected and transported away from the plot where they are generated. An off-site sanitation system relies on a sewer technology for transport.
On-site sanitation	A sanitation technology or system in which excreta (referred to as faecal sludge) is collected and stored and emptied from or treated on the plot where they are generated. They are sometimes referred to as 'containment facilities' and are usually located below ground level, to which the toilet is connected. Several technologies are associated with this step, including septic tanks, dry- and wet-pit latrines, composting toilets, dehydration vaults and urine storage tanks, as well as containment and storage technologies without treatment, such as fully lined tanks and container-based sanitation.The treatment provided by these technologies is often a function of storage and is usually passive (e.g., requiring no energy input). Thus, products that are 'treated' by these technologies often require subsequent treatment before use and/ or disposal.
Open drain	Open channel used to carry greywater, surface water or stormwater.
Outlet	A pipe or hole through which wastewater is discharged or a gas may vent.
Overflow	An outlet for excess wastewater.
Policy	A course or principle of action adopted or proposed by an organization or individual; A plan or course of action, as of a government, political party, or business, intended to influence and determine decisions, actions, and other matters.
Public toilet	Not restricted to specific users; may be formally or informally-managed.
Regulation	The action or process of regulating or being regulated.
Regulations	Rules or directives made and maintained by an authority.
Risk	The likelihood and consequences that something with a negative impact will occur.
Sanitation service chain	All components and processes comprising a sanitation system, from toilet capture and containment through emptying, transport, treatment (in-situ or off-site) and final disposal or end use.
Sewer	An underground pipe that transports blackwater, greywater and, in some cases, stormwater (combined sewer) from individual households and other users to treatment plants, using gravity or pumps when necessary.
Shared toilet	A single toilet shared between two or more households.
Soak pit	A pit or chamber that allows effluent to soak into the surrounding ground.
Toilet	The user interface with the sanitation system, where excreta is captured; can incorporate any type of toilet seat or latrine slab, pedestal, pan or urinal. There are several types of toilet, for example pour- and cistern-flush toilets, dry toilets and urine-diverting toilets.
User interface	User Interface describes the type of toilet, pedestal, pan, or urinal with which the user comes in contact; it is the way by which the user accesses the sanitation system.
Wastewater	Used water from any combination of domestic (households and services) industrial, stormwater and any sewer inflow/infiltration.
Water body	Any substantial accumulation of water, both natural and manmade (i.e. surface water).
WHO Guidelines	A WHO guideline is any document containing recommendations about health interventions, whether these are clinical, public health or policy recommendations.

1. Introduction

Safe sanitation is essential for health, from preventing infections to improving and maintaining mental and social well-being. Lack of adequate sanitation contributes to diarrhoeal diseases, parasitic infections, and undernutrition, as well as posing significant risks and causing anxiety, especially for women and girls. Achieving universal access to safe sanitation, which protects health, privacy, and dignity, is a global development goal and a recognized basic human right.

WHO published *Guidelines on Sanitation and Health* in 2018 which provides recommendations and guidance for managing sanitation systems that protect public health *(1)*. The guidelines aim to support national and local authorities responsible for the safety of sanitation systems and services and those responsible for the development, implementation and monitoring of sanitation standards and regulations. In alignment with these guidelines, UNICEF's *Game Plan to reach safely managed sanitation 2022–2030* emphasizes the importance of safe and sustainable sanitation and aims to strengthen systems at national and local levels by promoting equity and resilience in sanitation services. *Sanitary inspections for sanitation systems*, also referred to as *sanitation inspections* in this document, were developed as a tool to support the implementation of the *Guidelines on sanitation and health*, in particular Chapter 3 on *Safe sanitation systems (2)*. They complement the sanitary inspections of drinking water supplies, first published in 1997 and updated in 2024, which have been commonly used for the management of small water supplies *(3, 4)*. Sanitation inspections follow a similar format but assess risks from sanitation technologies or systems, some of which are exacerbated by climate change such as flooding and water scarcity.

A safe sanitation system ensures human excreta are separated from human contact at all steps of the sanitation service chain, from the toilet to final treatment and disposal or use. While ending open defecation and providing improved toilets is vital, risks can arise at any point in the sanitation chain. Safely managed sanitation services aim to minimize these risks at each step.

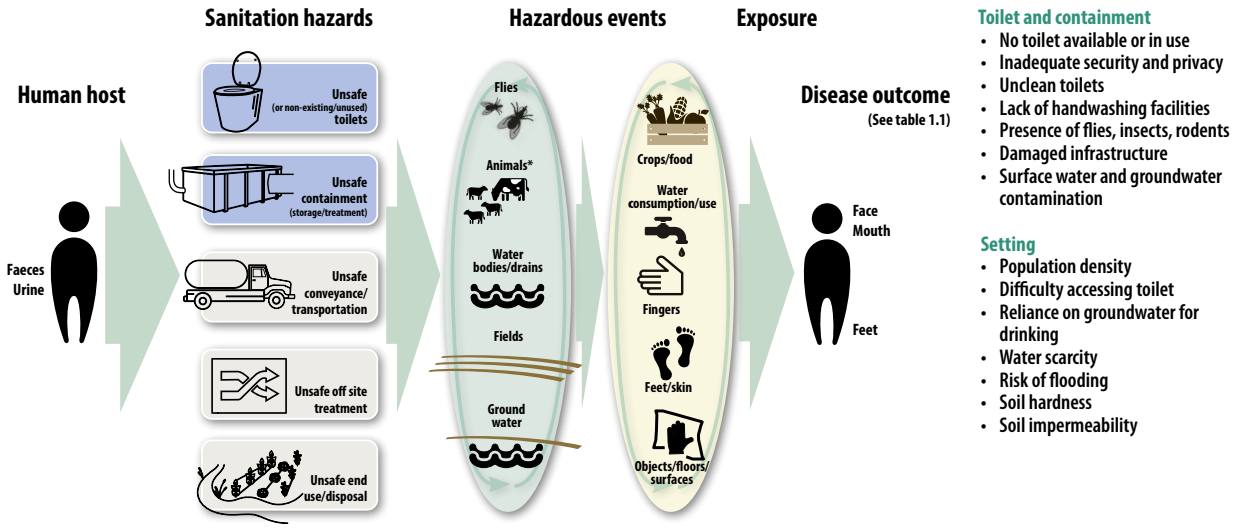
The *Guidelines on Sanitation and Health* emphasize the importance of risk assessment and management to ensure the safety of sanitation systems across the entire service chain. Sanitation Safety Planning (SSP) is the recommended approach for this purpose, with sanitation inspections serving as the most basic form of SSP *(5)*. While SSP is tailored for complex urban sanitation systems, sanitation inspections are more applicable to simpler onsite systems, making them especially relevant in rural areas.

This document provides a summary of tools and examples of the implementation of sanitation inspections, tailored to different contexts and objectives and their application within varied regulatory environments.

2. What are sanitation inspections?

Sanitation inspections are short, standardized observation checklists to assess actual or potential risks to people's health and well-being in and around a sanitation facility. Sanitation inspections can vary in scope, detail and complexity, but are designed to capture risks, including those exacerbated by climate change, from the toilet and superstructure, the on-site system (e.g. pit or septic tank) and the surrounding area. Figure 1 shows the pathways through which excreta-related pathogens are transmitted and summarizes some of the key risks covered in the WHO inspection forms .

Figure 1. Transmission of excreta-related pathogens and risks assessed in the WHO sanitation inspection form

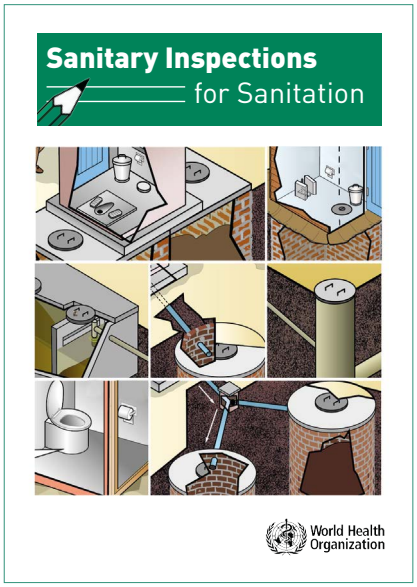


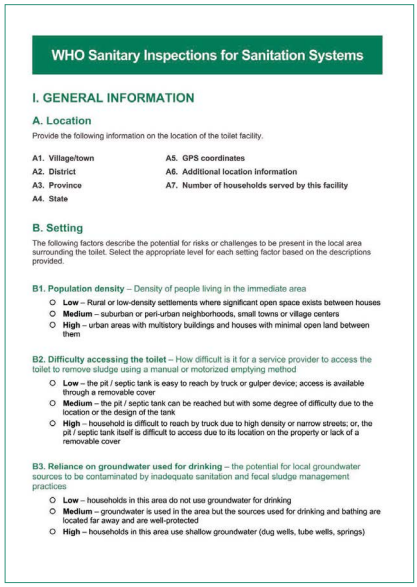
Source: *(1)*.

