Safely Managed Sanitation Services in the Global Sanitation Fund

Based on research by Andy Robinson and Andy Peal

SHF
The Sanitation & Hygiene Fund

Water Supply and Sanitation Collaborative Council Legacy Publication

The Water Supply and Sanitation Collaborative Council has been advocating and supporting sanitation and hygiene for 30 years. We are now stepping up and transitioning into The Sanitation and Hygiene Fund for a global, transformative and long-term approach to help achieve Sustainable Development Goal 6.2.

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Annex 2:
Key informant interviews

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Matteus van der Velden	Manager, Asia Regional Unit
Clara Rudholm	Manager, East and Southern Africa Unit
Simon Msukwa	Programme Officer, East and Southern Africa Unit
Hakim Hadjel	Manager, West and Central Africa Unit

Global sector informants

Name	Position	Organization
Jesse Shapiro	Environmental Health Team Lead, Senior WASH Advisor, and Sanitation Focal Point	Global Health Bureau, USAID
Pippa Scott	Partner and Principal Consultant in WASH	i-San
Prit Salian	Principal Consultant	i-San

GSF-supported programmes

Name	Position	Organization
Benin		
Yadjidé Adissoda Gbedo	Programme Manager	Medical Care Development International
Cambodia		
Rafael Catalla	Programme Manager	Plan International
H.E Chreay Pom	Director General Rural Affairs	Ministry of Rural Development
Dr. Chea Samnang	National Coordinator	Council for Agricultural and Rural Development
Ethiopia		
Mesfin Gebreyes	Programme Manager	UNOPS
Abireham Misganaw Ayalew	Team Leader, Basic Sanitation Services	FMOH
Amanuel Tafese Atomsa	Sanitation Expert	KPMG

Name	Position	Organization
Kenya		
Daniel Kurao	Programme Manager	Amref Health Africa
Okumu Nakitari	CPM Representative	Deloitte
Madagascar		
Rija Fanomeza	Programme Manager	Medical Care Development International (MCDI)
Nepal		
Sudha Shrestha	Programme Manager	UN-Habitat
Nigeria		
Nanpet Chuktu	Programme Manager	United Purpose
Kabiru Abass	WASH Technical Focal Point	PricewaterhouseCoopers
Priscilla Achakpa	National Coordinator	Women Environmental Programme
Senegal		
Adama Sy	Programme Manager	AGETIP
Tanzania		
Nelson Mmari	Programme Manager	Plan International
Lydia Mcharo	Acting Programme Manager	Plan International
Emmy Patroba	CPM WASH Consultant	Deloitte
Togo		
Fataou Salami	Programme Manager	UNICEF Togo
Uganda		
David Mukama	Programme Manager	Ministry of Health
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Annex 3:
SMSS online survey results

Introduction

The survey was available in English and French. The data has been analysed by language and reveals interesting similarities and differences.

Limitations of the online survey

The sample size was relatively small with 70 responses from the English survey (seven countries) and 15 responses from the French survey (four countries) for a total of 85 responses.

Country and agency representation (Q. 1 and 2)

The responses in English were from: Uganda 21; Nepal 19; Nigeria 13; Kenya 10; Cambodia 3; Ethiopia 2; and Tanzania 2.

The responses in French were from: Benin 10 and Madagascar 5.

The majority of the English survey replies were either from representatives of implementing partners (37) or from representatives of executing agencies (31). Only two were replies from representatives of programme coordinating mechanism organisations and none were from country programme monitors. Nearly half (48%) of the English survey replies were from NGOs (including local NGOs, International NGOs, CBOs and faith-based organisation), 39% were from national and local government departments and the balance (13%) were from representatives of UN-Habitat in Nepal.

The French survey responses were from the international executing agencies (7), implementing partners (6 in Benin), a consultant in Madagascar, and a local government partner (commune) in Benin.

Understanding of SMSS (Q. 5,6,7,8)

When asked “How clear is the concept of 'safely managed sanitation services'” 44% of the English survey respondents said that they were “very clear”, but a similar proportion (37%) said that they were only “somewhat clear”, suggesting that there is some doubt around the definition across the programmes. The French responses were similar with 47% responding “not clear” or “somewhat clear”, compared to 53% responding “very clear” or “completely clear”.

The survey asked respondents to “explain the difference between 'basic' and 'safely managed' sanitation services” This produced a wide range of responses, with many respondents identifying a ‘basic’ latrine as one of ‘low’ quality and a ‘safely managed’ latrine as one of a ‘higher’ quality. Many gave examples to illustrate this point, for instance for ‘basic’: “minimum services”, “one that may not guarantee separation of humans from excreta”, “simple toilet used in the household”, “availability of toilet and water supply”, “sanitation but with minimal health benefits”, “rudimentary aspects of sanitation”, “minimum accepted level”, “not ideal and convenient and are not durable”.

Typical ‘safely managed’ examples were: “increased privacy”, “more user-friendly”, “more advanced technologies/service”, “improved/civilized/developed/conformed sanitation services”, “fulfil all requirements of sanitation and hygiene”, “better health benefits in terms of disease control”, “satisfy all the required standards of a healthy environment”, “durable cleanable and sealable and convenient to use”, “clean latrine, free of flies and with hand-washing facility”, “no open defecation”, “quality standards looking at the community in its entirety”. But some confusion was also apparent, with some respondents suggesting that safely managed sanitation required equitable access for all, and others that this was for local committees to decide as there should be no “imposition of options”. Others noted that safely managed sanitation related to treatment of faecal waste, which has been common feedback throughout the study (with many respondents to both the online survey, and the telephone interviews, suggesting that safely managed sanitation requires faecal sludge management with vacuum tankers and treatment facilities).

When asked: “What would ‘safely managed sanitation services' look like in your own programme context?”, many again used examples: “washable floor slab”, “fly-proof”, “with handwashing facility”, and “double pit with composting”. Overall, only around 25% of the replies provided a response that was in line with or roughly in line with the SDG 6.2.1 definition for SMSS.

However, a higher proportion of English respondents were either very confident (36%) or somewhat confident (40%) that “the programme is adequately addressing safely managed sanitation services” (SMSS), with the balance (24%) being “not so confident” or not confident at all”. Only 27% of French respondents felt extremely or very confident that their programme was adequately addressing SMSS, with the remaining 73% reporting that they were “somewhat confident”, or “not confident at all”.

Government understanding of SMSS (Q. 25, 26, 27)

While the survey respondents expressed a reasonable degree of confidence in their knowledge of SMSS, less than a third “felt that the local government and other partners …. have a good understanding on what 'safely managed sanitation services' means” or that “local government and other partners are prioritizing the promotion of safely managed sanitation services”. When asked if they were “aware of any government criteria for assessing how many people/communities are using safely managed sanitation services”, only 10% of French and 40% of English respondents knew of any activity, and many of these cited examples in relation to monitoring ODF compliance or a general reference to the use of sanitation surveys (i.e. not specific to SMSS).