Sanitation inspection forms include a set of questions with a list of possible risk factors with yes/no answers for each and a set of corrective actions for the risks identified. They also include for each risk factor a set of illustrations showing risks for key sanitation facility types (Figure 2). Sanitation inspections can be conducted by community representatives, government officials such as environmental health inspectors, or field officers from national and international organizations.

They are complemented by a series of *Sanitation System Fact Sheets* which are available for 11 common types of sanitation systems. The fact sheets outline the applicability of sanitation systems in different contexts, as well as design, operation, maintenance considerations, and mechanisms for protecting public health throughout the sanitation service chain (Figure 3).

Figure 2. WHO sanitation inspection forms





WHO Sanitary Inspections for Sanitation Systems

I. GENERAL INFORMATION

A. Location

Provide the following information on the location of the toilet facility.

A1. Village/town
A2. District
A3. Province
A4. State
A5. GPS coordinates
A6. Additional location information
A7. Number of households served by this facility

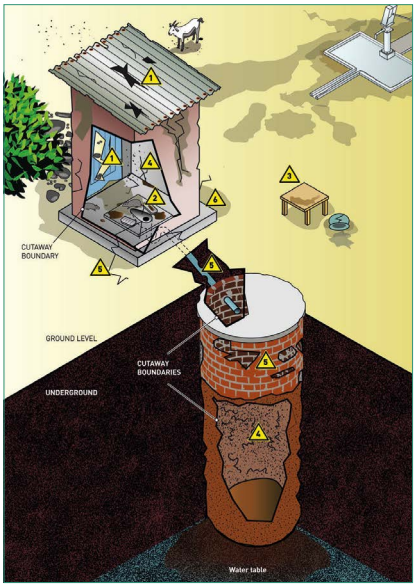
B. Setting

The following factors describe the potential for risks or challenges to be present in the local area surrounding the toilet. Select the appropriate level for each setting factor based on the descriptions provided.

B1. Population density – Density of people living in the immediate area
- Low – Rural or low-density settlements where significant open space exists between houses
- Medium – suburban or peri-urban neighborhoods, small towns or village centers
- High – urban areas with multistory buildings and houses with minimal open land between them

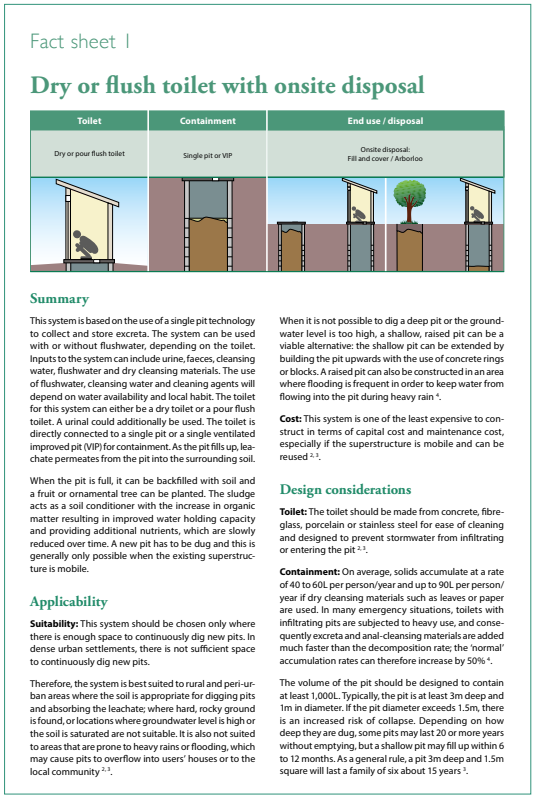
B2. Difficulty accessing the toilet – How difficult is it for a service provider to access the toilet to remove sludge using a manual or motorized emptying method
- Low – the pit / septic tank is easy to reach by truck or gulper device; access is available through a removable cover
- Medium – the pit / septic tank can be reached but with some degree of difficulty due to the location or the design of the tank
- High – household is difficult to reach by truck due to high density or narrow streets; or, the pit / septic tank itself is difficult to access due to its location on the property or lack of a removable cover

B3. Reliance on groundwater used for drinking – the potential for local groundwater sources to be contaminated by inadequate sanitation and fecal sludge management practices
- Low – households in this area do not use groundwater for drinking
- Medium – groundwater is used in the area but the sources used for drinking and bathing are located far away and are well-protected
- High – households in this area use shallow groundwater (dug wells, tube wells, springs)



Source: (2).

Figure 3. WHO sanitation system fact sheets



Fact sheet 1

Dry or flush toilet with onsite disposal

Toilet	Containment	End use / disposal
Dry or pour flush toilet	Single pit or VIP	Onsite disposal: Fill and cover / Arborloo

Summary

This system is based on the use of a single pit technology to collect and store excreta. The system can be used with or without flushwater, depending on the toilet. Inputs to the system can include urine, faeces, cleansing water, flushwater and dry cleansing materials. The use of flushwater, cleansing water and cleaning agents will depend on water availability and local habit. The toilet for this system can either be a dry toilet or a pour flush toilet. A urinal could additionally be used. The toilet is directly connected to a single pit or a single ventilated improved pit (VIP) for containment. As the pit fills up, leachate permeates from the pit into the surrounding soil.

When the pit is full, it can be backfilled with soil and a fruit or ornamental tree can be planted. The sludge acts as a soil conditioner with the increase in organic matter resulting in improved water holding capacity and providing additional nutrients, which are slowly reduced over time. A new pit has to be dug and this is generally only possible when the existing superstructure is mobile.

Applicability

Suitability: This system should be chosen only where there is enough space to continuously dig new pits. In dense urban settlements, there is not sufficient space to continuously dig new pits.

Therefore, the system is best suited to rural and peri-urban areas where the soil is appropriate for digging pits and absorbing the leachate; where hard, rocky ground is found, or locations where groundwater level is high or the soil is saturated are not suitable. It is also not suited to areas that are prone to heavy rains or flooding, which may cause pits to overflow into users' houses or to the local community [2, 3].

When it is not possible to dig a deep pit or the groundwater level is too high, a shallow, raised pit can be a viable alternative: the shallow pit can be extended by building the pit upwards with the use of concrete rings or blocks. A raised pit can also be constructed in an area where flooding is frequent in order to keep water from flowing into the pit during heavy rain [4].

Cost: This system is one of the least expensive to construct in terms of capital cost and maintenance cost, especially if the superstructure is mobile and can be reused [2, 3].

Design considerations

Toilet: The toilet should be made from concrete, fibreglass, porcelain or stainless steel for ease of cleaning and designed to prevent stormwater from infiltrating or entering the pit [2, 3].

Containment: On average, solids accumulate at a rate of 40 to 60L per person/year and up to 90L per person/year if dry cleansing materials such as leaves or paper are used. In many emergency situations, toilets with infiltrating pits are subjected to heavy use, and consequently excreta and anal-cleansing materials are added much faster than the decomposition rate; the 'normal' accumulation rates can therefore increase by 50% [4].

The volume of the pit should be designed to contain at least 1,000L. Typically, the pit is at least 3m deep and 1m in diameter. If the pit diameter exceeds 1.5m, there is an increased risk of collapse. Depending on how deep they are dug, some pits may last 20 or more years without emptying, but a shallow pit may fill up within 6 to 12 months. As a general rule, a pit 3m deep and 1.5m square will last a family of six about 15 years [3].

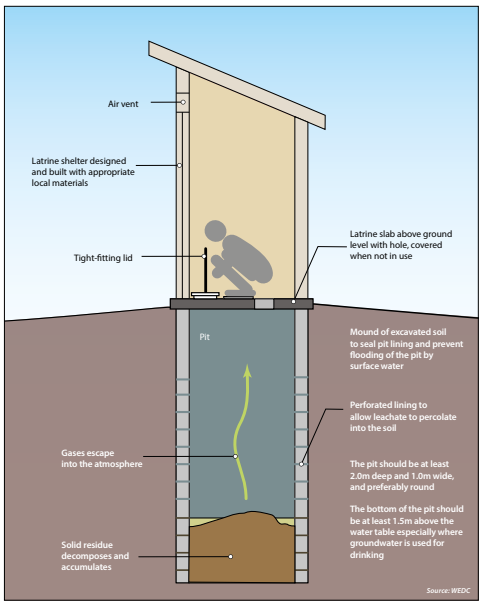


Figure 1. A single pit latrine

The water table level, and groundwater use should be taken into consideration in order to avoid contaminating drinking water. If groundwater is not used for drinking or alternative cost effective sources can be used, then these options should be explored before assuming that groundwater contamination by pit latrines is a problem. Where groundwater is used for drinking and to prevent its contamination, the bottom of the pit should be at least 1.5m above the water table [3]. In addition, the pit should be installed in areas located down gradient of drinking water sources, and at a minimum horizontal distance of 15m [2].

Excreta, cleansing water, flushwater and dry cleansing materials should be the only inputs to this system; other inputs such as menstrual hygiene products and other solid wastes are common and may contribute significantly to pit contents. As this will result in pits filling

Source: (2).

3. What can sanitation inspections be used for?

3.1. Value of sanitation inspections for on-site sanitation

On-site sanitation systems (OSS), such as pit latrines and septic tanks, are used by more people globally than sewer connections. Use of OSS in urban areas is growing twice as fast as sewer systems *(6)*. However, managing OSS is challenging because they are often seen as a household rather than a public responsibility, and their construction and operation are frequently unregulated.

OSS are vulnerable to failures, especially if not properly maintained or monitored. Identifying issues can be difficult since components are often hidden underground, and users may not be aware of or understand the severity of certain risks. Problems with OSS are not limited to low-income countries; high-income countries also face health and environmental risks from poorly managed systems and globally climate change, particularly floods, water scarcity and sea level rise, is causing unforeseen challenges to the functionality of OSS.

The risks associated with OSS are often poorly understood or quantified due to limited monitoring and surveillance. In contrast, sewered sanitation systems have clearer responsibilities for operation, management and monitoring with regulatory oversight requiring regular performance assessments. Regulations for OSS, however, are often weaker, and responsibilities for their management, operation and regular monitoring are often lacking or poorly defined.

Monitoring OSS can be best achieved through household questionnaires and sanitation inspections, which can be conducted by service providers, local government inspectors (e.g. from the health or environmental department) or other stakeholders, including non-specialists. While household questionnaires can help identify sanitation facility types and capture socio-economic factors to assess inequalities, they rely on self-reporting, which can be unreliable and biased *(7)*.

Sanitation inspections can help to identify and objectively assess a broader range of risks, particularly ones that may not be evident or known to the user. They can also suggest corrective actions to minimize these risks. The WHO sanitation inspection form includes possible corrective action for each risk assessed and an overall assessment of the level of correction required *(2)*.

3.2. Objectives of sanitation inspections

This document outlines the main types of uses for sanitation inspections. Their application will be context-specific, and the approach needs to be tailored to different regulatory environments. It is not expected that all three approaches will be applied within a single country.

1. **Regulators working with local authorities** for national reporting requirements which can include mitigation measures

2. **Household surveys** for national monitoring to inform progress towards sanitation targets and inform decision-making

3. **Programmes or projects** for monitoring and evaluation, assessing sustainability, or providing evidence of sanitation risks to drive policy change and investment in sanitation.

For each type of use, the following section of the document summarize the objectives of sanitation inspections, approaches to deployment, responsibilities, and capacities for implementation, as well as methods for sampling, assessment, data aggregation, and usage (Table 1).

These options illustrate that sanitation inspections can be deployed in various regulatory contexts. While regulatory compliance reporting requires clear policies and legislation, inspections for national risk monitoring or informing projects can be deployed in countries with less mature regulatory frameworks for sanitation. Such inspections could ultimately highlight the need for improved regulations and surveillance of sanitation.

Table 1. Summary of sanitation inspection uses

	Regulatory compliance monitoring	National monitoring and risk assessment	Local level assessment
Objective	Assess compliance against national standards, identify risks, and, in some cases, identify and enforce compliance actions Assessment may trigger updates to national standards to correct common failures (e.g., due to increase flooding as a result of climate change)	Assess risks to inform planning and improve estimates of safely managed sanitation for global and national targets	Monitor the status of toilets and on-site systems to identify critical risks and priority actions to reduce risks – including risks arising from climate change
User	Managed via water service authority or local government, governed by national EPA, health department or similar	National Statistical Office, Ministry of Health or other relevant national department	Programme managers (i.e. baseline monitoring), research institutes, or local government
Sampling	As required by laws	Nationally representative, may be less frequent than household surveys	Defined programmatic area. Often one-off data collection
Responsibility for inspection implementation (and follow up)	Inspection by registered and trained inspectors Corrective action by registered providers enforced by service authority or regulator	Non-technical (e.g. household survey enumerators) or semi-technical (e.g. health or environmental staff)	Varied options: Local authorities, NGOs, hired survey staff, etc.
Data aggregation and reporting	Local reporting to track sampling and compliance. National database to compile and assess all findings	Database within specific ministry or analysed with other national survey data	Aggregation by implementing agents at varied scales: district, city, programmatic area
Data use	Corrective action or recontrol of failed inspections; inform updates to standards and codes	Risk assessments, policy, planning, national statistics	Varied depending on objective: inform programme priorities, upgrade facilities
Examples	Ireland, France, Japan	Indonesia, Cambodia	Various from research or NGOs

4. Deployment options

4.1. Regulatory compliance monitoring

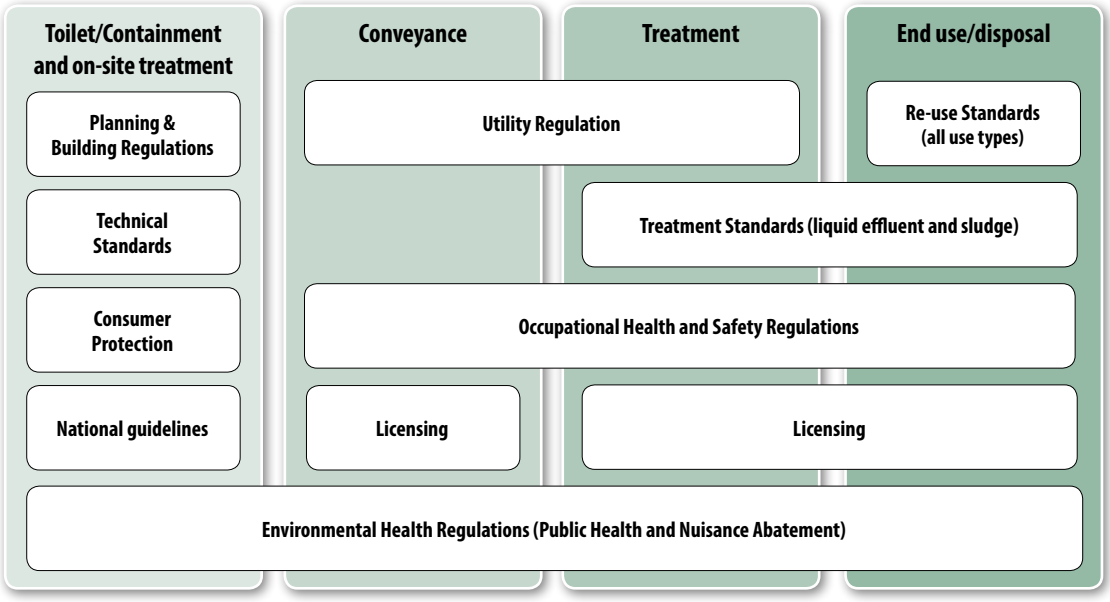
Objectives

Sanitation inspections can be used within a country's regulatory framework to monitor whether facilities comply with infrastructure or technology standards and regulations (Figure 4). Regulations relevant to toilet and on-site systems may include:

- Standards for planning, construction or technical design and siting of sanitation facilities;
- Environmental or public health standards on discharges to the environment; or
- Consumer protection regulations for adequate access to toilets.

The institutional arrangements for sanitation and the maturity of regulatory systems will influence how sanitation inspections are implemented. The case studies below highlight that often a single water or environmental law governs the frequency of regular deployment of sanitation inspections supported by a number of by-laws, policies and standards. The common objective of these inspections is to protect the environment or public health from the risks associated with poorly functioning sanitation systems. This is achieved by periodic inspection to ensure systems are built, operated, maintained and perform in compliance with standards. Inspections also include measures to incentivize or enforce the remediation and improved management of non-compliant systems.

Figure 4. Sanitation inspections as a regulatory tool for toilets and on-site treatment systems



Source: (1).

Deployment and responsibilities

The institutional arrangements and legal requirements for conducting inspections will influence the deployment approach. These may arise from environmental protection, health risk reduction or service delivery objectives.

When implementation is driven by environmental protection objectives or regulations, it will likely involve the Environmental Protection Agency and may target areas with high environmental contamination risk, as shown by the Ireland Environmental Protection Agency example (Box 1). Inspections may be used to regulate service delivery, such as in France, where communes are legally responsible for sanitation services and inspections are triggered by sale and purchase of properties to ensure adequate provision of non-sewered sanitation (Box 2).

Sanitation inspections may be one part of a broader data system for sanitation regulation. Regulators need multiple sources of data to monitor and report on service delivery, including financial data, capacity, and customer service with sanitation inspection risks being just one. For example, in Zambia, the National Water Supply and Sanitation Council (NWASCO) requires wastewater authorities to regularly report against key performance indicators (KPIs). When the wastewater authorities were recently tasked with the management of on-site sanitation, in addition to existing responsibilities for sewered systems, they needed to update their reporting processes. This update involved new sanitation standards, expanded data collection tools and additional training on sanitation inspections among other things.

Box 1. Ireland Environmental Protection Authority (EPA) annual inspection programme *(8)*

Under the Ireland Water Services Act 2007, the EPA and the water service authorities are required to implement an annual inspection programme to assess the risks from domestic wastewater treatment systems (DWWTSs), equivalent to on-site sanitation. The main objective of this programme is to prevent risks to human health and the environment caused by DWWTSs. Specifically, the programme aims i) to inspect whether DWWTSs are operating correctly and advise on remedial works, and ii) to engage with users to ensure they know how to operate and maintain their systems correctly.