Monitoring and reporting on SMSS (Q. 9, 10, 11)

Nearly three quarters of the English survey replies stated that on their programme they "actively monitor and report on safely managed sanitation results indicators and activities". However, in line with the earlier responses on definitions, many gave examples relating to monitoring progress towards achieving ODF and improved latrine targets, rather than monitoring related to SMSS. In contrast, only five responses specifically mentioned that they monitored households or communities practicing 'emptying, transport, treatment and end-use/disposal', or 'safe disposal on-site'.

Just over 50% of the survey respondents confirmed that in their opinion "nearly everyone" or "most people" on their programmes "are using improved latrines/toilets (i.e. basic sanitation services)", compared to a smaller percentage 19%–33% who thought that "nearly everyone" or "most people" on their programmes "are using safely managed sanitation services".

Context (Q. 4, 12)

Respondents confirmed that the most common contexts in which the GSF programmes operate are settings where there are "high levels of poverty" (81%–100%); "rocky soils" (73% in French responses); "communities that are difficult to travel to" (66%); "flood-prone areas" (53%–64%); and "collapsible or clay soils" (53%).

In contrast, the least common contexts are settings where there is "low land availability/unclear property rights" (20%–23%); "refugees/internally displaced persons" (0%–26%); and "high population densities (i.e. urban environments)" (13%–30%).

The English survey respondents confirmed that on the two Asian GSF programmes "water seal" household toilets are the most commonly used types. Whereas dry "pit latrines" are the most common in the seven African GSF programmes (for which responses were received), with more respondents of the opinion that pit latrines with a "squat-hole cover and a slab with no holes" are more common than pit latrines without these features (i.e. no squat-cover and holes in floor).

What happens when full (Q. 16, 17, 18)

In the two Asian programmes, over half of the respondents reported that the most common method of managing a full pit is to empty it re-use the same facility. However, the replies indicated that this activity is rarely done safely, as over three quarters of respondents reported that "emptied waste" is most commonly emptied to "an uncovered pit, open ground/field, water body, or elsewhere", with two-thirds of respondents agreeing that "someone had to enter the pit during emptying" but only a third of respondents were of the opinion that "people wear protective equipment or clothing".

In the seven African GSF programmes, the majority of respondents reported that the most common method of managing a full pit is to close and cover it over, dig a new pit and construct a new toilet over it.

Barriers households face in achieving UBS and SMSS (Q. 22)

Two thirds of the respondents identified “affordability” as the “biggest barrier for people who may be the most disadvantaged to upgrade/relocate their latrines, or access emptying services”. Availability of services was reportedly the next biggest barrier for anglophone respondents; whereas the francophone respondents reported that mental and physical disabilities were the second biggest barrier for households.

Biggest gaps an organisation faces in promoting SMSS (Q. 28)

In the seven anglophone GSF programmes, “low prioritization by the programme” and a “lack of understanding on the concept” were most commonly cited by respondents as the biggest gaps that organisations face in promoting SMSS. “Inadequate monitoring systems” and “awareness of programming approaches” were chosen by respondents as the least common problems. The priorities were slightly different in the francophone responses: with the main barriers being a “lack of clearly established definitions and criteria” and a “lack of appropriate capacity and skills by partners and staff”.

Support most requested from GSF (Q. 29)

Across the nine countries that responded, the most common type of support requested by the respondents were learning exchanges, training workshops, field manuals, and monitoring criteria and guidelines from WSSCC/GSF (and government). The least favoured options were case studies from other programmes, a visual compendium, and webinars.

Annex 4: Enabling Environments for GSF programmes

Box 1: Total Sanitation status in Nepal

A two-stage sanitation development process has been adopted in Nepal, with verified ODF communities then striving to become Total Sanitation communities. However, the 2017 Nepal Total Sanitation Guidelines state that achievement of Total Sanitation status will be broken down into two phases:

1. Clean and Hygienic Area (selected criteria)

- Proper use of toilet (toilets built in all households, institutions and public places; toilets safe and clean with soap and water available; faeces not visible in open spaces; children's faeces safely disposed; user-friendly institutional and public toilets)
- Personal hygiene (handwashing stations with soap and water in all households, schools, institutions and public toilets; awareness of personal hygiene, including menstrual hygiene management)
- Access to and use of safe water
- Safe food hygiene
- Household and institutional sanitation (clean inside and out; safe disposal of sanitary napkins; solid waste management; animal excreta management)
- Environmental sanitation (appropriate sanitation technologies for solid and liquid waste management; appropriate faecal sludge management (FSM); sanitary landfills; and wastewater treatment systems)

2. Total Sanitation Oriented Area (selected criteria)

- User-friendly toilets have been built.
- Faecal sludge will be discharged through sewerage systems and disposed in a designated safe disposal site, with emphasis on the reuse of products.
- Water quality of rivers, ponds and reservoirs has been maintained.

Basic sanitation service: definitions[85]

The study found that each GSF programme had adopted their respective national definitions for an improved sanitation facility and that these generally align with the sanitation classifications used by the JMP. Importantly, the 2018 update of the JMP core questions on WASH household surveys (WHO, 2019) includes some revised monitoring definitions for sanitation facilities, notably "pit latrines with slabs ... constructed from materials that are durable and easy to clean (e.g. concrete, bricks, stone, fiberglass, metal, wooden planks or durable plastic) should be counted as improved" and "slabs made of durable materials that are covered with a smooth layer of mortar, clay or mud should also be counted as improved". However, "pit latrines with slabs ... constructed from materials that are not durable and easy to clean (e.g. sticks, logs or bamboo) should be classified as 'pit latrine without slab' and counted as 'unimproved', even if they are covered with a smooth layer of mortar, clay or mud."

The JMP does not require that pit latrines be flyproof in order to be classified as an improved sanitation facility. For instance, the revised JMP monitoring definitions note that "some latrines have tight-fitting lids to cover the drop hole when not in use, but such lids are not part of the definition of improved sanitation facilities".

As a result of these new JMP-monitoring definitions, a significant number of toilets with mud-covered slabs (and even some with cement mortar-covered slabs) that were previously classified as 'improved sanitation facilities' may now have to be re-classified as 'unimproved sanitation facilities' (which are not counted as providing access to basic sanitation services). Conversely, the GSF focus on the promotion and monitoring of flyproof latrines suggests that many of the sanitation facilities found in GSF programme areas may provide a higher level of service than JMP access to basic sanitation.

Safely managed sanitation service definitions

The desk reviews found only one country with a written definition for SMSS, and none of the GSF programme documents contained a definition of SMSS. Nevertheless, all GSF programme respondents were aware of the SDG 6.2.1 SMSS target, and most were able to provide a reasonable definition of safely managed sanitation services, indicating general understanding of the concept.

However, there were some questions about the relevance and application of this concept in rural areas. For instance, many respondents to the online survey and telephone interviewees suggested that these services relate to faecal sludge management, with service providers required to empty and transport faecal sludge to treatment plants or disposal sites. A few respondents noted that SMSS also includes safe containment of excreta, and that a household using a private pit latrine with slab that is closed and replaced when the pit is full should be counted as a household using safely managed sanitation service.

85 In interviews, respondents often used the term "basic" to describe a poor-quality or unimproved toilet, as opposed to describing an improved toilet that meets the JMP definition of providing access to a "basic" sanitation service. This is not surprising considering how recently the sanitation monitoring ladders have been adjusted in line with SDG 6.2.1, in line with national documents that predate the revised SDG sanitation ladders. For instance, the first level of the Tanzania ODF verification criteria (ODF Level 2) requires that all households have access to "basic" sanitation, while the second level (ODF Level 1) requires that all households have access to "improved" latrines.

In Kenya, the definition of basic sanitation given in the glossary of the National ODF Kenya 2020 Campaign Framework (MoH, 2016) has been extended to include the requirement that "… excreta is only considered to be safely managed where it is safely transported to a designated disposal/ treatment site, or treated on-site before being re-used or returned to the environment." What form this can take, or any other details, are not provided or explained.

The review also looked at other definitions and approaches used in the sector to estimate SMSS. For example, the Shit Flow Diagram (SFD) process (SuSanA, 2018) is used for rapid assessments of excreta flows in towns and cities using a graphical representation. The SFD analysis uses the sanitation chain to track excreta flows from the point of production (containment), through emptying, transport and treatment, up to the point of end use or disposal. It is based on the idea that excreta flows are either 'safe' or 'unsafe', with safety assessed by whether the hazard (pathogens in the excreta) are likely to enter the environment at each point along the sanitation chain and if human exposure to that hazard at that point is also likely to result in a significant public health risk. It is therefore similar to the JMP methodology but includes additional data points on potentially hazardous events (e.g. it includes an assessment of the risk of pollution of groundwater used for drinking, and an assessment of the performance of offsite treatment facilities) and therefore provides a more nuanced assessment of safely managed services.

Sanitation targets

National targets for ODF:

- Madagascar and Nepal: ODF by 2019
- Ethiopia: 82% of kebeles ODF by 2020
- Kenya: 2020[86] (current status: 20% villages certified ODF)
- Nigeria: 2025 (current status: 1% villages certified ODF)
- Other seven GSF countries: ODF in 2030 (based on SDGs)

There is less clarity on targets for access to basic sanitation services—although respondents were aware that the SDG goal is for universal access to basic sanitation (UBS) by 2030.

- Ethiopia: 82% of households with access to improved sanitation and handwashing facilities by 2020
- Tanzania: increase access to improved sanitation to 95% by 2025.
- Uganda: Uganda Vision 2040 confirms target of UBS by 2030

86 Kenya ODF date originally set for 2013.

Annex 5:
National ODF Definitions

Country	ODF Criteria
Benin National Strategy Document for the Promotion of Basic Hygiene and Sanitation	• All OD areas are cleaned • Each household has access to a fly-proof hygienic latrine • All hygienic latrines are used and well maintained • Each latrine is equipped with a handwashing facility with soap/ash with proof of use While not specified in the strategy document, a 'clean environment' is taken into consideration by the Ministry as part of the ODF criteria: the compound and areas around water points are clean (no rubbish, swept, weeds removed).
Cambodia National Guidelines on ODF Verification, 2013	• No defecation in the open, including children's faeces. Dig and bury is considered an OD practice. • 100% of people do not defecate in the open and at least 85% of people have access to a functional improved latrine (pour flush). The remaining 15% can either share or use unimproved (dry-pit) latrines. • Community has formulated and enforces informal or formal actions against open defecation
Ethiopia (Community-led Total Sanitation and Hygiene Implementation and Verification Guide)	ODF Level 1 • 100% of latrines are in use • Latrines have a squat hole cover • Latrines have a superstructure • All institutions have gender friendly latrine • Latrines have been constructed for use of travellers and in public gathering areas and are in use • No trace of open defecation ODF Level 2 • All the above • Each latrine has a hand-washing facilities are on working order and have water and soap or a soap substitute • Household safe water handling • Existing water sources are well protected from potential contamination by livestock and others, with good drainage

Country	ODF Criteria
Kenya National ODF Certification Guidelines; ODF 2020 Campaign Roadmap	• No defecation in the open (including in latrines) • Everyone must have access to a latrine (owned or shared) • All latrines must be fly-proof (tight fitting hole covers if not VIP) • Latrine floors must be free of faeces and urine • Superstructures provides privacy • All households have a handwashing facility near latrine with soap/ ash and water • Evidence of use of latrines by household members (footpath leading to the toilet) Other environmental hygiene components such as compost pits, clothing lines, dish racks, and safe water storage are also considered. While not part of the core ODF criteria, the verification team will take these components into consideration with the community so that they are addressed in a timely manner.
Madagascar (National guidance document pending)	• All open defecation areas are cleaned and/or transformed • All latrines are "flyproof" • Every latrine is equipped with a hand-washing device with soap/ash
Nepal Sanitation and Hygiene Master Plan, 2011	• There is no OD in the designated area at any given time; • All households have access to improved sanitation facilities (toilets) with full use, operation and maintenance; and • All the schools, institutions or offices within the designated areas must have toilet facilities • In addition, the following aspects should be encouraged along with ODF declaration process: • Availability of soap and soap case for hand washing in all households; and • General environmental cleanliness including management of animal, solid and liquid wastes is prevalent in the designated area.
Nigeria Protocol for certification and verification of ODF and total sanitation communities	• No defecation in the open • All households have a latrine, which are maintained and have evidence of use (path to latrine, ash is used in the pit) • All latrines are fly-proof • All anal cleansing materials are disposed in the pit • Hand-washing materials are available in or near the latrines with soap/ash • Latrines not close to groundwater drinking sources (30 meters) • Schools, market places, and health centres have latrines and handwashing facilities (separate facilities for boys and girls in schools)
Senegal (no official government CLTS strategy at the present time?)	• No defecation in the open • Each household has a latrine which is consistently used by the household (no sharing) • Each latrine has a handwashing station (with soap?) • The community environment, including water points, are clean

Country	ODF Criteria
Tanzania National Guidelines for Verification and certification of ODF Communities, 2016	ODF Level 2 • All households have access to basic sanitation • All institutions e.g. schools churches, mosques, health facilities, market places have improved and properly managed sanitation and hygiene facilities • No signs of OD around farmlands, bushes, water points, valleys, play fields, rivers, around water sources etc ODF Level 1 • All the above plus • All households have access to improved latrines • All households have functional hand washing points next to the latrine with soap • Existence of clear strategy to ensure ODF status is sustained e.g. enforcement of by-laws, close and regular follow up support • Clear commitments by community for maintaining ODF status
Togo Politique nationale d'hygiéne et d'assanissement 2016 et le PANSEA 2016)	• 100% of the concessions has and uses the latrine (sharing is not accepted outside of the compound) • Each latrine is equipped with a handwashing facilities and water plus soap/ash • All latrines have ash to remove odor and keep flies away • Each latrine slab has a cover • 100% of old OD sites are destroyed (No open defecation site in the community) • Schools, health centres, market places, and places of worship have latrines that are in use • No trace of OD around the concessions or in the village Total sanitation post ODF situation: Integration of other aspects of hygiene and sanitation: • Waste water management • Waste household management
Uganda Not aware of any national guidance document	• No defecation in the open • Latrines are fly-proof • Handwashing stations are located next to latrines with soap/ash