Responsibility for sanitation inspections is divided among stakeholders as follows:

- **EPA** is responsible for producing and reviewing the national inspection plan and annual reports, appointing water service authority DWWTS inspectors, coordinating the Septic Tank Inspectors Network, providing technical support, and supervising water services authorities.
- **Water Service Authorities** are responsible for implementing the inspection plan, including site selection, ensuring inspections are conducted, following up on advisory notices and re-inspection, pursuing prosecution when warranted, and engaging with the public.
- **Homeowners** are responsible for registering their DWWTS, ensuring it complies with regulations, facilitating inspections, and complying with advisory notice if the system fails inspection.

Box 2. France public service for non-collective sanitation inspection requirements *(9)*

Since 1992, communes in France have been required to establish a public non-collective sanitation service, known as '*service public d'assainissement non collectif (SPANC)*', responsible for overseeing all non-collective sanitation systems (equivalent to on-site sanitation). The Water Law of 1992 made control inspections obligatory, and this requirement was reaffirmed in the Law on Water and Aquatic Environments of 2006. The purpose of these controls is to verify that the non-collective sanitation systems do not harm public health or personal safety and preserve the quality of surface and groundwater.

Communes, through SPANC, are required to regularly monitor existing systems and provide permits for new systems. This involves inspections that assess potential environmental or health risks related to the design, execution, operation, condition, or maintenance of the installation. Households are responsible for contacting SPANC before the construction of new buildings or rehabilitation of existing ones to obtain approval for non-collective sanitation and arrange for an inspection/verification following construction before backfilling. Additionally, households are responsible for organising an inspection prior to the sale of a property. In some communes, SPANC conducts the approvals and inspections; in others, they maintain a list of individuals or firms authorized to carry out these tasks.

Box 3. Regulated inspections of Johkasou prefabricated on-site systems in Japan *(10, 11)*

In Japan many households not connected to the sewer network use Johkasou treatment systems, either at a community or household scale. These prefabricated tanks treat household blackwater and greywater through anaerobic filtration and contact aeration processes. Governed by the Johkasou Act of 1983, which was updated in 2005, the use of these systems is subject to several legal requirements. The steps involved and the associated legal framework are shown in Figure 5 and summarized below *(10)*.

For new buildings and systems, prefabricated Johkasou units must be manufactured in compliance with design standards set by approved manufacturers. Installation must be carried out by qualified and registered construction vendors and inspected three times during construction by qualified and registered inspectors. The Act also covers operation and maintenance, requiring owners or users to desludge their systems regularly, a task that can only be performed by an approved emptying business. Households must maintain their systems every four months for small on-site systems and more frequently for larger systems. All Johkasou owners or users are legally obligated to undergo an annual inspection by a designated agency and to pay the inspection fee. These inspections verify that maintenance and desludging are performed correctly and that the treatment performance is adequate. In 2015, there were 1280 Johkasou inspectors and 65 specified inspection agencies registered under the Johkasou Act's enforcement regulations, with training typically provided by the Japan Environmental Conservation Society (JECES).

Figure 5. Legal framework for inspection and maintenance of Johkasou on-site treatment systems in Japan.

	Inspector	Operator	Desludging technician	Inspector
	Legal inspection by Article 7 ▶	**Operation/maintenance** ▶	**Desludging** ▶	**Legal inspection by Article 11**
Purpose	Confirm adequate construction/ installation and treatment performance	Maintain normal treatment performance	Recover normal treatment performance	Confirm adequate maintenance and desludging and performance
Inspection content	Visual inspection Water quality testing Documents review	Sludge accumulation Water quality Mechanical apparatus Replenish disinfectant	Remove sludge Cleanse toilet Report any faults or defects inside Jhokasou	Visual inspection Water quality Documents review
Timing	3 to 8 months after starting operation	>3 times a year depending on size and treatment process	Once a year	Once a year
Responsible agency	Specified inspection agency which is a public service corporation of the prefecture	Maintenance vendor licensed by prefectorial government	Desludging vendor, registered by the mayor	Specified inspection agency

Source: Adapted from *(11)*.

Capacity for implementation

Inspections conducted for compliance and reporting require inspectors to have adequate training and qualifications to ensure they possess the necessary capacity and authority for their roles. While the specific training depends on the scope and details of the inspection, it generally includes recognizing different types of sanitation facilities, identifying potential risks, assessing corrective actions, and understanding how to communicate outcomes and enforce compliance, especially in cases of non-compliance. A key benefit of sanitation inspections is their adaptability to various stakeholders. In many countries, inspections are conducted by formally identified bodies or trained staff, particularly when sanctions are involved. It is important to assess whether local capacity is sufficient to meet the expected demands or if a centralized inspection team is needed.

In Ireland, thoroughness and consistency in inspections and enforcement are deemed critical. Inspectors of domestic wastewater treatment systems (DWWTS) must complete a two-day course provided by the Local Authority Services National Training Group and are appointed by the EPA. The EPA also coordinates the Septic Tank Inspectors Network, part of the Network for Ireland's Environmental Compliance and Enforcement (NIECE). This platform allows DWWTS inspectors to meet, exchange information, and develop guidance.

Sampling

An inspection plan should define the minimum inspection numbers to be conducted over a defined time period. Sampling for environmental or public health protection may be weighted in high risk areas. Therefore a common first step is to conduct an initial identification of high-risk areas within the country, from which selection of sites at local level can be prioritized. High risk area may be identified on the basis of disease (high wash-related disease endemicity), areas with high potential for contamination of drinking-water sources (such as from water use and population density data), or from surveillance of water quality.

There is not one specific approach to sampling for inspections, and it could be based on national objectives of a certain frequency of inspection (every 10 years in France or annually in Japan, see Box 3) or a target number of inspections per year (1200 nationally in Ireland). While the legislation in Japan requires that every Jokhasou is inspected annually, in 2017, out of 7.6 million on-site system units installed all over Japan, 3.3 million (43%) were actually inspected. Efforts are currently underway to increase the number of inspections. Sampling strategies in Ireland and France are summarized in Box 4 and 5).

Box 4. Sampling for sanitation inspections in France *(9)*

There are three categories of properties requiring inspections in France:

- New or renovated buildings or non-collective systems must submit design for approval and be inspected following construction.
- At the time of property sale: With the aim of accelerating the rhythm of rehabilitation of existing systems, all property sales must include a certificate of inspection of non-collective sanitation. This must have occurred within 3 years prior to sale, and rehabilitation of identified issues must occur within 1 year of purchase.
- Other existing systems: All systems were required to be monitored once before 2012, then should be scheduled for inspection at least once every 10 years.

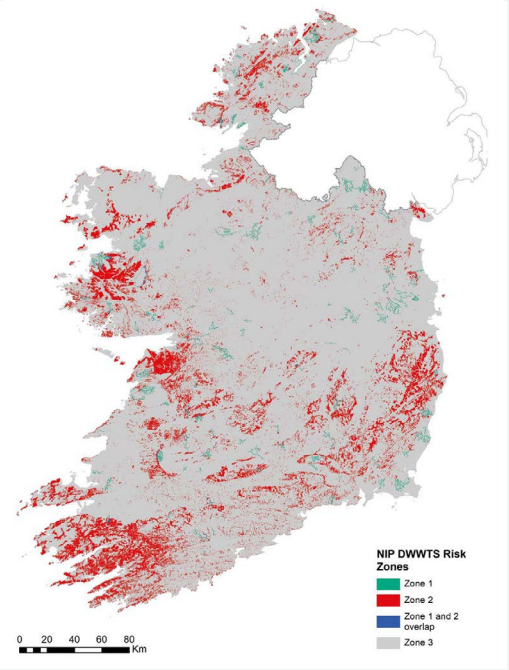
Box 3. Sampling for sanitation inspections in Ireland *(8)*

A risk-based methodology is used to distribute an annual target of inspections between water authorities and risk zones. For 2023–2026, the target is 1200 inspections per year, an increase from 1000 in 2022. These are distributed over the five-year period (2022–2026) in the three zones as described below and shown in the map on the right from EPA Ireland 2021 *(8)*.