Annex 6: Lifespan of latrine pits

The GSF-supported programme managers provided estimates of typical latrine pit sizes (in different contexts), which were used to estimate how long it would take a typical latrine pit to fill. The faecal sludge accumulation rate was assumed to be 40-60 litres per person per year (see below). No allowance was made for the addition of degradable (or non-degradable) solid waste[87], as no data were available on solid waste addition (or on sludge accumulation rates). The pit-filling times in the table below illustrate the effect that different pit volumes and household sizes can have on pit-filling times (rather than to provide reliable estimates for each country programme).

Pit-filling times (based on GSF estimates of typical latrine pit sizes)

Country programme	Household size (# individuals)	Typical pit volume[88] (m3)	Typical pit-filling time (years)
Madagascar	5-8	3.0	6-15
Senegal	10	9.8	16-24
Nepal	5-8	0.7-1.4	1.5-7.0
Cambodia	5	0.76	2.5-3.8
Uganda	6	2.6-4.3	7-18
Ethiopia	5	1.6-2.4	5-8
Nigeria	5	2.3–4.0	7.5-20
Tanzania	5	2.2	7-11
Togo	5-6	1.7	5-8
Kenya	5	2.2	7-11
Benin	6	1.3	3.6-5.4

The estimates of pit filling times, which range from 1.5 years in Nepal up to 20+ years in Nigeria and Senegal, confirm significant differences in the potential FSM requirements associated with the sanitation technologies found in each country programme. In some cases, the pit is closed and replaced when full; in others the pit is emptied (either immediately so that it can be re-used, or after several years while a second 'alternate' pit fills).

87 The addition to the pit of non-degradable solid waste can double the sludge accumulation rate. Different types (and volumes) of anal cleansing material that are added to the pit may also affect the sludge accumulation rate.

88 These estimates are very approximate, and do not allow for 30cm space at the top of the pit (depth should usually be reduced by 30cm to allow for level of pipe entry, and soil to cover and close pit when full).

In Senegal, households build large pits (2.5m diameter and 2.0m deep) which, despite an above-average rural household size of 10 people, may take 20 years to fill. Large pits were also reported in Nigeria, where some households invest in pour-flush latrines with permanent superstructures and build as large a pit as they can afford to reduce the need to replace or empty the facility. And in Uganda, national guidelines stipulate that pits will be a minimum of 5 m deep and can therefore also take up to 20 years to fill.

In contrast, the small concrete ring-lined pits in Nepal and Cambodia, which are often only 0.9 m in diameter, were estimated to take just 1.5-2.5 years to fill. A household survey conducted by iDE Cambodia (iDE, 2018) between 2015 and 2017 (3,720 households surveyed in 7 provinces) found that 88% of households had only one latrine pit, and 16%–18% of households had emptied their pit at some point.

Pit-filling time is influenced by:

- **number of people using the latrine:** large households and shared use latrines will require larger volume pits to avoid filling up quickly,
- **pit lining:** whether sealed or open, whether liquids can leach into soil,
- **groundwater level:** high groundwater level can create anaerobic conditions, and limit leaching of liquids into soil,
- **permeability of soil surrounding the pit:** low permeability soils like clay will limit leaching of liquids into soil,
- **volume of water flushed into pit:** due to anal cleansing, toilet cleaning and disposal of other wastewater into the pit,
- **volume of solids added to the pit:** ash and sawdust added to reduce smell and fly nuisance; solid anal cleansing materials; solid waste disposed to pit,
- **climate:** hot temperatures usually increase degradation rate and lengthen filling time, and
- **diet:** amount of fibre in diet can influence pit filling time.

Pit-filling rates are highly variable by context and population, due to the large number of variables listed above. Most studies of rural pit latrines suggest that sludge accumulation rates average 40-60 litres per person per year, with wet pits generally found to have lower accumulation rates (due to the faster degradation under anaerobic conditions) and dry pits to have higher accumulation rates. Where solids are regularly added to the pit, filling times may reduce by 33% (for biodegradable solids) to 50% (for non-biodegradable solids).

Some studies have reported much higher latrine-pit-filling rates (up to 300 litres per person per year) but these data are from urban latrines, with large household populations (more than 20 people) using facilities with limited leaching potential, and high water inflows into the pit, all of which reduce the chances of any degradation of the pit contents and significantly reduce the pit-filling time. Dry pit latrines containing consolidated faecal sludge are difficult to empty completely, and these latrine pits appear to fill more quickly over time because each emptying leaves a progressively larger volume of consolidated and hard-to-remove sludge in the bottom of the pit.

The GSF Madagascar programme encourages the regular addition of wood ash to the latrine pit after use. The programme manager suggested that the addition of ash assists the decomposition process (through provision of carbon to increase the carbon-nitrogen ratio and assist the degradation process) and extends the pit-filling time (pits where ash was not added to faecal sludge were thought to fill more quickly than pits with regular addition of ash).

While the science of the decomposition of faecal sludge is complex, with many different variables that affect rate of decomposition, most research suggests that wood ash (in sufficient quantities) is a desiccant that raises the pH of the pit contents and, as a result, slows the natural composting process.[89] While the higher pH is beneficial for pathogen elimination, as a pH above 10.0 is sufficient to kill most pathogens (with the exception of Ascaris eggs which require a pH of 12.0 or above), it seems likely that substantial ash addition to pit latrines is likely to slow degradation rates and reduce pit-filling times. However, the addition of wood ash is beneficial because it increases the carbon content (although the addition of wood shavings is even more effective); helps to dry the pit contents (increasing aerobic potential); and diminishes fly and smell nuisance that are often significant factors in long-term latrine use and user satisfaction.

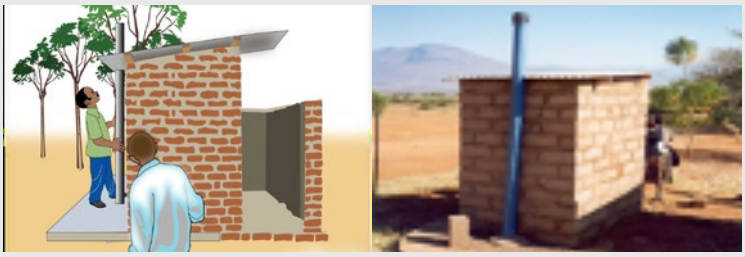
89 Desiccation (through wood-ash addition) reduces a moisture content below 40%, which is too low to allow biological growth and conservation of heat to reach thermophilic temperatures that encourage aerobic compost microorganisms to feed on organic matter and cause decomposition. Oxygen levels (e.g. through aeration of the compost pile) and carbon-nitrogen ratios are also critical to this process.