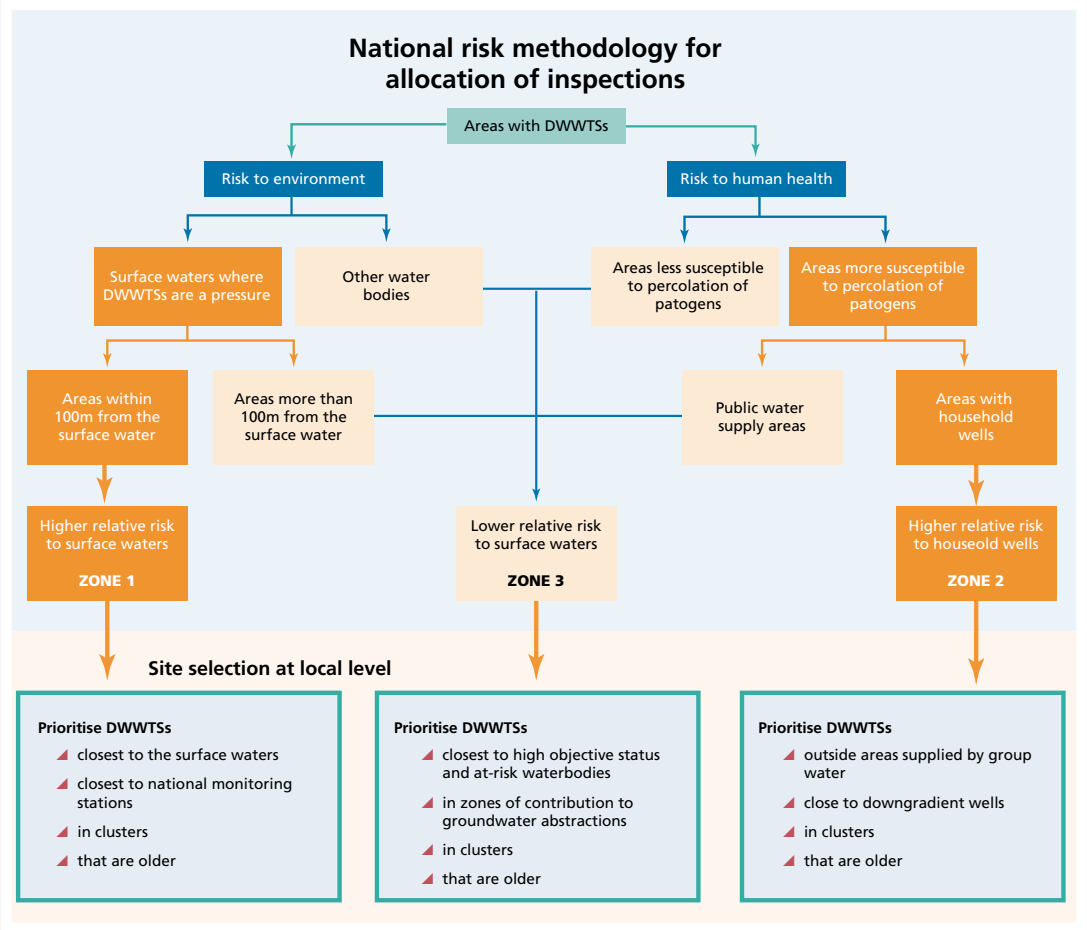
1. 2400 inspections in areas with higher relative risk to surface waters (no public sewerage and within100m of water bodies where DWWTS have been identified as a pressure on water quality)

2. 2400 inspections in areas with higher relative risk to household wells (shallow groundwater or karst areas)

3. 1000 inspections in areas of lower relative risk; any areas outside of the two higher relative risk areas



The allocation of inspections to each water services authority is weighted based on the estimated percentage of residential buildings in each risk zone in each water services authority area. Water services authorities must complete their minimum annual allocations each year and distributed across the zones, focusing on zones 1 & 2. Selection of DWWTS to inspect within the zones can be further prioritised based on local information to those that are in clusters, older systems, those closest to surface waters and national monitoring stations (Zone 1), those outside group water supply areas and close to downgradient wells (Zone 2), and those closest to at-risk water bodies or groundwater abstraction areas (Zone 3). The methodology is shown in the Figure below from Ireland EPA 2021 *(8)*.



Assessment

Households are typically given written notice of an upcoming inspection, which may include details on what to expect. For instance, the EPA website in Ireland provides videos and explanations to help households understand the inspection process. Inspectors use standard risk assessment forms to evaluate whether the sanitation system complies with regulations. If issues are identified, the assessment can also determine whether remediation actions are necessary. Households receive the inspection findings either at the conclusion of the inspection or through a report sent at a later date. The inspection report details whether remediation and reinspection are required, the timing for these actions, and any repercussions for non-compliance.

Below are some of the features and hazards assessed during inspections in Ireland and France.

Box 6. Overview of risks assessed in sanitation inspections in Ireland and France

Ireland

- No rainwater or clean surface water entering
- No leaks
- No ponding
- No unauthorized discharges
- Components in working order
- Proper maintenance and operation
- Desludging
- Not a risk to human health or the environment

France

The control covers at least the following points:

- changes since the last inspection
- land redevelopment on and around the sector
- sludge level and normal accumulation of grease
- good flow of effluent to the purification device
- absence of stagnant water on the surface
- operation of electromechanical devices and ventilation
- condition of the structure (cracks, corrosion)
- if discharge into a surface environment: appearance of the effluent at the outlet, possibly analysis and assessment of the impact on the receiving environment

The latest report from Ireland's national inspection programme found that of the 1189 inspections completed in 2023, 45% of domestic wastewater treatment systems (DWWTS) failed the inspection, with a significant number identified as a risk to human health and the environment *(12)*. The main reasons for failure were operational issues (such as desludging and maintenance) and structural defects (including illegal discharges to ditches or streams, leaks, ponding, and rainwater ingress). The annual failure rate has varied between 44% to 57% since the inspections started in 2013 and 80% of systems that previously failed have since been fixed.

Data aggregation and use

The approach and responsibility for data aggregation and use for regulatory compliance often involves various reporting levels. Findings of individual inspections are aggregated at the local level, where the data is analysed to ensure the sampling requirements are met and that remedial action and verification inspections are conducted. The national agency is then responsible for compiling and reviewing the data for national reporting and risk management. Examples of data aggregation include:

- **In Ireland**, inspectors record inspections into the Domestic Wastewater Application computer system, hosted and supported by the EPA. The Water Authority ensures that annual quotas are met and follows up on compliance. The EPA collates and reports the data annually and develops the five-year monitoring plan.

- **In France**, communes submit data to an online water and sanitation data portal SISPEA (*Système d'Information sur les Services Publics d'Eau et d'Assainissement*), managed by the French Office for Biodiversity (Office Français de la Biodiversité) *(13)*.

Sanitation inspections are not only used to identify risks but also to enable mitigation actions. In both Ireland and France, regulations are in place to enable enforcement of corrective actions so that on-site systems are rehabilitated, rebuilt or managed to meet standards. Inspection forms are designed to determine whether corrective actions are needed, make recommendations and suggest steps or organisations to support in rectifying the issues. The approach to assessing compliance, identifying corrective actions and the compliance mechanisms are summarized in Box 7.

Regarding corrective actions, WHO guidelines recommend that national guidelines be established to advise on enforcement practices and legal proceedings, particularly in the collection and presentation of evidence. Enforcement activities should be reviewed and reported annually to highlight common sanitation issues and to ensure that enforcement measures are not applied abusively. It is also important to ensure that regulatory actions do not prevent households from using certain types of infrastructure or practices if realistic alternatives are not available (e.g., banning a type of toilet may be counterproductive if it leads to open defecation).

Box 7. Examples of different approaches to overall risk assessment and follow up actions

WHO sanitation inspection form	Overall assessment: • Pass – no risks or correction action. • Pass (conditional) – correction of minor risks. • Fail – major risks are detected and consider whether on-site systems should be abandoned and a new system built. Action: The inspection form suggests possible corrective actions for each risk assessed, and these should be summarized at the end with a recommendation of service providers that can support implementing these actions and the date for reinspection.
Ireland	The Water Services Authority issues an advisory notice to the homeowner if their DWWTS fails the inspection. The advisory notice specifies the reasons for the failure, what measures need to be taken and the timeframe for remedial works. This varies from 1 to 12 months, depending on the seriousness of the issue and the scale of work. Financial assistance for remediation is available. Between 2014 and 2020, 597 grants totalling 2 million euros were allocated. Failure to comply with an advisory notice is a prosecutable offence with a potential fine of up to €5,000. Between 2013 and 2023 the inspections resulted in 62 legal actions due to failure to remediate the DWWTS *(12)*.
France	Following inspection, SPANC sends a diagnostic report to the household with a section specifying the main modifications to be made. In the event of an unfavourable assessment, compliance work is mandatory if the installation involves a proven health hazard or environmental risk. The work must be completed within 4 years, or shorter depending on the degree of the risk. Inspections prior to property sale require rehabilitation one year following purchase. SPANC can issue a fine of EUR 70 for missing the rehabilitation deadline, and in the event of a pollution offence, the sanction becomes criminal (fine, imprisonment).

4.2. National level monitoring and risk assessment

Objectives

National monitoring of sanitation services can have several objectives, such as tracking against national and global targets, identifying the current service status and gaps, as well as assessing risks to inform policies and investments. National monitoring can rely on administrative data, which are more commonly available in areas with centralized water and wastewater systems. These data can be sourced from regulators or service authorities and can include data on sewer connections, volumes of wastewater treated, among others.

Household surveys are another source of sanitation data that are nationally representative and regularly collected (often every 5 years) and are a main source of data for monitoring the SDGs. Household data sources include national census or global survey programmes such as the UNICEF supported Multiple Indicator Cluster Surveys (MICS) or the USAID-supported Demographic and Health Surveys (DHS). However, self-reported data on on-site system type and risks from household surveys may be less reliable compared to data obtained through direct observation and structured assessments by trained enumerators.

Sanitation inspections address gaps and limitations in administrative and household survey data, particularly for assessing risks associated with on-site sanitation and providing estimates for SDG indicator 6.2.1 on safely managed sanitation.