Annex 7:
Toilet type definitions used in Tanzania

In Tanzania, the National Guidelines for Verification and Certification of ODF Communities (MoHCDGEC, 2016) include five latrine types:

- Type A : Traditional pit latrine (TPL)
- Type B: Improved traditional pit latrine (ITPL)
- Type C: Ventilated improved pit latrine (VIP)
- Type D: Pour-flush/flush (with water seal)
- Type E: Ecological sanitation

Photographs of examples of these latrine types are included in the table below along with the Swahili name in parentheses.

Latrine type (Aina ya choo)	Example of toilet type (Picha za Vyoo)
Type A: Traditional pit latrine (Choo cha asili)	
Type B: Improved Traditional pit latrine (Choo cha asili kilichoboreshwa)	
Type C VIP- ventilated improved pit latrine (Choo chenye bomba la hewa)	

Latrine type (Aina ya choo)	Example of toilet type (Picha za Vyoo)
Type D Pour-flush latrine (Choo cha maji)	
Type E Ecological sanitation (Choo cha Ikolojia)	

Type A toilets (traditional pit latrines) are defined as unimproved latrines. The latter are typically characterised by one or more of the following attributes: no floor slab, or a non-washable floor slab, no door, or a door and walls that do not afford the user privacy, and no roof. The definition of terms provided in the MoHCDGEC, 2016 guideline indicates that Types B to E are considered "improved latrines", in that they will have "a washable floor, walls and door for privacy, a roof and the potential to safely contain faecal matter from contact with human being." Importantly, any Type D toilet (pour-flush/flush) that does not have a water seal is considered to be a Type B toilet. The Usafi wa Mazingira Tanzania (UMATA) programme follows the national guidelines and therefore uses the same Type A to Type E classification system, and the same definition for an improved toilet. The photographic examples of each toilet type (see above) are used by the UMATA programme to help classify toilets. In line with the national guidelines, UMATA also collects data on a number of other features that help to determine the quality of the facility (e.g. whether shared or not, if floor is washable, and presence of walls, roof, door and handwashing facility). However, the pit type (single or twin) and presence of any lining is not monitored and, despite the fact that many of the toilets are known to be offset-pit toilets, the pit location (direct or offset) is not monitored. Monitoring these features would help improve understanding of household sanitation preferences and enable strategies to be developed for supporting households. For instance, monitoring the number of pits that are lined would help when estimating the current demand for emptying as only these pit types are routinely emptied. And, while the current situation suggests that demand is low (e.g. routine monitoring data shows only 1% with pour-flush latrines), as urbanisation increases it is not unreasonable to expect that the demand for emptying will also increase.

Annex 8:
WHO draft service provider surveys

Below is a list of WHO draft questions for piloting emptying and transport (E&T) service provider surveys:

- ET1. What is your employment status (self-employed, company owner, employee)?
- ET6. How many other E&T service providers working in the same areas?
- ET7. What sort of toilet facilities do you empty?
- ET8. What type of equipment do you use for emptying?
- ET9. What type of equipment do you use for transport?
- ET10. When emptying and/or transporting the faecal sludge, do you [or your colleagues or employees] wear any special clothes or equipment?
- ET11. What special clothes or equipment is worn? [Selection options: 1. Gloves; 2. Boots; 3. Masks; 4. Overalls; 5. Others (specify); 8. Don't know.]
- ET12. On average, how many septic tanks, pit latrines and other systems do you empty per day/week/month?
- ET13. Do you discharge each [truck/vacutug/cart] load to the same location?
- ET14. How many different sites or locations do you visit and discharge loads?
- ET15. Do you visit one site or location more than others?
- ET17. Do you keep a record of all household emptying and transport activities?

Annex 9:
SNV SSH4A survey questions

Sanitation (SAN) Survey Module

- SAN3 (Ask and observe): What type of toilet is it? Can you show it to me?
- SAN3A (Ask and observe): Where do the faeces go? Options: to street, field, open; pond; latrine pit, tank, sewer.
- SAN4 (Ask and observe): Can rats reach the faeces in any way?
- SAN5 (Ask and observe): Does the toilet pan or slab allow flies to go in and out of the pit?
- SAN5A (Ask and observe): Is the toilet slab washable and/or cleanable?
- SAN6 (ask and observe): Is the tank/pit above ground?
- SAN7: How deep is the toilet pit below the surface?
- SAN8: Does the pit or toilet leak, overflow or flood at any time of the year?
- SAN8A: How often does the pit or toilet leak, overflow or flood? Options: it happened once; rarely; regularly; continuously.
- SAN9: Can (ground)water get in or out of the pit?
- SAN10: When the pit was dug, was any groundwater seeping in?
- SAN11 (Ask and observe): What is the distance to the nearest water source?
- SAN12 (Ask and observe): is that water source uphill or downhill from the toilet?
- SAN13: Is there any solid waste that you dispose in the toilet?
- SAN14: Which type of solid waste do you dispose in the toilet?

(If “No” to SAN16) SAN17: Why has the pit never been emptied?
SAN17A: How long have you been using the current pit?

- SAN20: To empty the pit, did someone need to enter the pit?
- SAN21: Did emptiers use any of the following: boots, gloves, face mask, or none of the above?
- SAN22: What was it emptied into? Options: directly into drain/water body (<500m away); directly into field (<500m away); into open pit on compound; into temporary covered pit on compound; into permanent covered pit on compound; stored for composting in compound; into open drum/container and taken away; into closed container/tanker and taken away.
- SAN23: Were the pit contents dry when removed?
- SAN24: Did you use any of the pit contents?
- SAN25: How long do you store the pit contents before it is used?
- SAN26: Do you do any further processing apart from storage before it is used?

Use of Sanitation (USAN) survey module

- USAN2 (Ask and observe): Is the toilet functioning as intended?
- USAN3 (Ask and observe): Are the walls and door of the toilet in place?
- USAN4 (Ask and observe): Is the toilet free from faecal smears on pan, wall and floor?
- USAN5 (Ask and observe): Is the toilet pan free from used cleaning materials?
- USAN6: What do you use for anal cleansing?
- USAN7: Do you use water in your toilet? Options: No; yes, for anal cleansing; yes, for flushing; yes, both anal cleansing and flushing.
- USAN8: Is water available in the toilet?
- USAN9 (Ask and observe): Does the toilet provide privacy?
- USAN10: How do you dispose of stools of children under the age of three years?
- USAN11: Is everyone in the household presently able to use the toilet easily and conveniently, unassisted?
- USAN12: If no to USAN11, why?
- USAN13: How many small children in your household are unable to use the toilet easily and conveniently, unassisted?
- USAN13A:How are small children supported to use the toilet?
- USAN17: Did you make any changes to make sure that everybody can use the toilet easily and conveniently, unassisted?
- USAN21: Do you have any problems cleaning and maintaining your toilet?

Annex 10:
Shit Flow Diagrams based on GSF outcome surveys

Below are two Shit Flow Diagrams (SFDs) based largely on data from the 2018 GSF Cambodia and Tanzania outcome surveys. For the GSF Cambodia SFD, additional data on emptying and unsafe management practices were obtained from a summary of iDE FSM surveys undertaken between 2015 and 2017. Excreta flows from under-five year old children ('U5s' in the table) were separated from the other excreta flows (adults and older children), based on the percentage of under-five children in the rural population in the 2014 Cambodia DHS report (11.5%). The other excreta flows were reduced by this percentage to recognise that infant and child excreta flows are managed differently to those of adults and older children. Where detailed data were provided on the types of toilets used by under-five children, the proportion of children estimated to use safely managed sanitation services was based on these toilet types.

Summary of GSF Cambodia SFD estimates

Cambodia SFD including under 5s																
	adjust for U5s	0.88														
			Containment		Emptying/what happens when full					Child excreta		End use/disposal				
	JMP data	%age of population	Safe	Unsafe	Emptied	Unsafely emptied*	Install second pit	Not yet full	Cover and replace	Safe	Unsafe	Safe burial	Dumped in fields	Percentage safe		
Flush to septic tanks	59	51.9	51.9		20							10	90			
					10.4							1.0	9.3	1.0		
						15										
						7.8										
							50	15								
							26.0	7.8						33.7		
Flush to pit latrine	3	2.6	2.6		65							100				
					1.7							1.7		1.7		
						35										
						0.9										
Pit latrine with slab	1	0.9	0.9						100							
									0.9					0.9		
Flush to septic tanks, shared	26	22.9		23												
Unimproved toilets	1	0.9		0.9												
U5 child excreta	12	12.0								39.29						
U5 Child share of safe excreta flows										4.71				4.7		
											60.71					
U5 child unsafe toilets and unsafe disposal											7.29					
Open defecation	10	8.8		8.8												
														42.1	= safe	
Percentage unsafe				32.6		8.7					7.3		9.3	57.9	= unsafe	
														100.0		
* flooded out																

A similar process was followed for the GSF Tanzania SFD, except that fewer complementary data sources were available on emptying and unsafe management practices. The 2016 Tanzania DHS report estimated that under-five children make up 17.7% of the rural population.

Summary of GSF Tanzania SFD estimates

Tanzania SFD including under 5s																
	adjust for U5s	0.82														
			Containment		Emptying/what happens when full					Child excreta		End use/disposal				
	JMP data	%age of population	Safe	Unsafe	Emptied	Unsafe flows	Install second pit	Not yet full	Cover and replace	Safe	Unsafe	Safe burial	Dumped in fields	Percentage safe		
Flush to tank or pit with water seal	8	6.6	6.6		5							10	90			
					0.3							0.03	0.3	0.0		
						15										
						1.0										
							0	0	80							
							0.0	0.0	5.2					5.2		
Flush to pit latrine with no water seal	62	50.8	50.8		5							10	90			
					2.5							0.3	2.3	0.3		
						15										
						7.6										
								0	80							
								0.0	40.7					40.7		
Pit latrine with slab	3	2.5	2.5					0	100							
								0.0	2.5					2.5		
Improved but shared	14	11.5		11.5												
Unimproved toilets	9	7.4		7.4												
U5 child excreta	18	18								62.21						
U5 Child share of safe excreta flows										11.20				11.2		
											37.79					
U5 child unsafe toilets and unsafe disposal											6.80					
Open defecation	4	3.3		3.3												
														59.9	= safe	
Percentage unsafe				22.1		8.6					6.8		2.6	40.1	= unsafe	
														100.00		

Annex 11: Summaries of GSF-supported programme visits

Cambodia country visit summary

Reason programme selected for visit

Although the GSF-supported Cambodia programme has not yet introduced activities to promote safely managed sanitation services (SMSS), other rural sanitation stakeholders in Cambodia have been working on faecal sludge management (FSM) and SMSS options for several years. In addition, the Royal Government of Cambodia has constituted a national working group on rural FSM and instructed this group to develop guidelines on safe rural FSM. As a result, significant learning on SMSS was available from the Cambodia visit.

Background

The consultant visited the GSF Cambodia programme (CRSHIP-2) for one week in late June 2019. The visit was designed to allow time for discussion with the GSF Cambodia team and other sanitation stakeholders (largely in Phnom Penh) on their research and SMSS activities, with only 1.5 days allocated for field visits to the GSF programme area. Field visits were made to three ODF communities in Takeo province. These communities were randomly selected from the older CRSHIP-1 communities, as the aim was to learn how communities were managing their toilets (and faecal sludge) over time.

Typical toilets

More than 95% of toilets in the programme areas are flush or pour-flush latrines with water seal pans, with less than 1% of toilets reported to be dry pit latrines (with or without slab), hanging latrines or composting toilets. Around 75% of the pour-flush latrines are estimated to flush to a single offset pit (usually lined with 3 concrete rings and covered with a round concrete slab); with another 10% of pour-flush latrines installed directly over a 3-ring lined pit; and the remaining 10% flushing to twin offset latrine pits (usually installed in series, with a connecting pipe).

The concrete rings used to line the latrine pits were originally designed to allow leaching (of liquids and gases) into the soil surrounding the pit, either through open joints, holes left in the rings, or other porous additions to the concrete. However, masons have started using solid concrete rings (intended for lining wells or drains rather than latrine pits) in latrine pits, and high groundwater tables often encouraged people to cement the joints (to reduce water ingress into the pit). Masons often suggest to households that leaching can still place through the open base of the pit, this is extremely unlikely as the soil at the base quickly becomes covered in faecal sludge, which blocks the pores in the soil and limits infiltration. As a result, the leaching capacity of some latrine pits in Cambodia is limited, and the pits often fill up with liquid more quickly than expected.

Typical pit volume = 0.9m dia. x 2/4 x 1.2m deep = 0.76 m3
Average filling rate = 40-60 litres per capita per year
Average household size = 5
Typical pit filling time = 2.5-3.8 years

Limited leaching capacity (leading to shorter pit filling times) encourages toilet users to add a second pit in series (which receives the liquid sludge that overflows from the first pit, thus acting as a 'septic pit'), or to pierce (make a hole in) the highest concrete ring to allow liquid faecal sludge to flow out (contaminating the local environment) to extend the period until the pit needs emptying (i.e. when it fills with solid faecal sludge or becomes blocked).