The objectives of national regulatory compliance reporting and national monitoring may overlap, as both aim to assess and mitigate risks. The previous section discussed the deployment of inspections for regulatory compliance in contexts with well-established legal and regulatory frameworks. This section focuses on national monitoring for risk assessment purposes, particularly in countries with less developed or weaker regulatory and institutional frameworks for on-site sanitation that may limit compliance monitoring.

Deployment and responsibilities

There are two key approaches to deploying national household sanitation inspections:

- **Stand-alone inspections:** These inspections are specifically designed to assess sanitation and involve tailored sampling strategies, selection of enumerators, and inspection forms for this purpose. They can build on existing inspections, such as those assessing toilet access for open defecation programmes, by expanding their scope to include sanitation facility types and risks. Regular inspections may also be conducted for housing improvement programmes. Typically managed by a relevant agency, like the Ministry of Health or the Ministry of Water, the data collected may be shared and used across multiple departments.

- **Inspections coupled with household surveys:** Combining inspections with existing national household surveys can be a cost-effective and regular way to gather data on sanitation risks. By adding specific questions to these surveys, the assessment of sanitation facilities can be more detailed and rigorous than the self-reporting questions alone. An enumerator already involved in other survey tasks, such as measuring a child's height or checking water quality, could also perform sanitation inspections. Alternatively, household enumerators can be trained to handle both the survey and inspections. Household surveys are often managed by the National Statistics Office or through programmes like MICS or DHS.

Box 8. Pilot testing of sanitation inspections for national monitoring in Indonesia *(14)*

UNICEF Indonesia conducted a pilot project to test sanitation inspection tools and explore ways to integrate them into national monitoring systems. The inspections were designed to assess the progress of the national sanitation target, defined in the government's Medium-Term Development Plan, and to improve estimates of safely managed sanitation for global SDG monitoring. The inspection tool enables assessment of the type of on-site system, its compliance with national design standards, discharge of excreta to the surface environment and the frequency of sludge emptying.

Sanitation inspections conducted as part of UNICEF pilot project ©UNICEF

As part of the National Community-Based Total Sanitation programme (STBM in Indonesia), the Ministry of Health manages a national monitoring system and online platform to monitor open defecation, along with other STBM programme pillars (handwashing, drinking water, food management, solid and liquid waste). Regular household inspections are conducted by local public health staff, known as sanitarians, with the results compiled into a national sanitation database. UNICEF trained these sanitarians to conduct detailed assessments of sanitation facilities using the sanitation inspection tool (see the capacity section below). Inspections were conducted in 1371 households across six provinces during 2021-2022.

In Indonesia, the responsibility for sanitation services and monitoring involves multiple stakeholders. The Ministry of Health collects data on open defecation and is primarily involved in rural sanitation, while the Ministry of Public Works and Housing is responsible for sanitation infrastructure, including standards for septic tanks and pit latrines, emptying and treatment services. This division of responsibilities posed challenges for sanitarians employed by the Ministry of Health. While they previously assisted households in improving toilet access following inspections, they were unable to support upgrades to containment infrastructure or facilitate access to emptying services, as these were perceived to be beyond their scope.

To address the issue, the Ministry of Health and the Ministry of Public Works agreed to jointly collect data using common definitions, questions and data collection and to collaborate on data analysis and sharing. The Ministry of Health will use the data to monitor post-ODF status, while the Ministry of Public Works will use the data to determine which households are eligible for subsidies for septic tanks and to inform faecal sludge management planning. The Ministry of National Development Planning will also use the data to track progress against national development targets, ensuring alignment with Indonesia's sanitation goals under SDG-6.

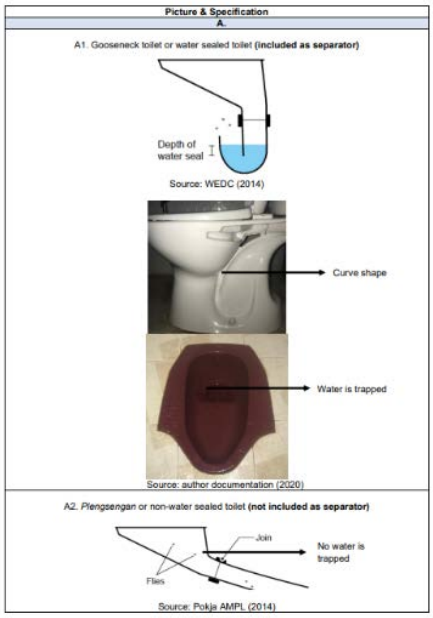
Currently, Indonesia only collects national-level data on sanitation annually, which limits the ability to address specific regional needs. Therefore, more detailed data collection at the provincial and city/district levels will infom better planning, such as the Ministry of Health to pinpoint areas at risk of reverting to unsafe practices, the Ministry of Public Works to better target infrastructure investments and subsidy programmes, and the Ministry of National Development Planning to monitor and support progress more effectively at both regional and national scales.

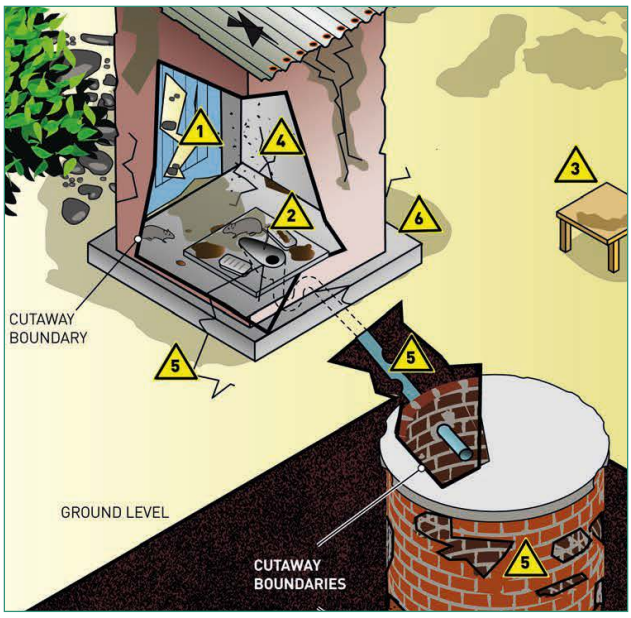
Capacity for implementation

Sanitation inspections require a greater technical and public health understanding than traditional household surveys. Enumerators need to be trained to understand and identify different types of sanitation facilities, which may differ from local or traditional classifications, and assess the risks associated with them. Visual tools, such as showcards and diagrams, can be used to aid the assessment in the field, such as those presented in Figure 6. WHO worked with mWater to develop a free digital editable version of the sanitation inspection forms *(15)*.

The complexity of the survey should align with the skills and background of the enumerator. Inspections integrated with household surveys may need to be less technically complex, as they are often conducted by enumerators with more social background. In contrast, sanitation-specific surveys can be more detailed, as they are typically carried out by enumerators with an environmental health or other technical background.

Figure 6. Visual tools to support sanitation inspections used in Indonesia: UNICEF Indonesia pilot project (left) and in the WHO Sanitation Inspection forms (right)





In Indonesia, inspections were conducted by environmental health officers (sanitarians) who had prior experience in inspections and public health knowledge. They received 1–2 days of training, either in-person or via video, and spent time field-testing the tools (Figure 7) *(14)*. Local government staff and other sanitation stakeholders were also invited to the training, with the additional goal of building capacity and raising awareness about safely managed sanitation.

While the sanitarians had the necessary expertise to conduct the surveys, there were typically only one or two staff members per village, and their roles covered many functions, making it challenging to complete inspections within a short timeframe. Given this challenge—and the fact that the sanitation inspection tool was found to be user-friendly even for those with non-technical backgrounds—it is feasible that community members, such as women volunteers or village cadres, could be trained to carry out the inspections. The sanitarians could then focus on training these enumerators and providing oversight.

Figure 7. Training materials for enumerators as part of the pilot project for on monitoring safely managed onsite sanitation in Indonesia *(14)*

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Sampling

To ensure that data is nationally representative or suitable for national estimates, survey planners should seek guidance from the national statistical office on appropriate sampling methods. Sampling should account for the variability in types of on-site systems and environmental conditions that may influence hazards such as likelihood of flooding, soil permeability or groundwater depth. When inspections are combined with household surveys, it may not be necessary to inspect every household if sanitation risks are assumed to be similar for nearby properties. For instance, in Cambodia, inspections were conducted for just over one-quarter of the households surveyed, with samples distributed to maintain national representation (Box 9). Further analysis of sanitation inspection data could provide insights to refine sampling methods. This might include analyzing the variability of risks associated with different types of on-site systems and environmental contexts, as well as examining how these risks vary over time to inform the frequency of inspections.

Box 9. Coupling of sanitation inspections with national socio-economic survey in Cambodia *(16)*

Sanitation inspections were carried out in Cambodia by the National Institute of Statistics (NIS), with support from UNICEF, to better understand the status of sanitation systems, improve estimates for SDG 6.2.1, and identify local containment risks. This initiative emerged from data gaps identified during a national workshop that brought together key sanitation stakeholders in the country to build a shared understanding of safely managed sanitation. A specific challenge in Cambodia was accurately classifying type of on-site system through household surveys. Previous data indicated that most households use septic tanks, for which the JMP assumes only 50% are safely contained in the absence of local data. This contrasts with pit latrines, where 100% are assumed to be contained. Misclassifying the type of on-site sanitation system can significantly affect the estimated proportion of safely managed on-site sanitation systems when applying global assumptions. The inspections aimed to refine classification methods, including adding a category for flush-to-pit/cesspool systems, to collect national containment data that could replace global assumptions, and to develop recommendations for future surveys or inspections in Cambodia.

The inspections were conducted as a stand-alone effort but were linked to the recent Cambodia Socio-Economic Survey (CSES) conducted in 2023. The CSES, a nationally representative survey, covered 12,096 households. The sanitation inspections sampled a subset of these households, revisiting 3600 households across 114 urban and 186 rural villages, with 12 households selected per village. This coupling allowed the inspection data to be linked with the nationally representative results of the CSES, enabling assessments of inequalities and other socio-economic factors. The inspections were carried out by NIS non-technical enumerators who received two days of training on the inspection objectives, principles of sanitation facility types, risk assessment, and field-testing the form. The questionnaire included observations of the type of on-site system, issues with containment, evidence of release of excreta into the environment (Figure 8), and self-reported questions on the frequency and impacts of flooding and contamination events.

Box 9. *continued*

Figure 8. Evidence of overflow, surface ponding and uncontained excreta in Cambodia

Source: (16).

Assessment and data use

Sanitation inspections deployed through national monitoring are likely to be less detailed than those for compliance, due to the large sample sizes and less technical backgrounds of enumerators. Inspections integrated into a national survey can be limited to just the core questions necessary for global monitoring. However, additional local or expanded questions may be included to assess specific risks or functions of sanitation facilities relevant to national targets and standards (Table 2). This list is not exhaustive but provides examples of questions tested in recent SMOSS monitoring pilots in Indonesia, Bangladesh and Serbia, as well as those drawn from the WHO sanitation inspection forms. The complexity of the inspection must align with the capacity of the enumerators available to deploy it. The shorter list of core questions in Table 2 is considered feasible for enumerators implementing household surveys.

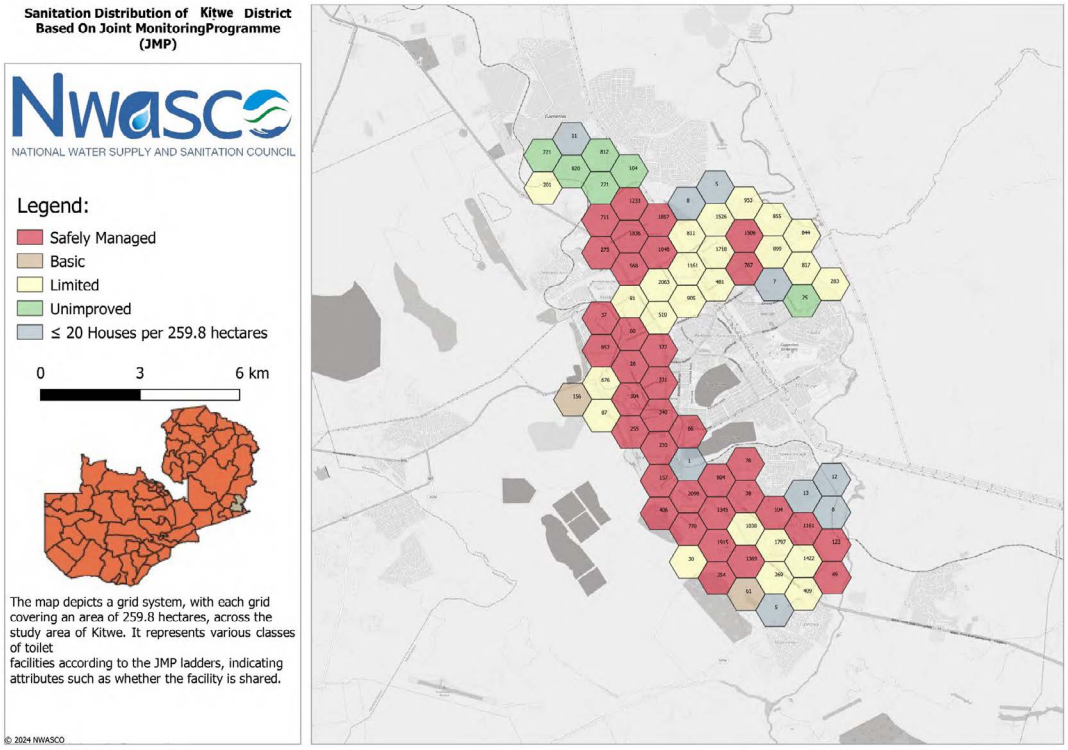
Table 2. Minimum and potential expanded observation questions for sanitation inspections

Core observation questions for global monitoring SDG 6.2.1	Additional expanded questions (examples only, not a complete list)
• Observe the type of sanitation facility. • Does the containment (tank or pit) have an outlet pipe for liquid effluent? *(Prompt: outlet is an external pipe through which liquid effluent from the containment is discharged)* - If the containment has an outlet pipe for liquid effluent, where does this pipe discharge? • Observe if there are other visible problems with the facility causing excreta to not be contained? *(select all that apply)* - There are large cracks, corrosion, deformations or other visible damage to the containment - Major malfunction of the installation (e.g. incomplete system, broken pipes) - Ponds of effluent are visible on the ground/surface outside the containment - Other visible leaking or overflow to the surface environment	• Is the toilet superstructure absent, incomplete, damaged? • Does the toilet superstructure provide privacy to the intended users? • Is the toilet dirty with visible excreta on surfaces? • What is the material used for containment wall? • What is the dimension of the containment? • Can outside water seep into the pit/septic tank or can internal fluids leak out? • Are there excreta overflowing from the squat hole, pan or pedestal? • Are there ponds of effluent visible on the ground outside the toilet? • Is the pit poorly maintained such that the cover slab is cracked or damaged? • Is the pit poorly maintained such that the side walls are not stable? • What is the estimated distance between containment and nearest groundwater source? • Where is the sanitation facility located? • Is the containment accessible for mechanical emptying?

The findings from inspections conducted as part of national monitoring are more likely to inform local or national risk management measures than to provide direct feedback on remediation actions to individual households. Several factors must be considered before offering feedback to households, including whether there are regulations or standards against which the sanitation facilities are assessed, whether information on available mechanisms or services for rehabilitation can be provided, and whether the methods used allow for the rapid synthesis of inspection outcomes and the means to provide feedback. Ethical considerations and consent must also be addressed, as monitoring for compliance requires different consent protocols than monitoring for general data collection and risk assessment.

Inspection data can serve various purposes at both national and local levels. In Indonesia, in addition to improving estimates for global monitoring of SDG 6.2.1, the data is expected to inform local and national government planning and budgeting, guide the design of a national septic tank improvement and subsidy programme, and contribute to local customer databases for regular septic tank emptying. In Zambia, inspections conducted by wastewater authorities and managed by the national regulator, NWASCO, are compiled nationally to identify high-risk areas for on-site sanitation. Using electronic devices for sanitation inspections can also capture spatial data, enabling the comparison of sanitation risks with public health or water quality data to identify priority areas for risk management *(17)*.

Figure 9. **Maps used for risk assessment in Zambia based on sanitation inspection data.**



Source: (17).

4.3. Local level assessments

Sanitation inspections can be used at smaller scales than national monitoring and for a range of purposes. Many local governments, donors, NGOs and researchers use sanitation inspections to improve understanding of risks and inform policies and programmes to improve sanitation facilities and service delivery.

A few examples with specific objectives are provided below. As detailed in the previous use examples, the sampling approaches will vary depending on the scope and objective of the assessment. Key considerations include:

- Defining the target population or area for inspection, such as rural versus urban settings, varying income levels, different risk levels or sanitation access, and specific programmes within communities, districts, or regions.

- Determining sampling method (e.g. random sampling, stratified sampling, or cluster sampling) and the sample size to ensure results are representatives. Sample size estimations should take into account access to households, willingness of residents to participate, and feasibility of inspecting certain infrastructure.

- Defining frequency of inspections based on expected changes in sanitation conditions over time.

Inform community-led total sanitation programmes

The first recommendation of the WHO guidelines on sanitation and health is to ensure universal access and use of toilets that safely contain excreta. This recommendation urges governments to prioritize the elimination of open defecation and enable universal access to toilets while planning for equitable progress. It also emphasizes the need for authorities to cover entire communities with toilets that meet minimum safety standards.

In many areas, access to sanitation facilities and the provision of services along the sanitation chain are improving. For example, the Community-Led Total Sanitation (CLTS) movement has significantly increased access to and use of rural sanitation facilities. However, in some settings, the quality of the toilets constructed remains rudimentary and may not effectively separate excreta from users and the community. Additionally, poorly constructed facilities have led to slippage, with many users reverting to their previous practices.

Sanitation inspections can play a crucial role in post-ODF efforts by local governments, communities, NGOs, and others to identify major risks associated with toilets built during ODF campaigns. These inspections can help prioritize improvements and ensure that toilets meet minimum safety requirements, as recommended in Recommendation 1 of the WHO guidelines on sanitation and health. This information can guide programming on both demand and supply chains to upgrade existing infrastructure.