No GSF data were available on leaks, overflows or flooding out from the toilet pits or tanks. However, iDE Cambodia has collected data from more than 3,700 households in seven provinces during 2015-2017 which suggested that 10%-14% respondents had 'pierced' their latrine pit to let out liquid faecal sludge (particularly during the rainy season when groundwater tables rise, more water enters the pit, and some people have difficulties flushing their toilets). These data suggest that, even if households eventually empty their pits safely (e.g. using a service provider with appropriate protective clothing and equipment that disposes of the faecal sludge into a buried pit or to a safe treatment or disposal site), a proportion of toilets are not safely managed during their lifetime, with the risk that some households will let out liquid faecal sludge to prolong the life of the pit and avoid emptying.

Observed SMSS issues

Around 30% of the toilets observed in the three ODF villages visited had containment problems, notably signs of leakage and overflow from the pits (e.g. heavy vegetation around the pit, when other surrounding areas were lightly vegetated). One toilet with a single pit had an open "casting hole" above ground, with liquid effluent continuously flowing out of this hole and pooling around the pit. A significant proportion of toilets had grey water discharges (from washing in the toilet) around the pit, with the risk that this wastewater might enter the pit.

Around 50% of the households interviewed reported that they had emptied full pits (NB many of these toilets were 5-7 years old). Most had used some form of mechanical emptying:

- Self-emptied using some form of agricultural or drainage pump.
- Paid an informal operator to pump the sludge into a tank on a farm vehicle.
- Paid a vacuum tanker to collect the sludge.

The reported emptying costs varied from USD 10 (farm pump) up to USD 40-70 (vacuum tanker) depending on the volume of the pit. These costs are high for poor households, which encourages unsafe management (e.g. leaks, overflows, or deliberate outlets from the pit – known as flooding out, or piercing the pit – that are likely to reduce emptying requirements).

The frequency of emptying reported was also highly variable: only twice in 20 years, annually, and every 3 months. The frequency was clearly affected by the volume of the pit (some households had invested in 7 concrete rings, whereas others used only 3 rings; some had two pits connected in series, some had only one pit), the leaching capacity of the pit, and the success in emptying (as sometimes settled sludge becomes compacted at the base of the pit, and may not be removed by suction pumps, thus gradually accumulates and reduces the available storage volume).

The sludge emptied from the pits was generally disposed to nearby rice fields, although some households did not know where paid service providers (especially vacuum tankers) took the sludge. Only a couple of wastewater treatment plants were reported to be operational in the country (in Siem Reap and Phnom Penh) so there are currently few alternative options for safe disposal.

The potential to bury faecal sludge in pits or trenches was discussed with several sanitation stakeholders in Cambodia. Trenching has been used to dispose of faecal sludge at scale in Malaysia, and has been tested as a potential rural disposal solution in South Africa and Cambodia. Where space is available, trenching (or burial) provides a simple solution that limits the need to transport faecal sludge (as suitable burial or trenching sites can usually be found within or nearby most rural communities) and avoids the need for sludge treatment facilities, which are often beyond the capacity and resources of even large towns and cities in low income countries.

Productive use of faecal sludge

Another challenge is that rural communities in Cambodia are aware of the productive value of faecal sludge. The reason that most faecal sludge is dumped to rice fields is that people are aware that the nutrients will benefit the crop, and the value of the sludge as fertiliser often outweighs any potential concerns about the safety of the practice.

Uncontrolled use of untreated faecal waste poses potential public health risks, particularly where the waste is applied to land where fruit or vegetables are grown on the ground (potentially in contact with the pathogenic waste), where crops are harvested within three months (i.e. before pathogen die-off and inactivation can be assured), and where these fruit or vegetables may be consumed unwashed.

SMSS monitoring

Little monitoring of SMSS takes place. The CRSHIP programme recently introduced the following faecal sludge management (FSM) indicators into its programme database, in response to the new SMSS indicator in the GSF monitoring framework, but no data have yet been collected for these indicators:

- Households with filled latrine pit (number)
- Households who have emptied latrine pit (number)
- Households who have rebuild latrine (number)
- Households who have twin pit latrines (number)
- Households using biogas latrines (number)

The national WASH MIS includes only basic indicators on toilet use with no SMSS indicators. In addition, all national monitoring is currently paper-based, which creates problems of aggregation, verification and use of the data (although some stakeholders, such as iDE and SNV, use smartphone monitoring systems in their programmes).

Key challenges to achieving SMSS

A large number of toilets with lined single pits have been built in rural Cambodia over the last 10 years, with many pits now becoming full, overflowing and requiring replacement or emptying. Few households with ring-lined pits are willing to abandon or replace the investment made in these latrine pits; and while households are reluctant to pay someone else to empty the pit, they are also often reluctant to empty the faecal sludge themselves.

In rural areas, the data from previous studies suggest that:

- the majority of toilet owners have emptied their latrine pit at least once.
- more than 80% empty the wet faecal sludge manually (using a bucket on a rope)
- more than 70% dispose of the faecal sludge unsafely (to nearby fields, drains or water bodies).

SNV research on faecal sludge management perceptions also confirmed that:

- 94% stated that it was important to empty pits to avoid bad smells
- 89% believe that faecal sludge is dangerous
- 61% are not comfortable with manual emptying their pit themselves
- 50% have some acceptance of overflowing latrine pits in rural areas
- 50% have some acceptance of disposal of faecal sludge to fields and water bodies

Some households delay pit emptying by installing an overflow from the top of the pit - either by piercing the topmost ring so that liquid faecal sludge floods out (particularly in the rainy season); or by installing a pipe connected to a second pit so that the liquid faecal sludge overflows into the second pit. Therefore, most toilets are either emptied unsafely, with the pit contents disposed unsafely; or allowed to discharge directly into the local environment (which is possibly more unsafe, as the discharges are likely to contain high pathogen loads that will contaminate an area close to the house).

Rural sanitation stakeholders in Cambodia recognise these challenges, and are promoting the alternating dual/twin pit (ADP) latrine as the most sustainable solution. However, an ADP upgrade currently costs USD 50-75, with demand for ADP upgrades relatively low (in part because households understand that they will still have to empty the full pit at some point in the future, which will either involve a payment or an unpleasant job for the household members). There is currently insufficient experience with ADPs to convince rural toilet owners that the ADP is a simple and effective solution to their pit emptying problems, where the faecal sludge decomposes and allows them to empty relatively safe and harmless material when the second pit becomes full.

As a result, unsafe pit emptying is still prevalent and needs to be addressed (at the same time as promoting alternative solutions). Awareness needs to be raised on the public health hazards associated with the handling and disposal of untreated faecal sludge, and guidance needs to be provided (to all stakeholders, including local governments) on safe practices for emptying, transporting, treating and disposal of faecal sludge. Where FSM service providers are used (or are likely to become prevalent), local governments should monitor and regulate these services, and apply sanctions to households or service providers that do cause public health hazards through unsafe containment, emptying, use or disposal of faecal sludge.

As ADP toilets become more common and acceptable, financial support may be required to enable poor and disadvantaged households to upgrade their toilets from single pit facilities. East Meets West (EMW) piloted targeted subsidies for ADP systems in Svay Teab district to complete the district ODF process, but these subsidies only reached 40-60 households thus provide few lessons for larger-scale implementation.