Assess the risks of shared and public sanitation facilities

While shared sanitation facilities are not classified as basic or safely managed in global monitoring, they remain common and, in many dense low-income areas, the only immediate solution. Several NGOs, national governments, and researchers have used sanitation inspections to better understand the risks associated with shared and public toilets and to identify factors that enhance the safety of shared facilities. Inspections of shared facilities are similar to those for private facilities but may also include additional considerations of availability, proximity, and access. Inspections of public facilities may assess safety and privacy elements, such as lighting, locks, bins, separate access, and door privacy.

A study on quality indicators for shared sanitation was conducted in Kenya, Ghana and Bangladesh and assessed sanitation quality as defined by available and accessible, safe and secure, private and hygienic shared facilities *(18)*. The study recommended establishing quality standards and monitoring the following indicators to ensure user acceptance and shared sanitation interventions that improve public health:

- Technology: flush or pour-flush toilet technology where water is available and, if not available, construct improved toilets;

- Numbers of users: up to three households per facility;
- Accessibility/Availability: toilet located inside dwelling/inside compound/on plot, no restrictions of use, e.g. reported use 24/7, including at night;
- Safety/Security: solid floor and superstructure without cracks/holes, and functional lighting;
- Adequate privacy: availability of gender-separate toilets (whenever multiple cubicles are feasible/available), and lockable/functional doors;
- Acceptable cleanliness: no solid waste, no visible faeces/blood stains/sputum, no insects;
- Functional handwashing stations (soap and water);
- Additional contextualized standards defined with the local community.

Inform sludge emptying programmes

In cities in Indonesia and Bangladesh, sanitation inspections have been conducted to inform planning and create customer databases for regular sludge emptying programmes. For example, in Jambi, Indonesia, sanitation inspections, including photos and GIS coordinates, were carried out for over 40 000 households to establish a customer database containing information on the type of on-site sanitation system, size, age and accessibility for emptying *(19)*. Similarly, in Saidpur municipality, a non-sewered town in northwest Bangladesh, the sanitation facilities in over 18 000 households and 400 institutions were inspected to identify the type of on-site system and suitability for different sludge emptying methods. Data was uploaded to an information management system to aid in planning emptying services, particularly in identifying areas inaccessible by vacuum trucks *(20)*.

Integrated water and sanitation risk assessments

The interconnected nature of water supply and sanitation hazards could benefit from an integrated approach to safety planning. Hazards identified in sanitary inspections of small water supplies and those found during sanitation facility inspections often overlap. Integrated water and sanitation safety planning can enhance risk assessment by considering the impact on both services and more effectively planning mitigation measures.

In rural areas, implementing safety planning for water or sanitation typically involves many of the same stakeholders, and managing both simultaneously can be challenging due to limited resources and capacity. In Serbia, an integrated water and sanitation safety planning approach was piloted for three small water supply systems in rural areas *(21)*. This approach improved understanding of both drinking-water supply and sanitation systems and their associated risks, and the pilot identified benefits and recommendations for future scaling.

Following this pilot, Women Engage for a Common Future (WECF) developed the Water and Sanitation Safety Planning (WSSP) compendium to support integrated implementation for small-scale water supplies in rural areas. The WSSP aims to enhance understanding of water supply and sanitation mechanisms, identify existing and potential hazards and related diseases, and develop actions to jointly improve local hygienic conditions and support water protection policies *(22)*.

Research related to sanitation

Sanitation inspections have frequently been used to determine key parameters of sanitation facilities and containment as part of research into the impacts of sanitation on public health or environmental contamination. For example, a cluster-randomized controlled trial was conducted in India to assess the effectiveness of a rural sanitation intervention to prevent illness in children. This trial included structured observations of latrine functionality and signs of use *(23)*. In another study in Bangladesh, the influence of community level sanitation coverage on environmental contamination and child health was assessed through spot checks of latrine type, containment and hygienic condition, as well as the collection of soil, water and hand rinse samples *(24)*. The use of sanitation inspections for research is diverse, and the selection of parameters to assess varies based on the risk and exposure pathway being investigated.

5. Conclusion and way forward

5.1. Conclusion

Sanitation inspections of sanitation systems are increasingly implemented to identify and reduce health risks associated with toilets and on-site sanitation systems. These inspections are the simplest form of sanitation safety planning, involving a systematic approach to evaluating sanitation systems by assessing actual or potential risks to health and well-being. They provide a more objective and detailed assessment of sanitation facilities compared to what is typically achieved through household surveys.

Sanitation inspections can be deployed in various ways, depending on the regulatory context and objectives. They can be integrated into a country's regulatory framework to monitor compliance with infrastructure or technology standards and regulations. This approach is influenced by the institutional arrangements and maturity of the regulatory systems governing sanitation. Inspections can also be part of national monitoring frameworks to track progress toward national targets, assess service status and gaps, or inform planning, policies, and investments. They can be conducted in parallel with household surveys or as stand-alone inspections, such as during health or housing evaluations. Locally, inspections may be used to achieve post-ODF targets, study shared and public sanitation facilities, or research the impact of sanitation on health outcomes.

Sanitation inspections are crucial for identifying and objectively assessing a wide range of potential hazards, some of which may not be immediately apparent to users or public health inspectors. Beyond assessing status and identifying risks, inspections can also recommend corrective actions. The findings can inform national planning by highlighting areas for improvement. Additionally, national monitoring can provide data to track progress towards national or global sanitation targets. At local level or within specific programmes, inspections can guide service or programme planning by identifying priority areas for on-site sanitation upgrades, mapping customers for regular emptying programmes, or pinpointing specific local risks.

5.2. Limitations

Sanitation inspections have a number of limitations:

- On-site sanitation systems are typically below ground, often with only a small portion visible from the surface or none at all if installed beneath the house or toilet. Despite limited visibility, issues often manifest as visible hazards like excreta discharging to the surface, functional problems with the toilet, or other issues such as ponding or overflow.

- The form has a limited number of questions due to its simplified and user-friendly design. Consequently, it does not cover all potential health hazards or pathways for pathogen transmission. This limitation is most pronounced when the form is used in national household surveys, which have multiple objectives and often involve less technically skilled enumerators. In contrast, more detailed inspections are feasible when conducted for regulatory compliance by trained inspectors.

- The form assumes equal risk value in the overall risk score calculation, whereas some hazards may have greater impacts than others. Weighting these scores is possible but would require a scientific basis to justify differential scoring.

- Financial, technical, and administrative capacities are important considerations when determining the deployment approach, especially if regular inspections are not yet part of the regulatory or institutional framework. In some cases, inspections may be carried out in response to a neighbour's complaint, but they are not always conducted due to the high cost for one inspector to visit a single household.

- Identifying suitable actors to implement and manage the inspections may require significant stakeholders engagement, and the deployment approach should be tailored accordingly. Additionally, it is important to consider how assessments can lead to actionable outcomes, whether there are supporting regulations or financing, and which actors can implement or enforce improvements. Authorities may be aware that many septic tanks are not functioning properly, but these issues frequently affect poorer households who may lack the means to repair their systems.

- The WHO sanitation inspection forms are designed to accommodate various types of sanitation facilities, with diagrams for the six most common types, the standardized form need to be adapted to local contexts. Since local assumptions about what constitutes "good" or "safe" sanitation may vary, adapted questions should align with the objectives and risk factors of the original questions.

- The sanitation forms currently include climate-related factors that affect OSS functionality such as flooding, water scarcity and groundwater (sea level). However, climate mitigation aspects for greenhouse gas emission from OSS is not covered.

5.3. Way forward

Sanitation inspection packages would benefit from further testing and requires adaptation to different contexts.

Sanitation inspections will be tested during the second phase of the Monitoring SMOSS pilot project *(25)*. Additional questions about containment have been added to the MICS7 household questionnaire, which will be implemented in 26 countries in 2024–2025. These studies will provide more information about the success and challenges of implementing sanitation inspections in practice. The results related to containment will help improve understanding of the variability of indicators, which can inform future sampling strategies.

The remaining gaps include developing training materials suitable for different audiences and further assessment of the needs and capacity of different actors to implement the survey. Approaches to training of trainers, supervision and reporting requirements would also be useful to inform assessments conducted at a national scale.

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Annex 1. Approach to content development and declarations of interest

This guide was developed through a rapid review of the literature to identify relevant publications on the potential uses of sanitation inspections. It also incorporates feedback from presentations at various sessions during international conferences. Country examples were identified both through the literature review and pilot projects conducted by the WHO/UNICEF Joint Monitoring Programme for Water Supply, Sanitation and Hygiene, aimed at improving the monitoring of safely managed on-site sanitation. These examples were chosen to highlight diverse applications of sanitation inspections across both high- and low- and middle-income countries, representing various geographical regions. The draft of the user guide was shared with relevant experts involved in the country examples for review, further information, or clarification as necessary. Any declarations of conflict of interest from external contributors were reviewed by WHO technical focal points. No conflicts of interest, either actual or perceived, were found to influence the guidance.

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