Lessons learned

The successful promotion of pour-flush pit latrines with concrete slabs and concrete ring-lined pits has resulted in almost all toilets in rural Cambodia providing access to basic sanitation. The toilets are generally good quality, with only 5% found to be unclean. However, these toilets do not always provide safe containment – many of the toilets do not leach well, which means that they fill up quickly with wastewater, and some households solve this problem by allowing them to overflow, or by piercing a pit ring so that liquid faecal sludge can flow out. Furthermore, when the pits become full or unusable, a significant proportion of households empty their pits and unsafely dispose of the faecal sludge nearby.

Not everyone has a toilet – the GSF outcome survey suggested that around 10% of the GSF programme population has no facility and practices open defecation (despite 50% of the households surveyed living in certified ODF communities), and almost 30% share their toilets with 1-2 other households. Further work is required to reach these groups, as this excluded population (without access to basic sanitation) is likely to include the majority of poor and disadvantaged people, and the majority of the disease burden.

Madagascar country visit summary

Reason programme selected for visit

The GSF Madagascar programme was the first national programme funded by the GSF in 2010, thus has been a testing ground for developing programme approaches and systems. The Follow-Up Mandona (FUM) approach was developed in Madagascar, and several of the GSF Madagascar programme team have been involved in the transfer of capacity and knowledge from Madagascar to other GSF programmes (largely in Africa).

Background

The consultant visited the GSF Madagascar programme (FAA) for one week in early September 2019. The original intention of the visit was to learn about the programme from the FAA team in Antananarivo; and visit communities and local partners in one coastal region and one highland region. Unfortunately, due to the closure of one airline, and the busy summer holiday season, flights were not available to reach a coastal region thus the field visit schedule was revised to include two of the regions in the central highlands: Itasy and Vakinankaratra. These two regions are among the five major programme regions, and report high numbers of ODF communities, with around half of these ODF villages achieved during the 2011-2105 period (i.e. by now toilets will be filling and in need of replacing or emptying). In total, 9 ODF villages were visited (3 in Itasy and 6 in Vakinankaratra).

Toilet conditions

The toilets observed during the field visits were in generally good condition:

- Most were flyproof (covers in place and smooth easily cleanable slabs)
- Ash was present in most toilets
- Handwashing facilities were present in most toilets (usually tippy taps)
- Some upgraded toilets with cement slabs (although no market products)

Figure 1 Good latrines observed during the GSF Madagascar field visits

Figure 1 Good latrines observed during the GSF Madagascar field visits

The FAA team confirmed that toilets in the central highland regions are generally more durable and hygienic that those found in the coastal and southern areas. Two main factors were suggested: the presence of good building materials in the central highlands (where most houses are built solidly from fired bricks and timber, are often several storeys high, and have thick walls to protect against the cold); and good agricultural livelihoods (linked to the more predictable and temperate climate). The FAA team noted that toilets in the coastal areas tend to have a more flimsy construction (using branches and thatch), and are less durable and resilient in the face of tropical storms and collapsible soils.

Safely managed sanitation services

Figure 2 Non-flyproof latrines observed during the GSF Madagascar field visits

Figure 2 Non-flyproof latrines observed during the GSF Madagascar field visits

Figure 3 New latrines: observations of new pits, new construction and upgraded latrines with cement screeds

Figure 3 New latrines: observations of new pits, new construction and upgraded latrines with cement screeds

No open defecation was observed during transect walks, despite one community reporting that some households had reverted to open defecation. Sanitation access was good in most villages, but there was a high proportion of sharing: 43%-88% of households owned their latrines, with 12% to 57% sharing other people's latrines. All of the latrines observed appeared to be in use, with full pits reported and evidence of use in most cases.

Households reported that pits take 4-10 years to fill (similar to the estimated pit filling time, which was based on pits being about 2.0m deep), and that most dig new pits and build new latrines when the pit is full. No pit emptying was reported, and there was no evidence of leaks, overflows or other safe containment issues.

In these central highland regions, households reported that they were digging replacement pits from 6.0m to 8.0m deep in order to prolong the life of the new latrine. These claims were confirmed by the deep pits (under construction – see Figure 3) observed during the visit. These deeper pits are likely to have at least double the filling time of previous pits, taking perhaps 10-20 years to fill.

In the non-ODF village, some households had full latrine pits, or almost full pits, and had started to dig new pits, but had not completed the replacement latrines. In several cases, the households had abandoned old latrines, and claimed to be sharing their neighbour's (or family member's) latrine, but there was evidence (and confirmation from some villagers) that some households had reverted to open defecation. Despite these problems, the households with full pits confirmed that they were planning to build new toilets, and almost every household had already dug a new pit, which suggested that there was demand for sanitation (and some pressure to avoid open defecation) even in the worst performing village visited.

Biotay fertiliser

The IP in Vakinankaratra has developed a process for using old pit contents to create organic fertiliser, known as Biotay. An old pit was excavated while the consultant was in one of the villages, thus the process was observed in detail. A team of four workers walked from a nearby village and excavated a four-year old latrine pit (owned by a household that had already filled in and replaced at least three latrine pits). The excavation process took an hour, with the team digging down just over a metre until the excavated soil changed from red soil to dark brown soil. The team indicated that this dark soil was the start of the pit contents (which also contained solid waste: notably scraps of discarded clothing) and explained that, as the pit contents degrade over time, more soil is added to fill the hole, which explained the metre of red soil above the degraded pit contents. The team filled plastic sacks with the nutrient-rich humus from the old pit, and carried these sacks back to the Biotay centre.

The rest of the process was not observed, but the team explained that they would then mix the humus with rice husk ash before solar drying the mixture for at least six hours. The fertiliser product is then packaged and sold to households. The Biotay team had used the product to fertilise several fruit trees nearby, and reported good growth and high productivity in these fruit trees (e.g. a young papaya tree was reported to have borne fruit a year earlier than normal, and was heavily laden with fruit at the time of the visit).

While an interesting trial, which suggests that the nutrients in the old pits may be beneficial for agricultural use, the Biotay production process is complex, including: identification of full pits; excavation of pits; transport, mixing and solar drying of Biotay; packaging and distribution of fertiliser. At small scale, under good management, the Biotay production has worked. However, as the scale increases, the process will become harder to manage, and the costs (many of which are currently not evident, due to community contributions of labour, working space and NGO support) may limit the long-term viability of the process.

Key challenges to achieving SMSS

Many single pit toilets are now 3-5 years old, thus smaller pits are starting to fill and there is growing demand for replacement toilets and, in some cases (where people have built more permanent structures), for emptying and disposal services.

The field visits highlighted multiple examples of full latrine pits that had not been properly covered or closed. As a result, the pit contents remained visible and accessible (e.g. to flies and insects, rodents, birds and other animals); there is potential for the pit contents to be washed out (e.g. during heavy rainfall or flooding events); and, in some case, there is a potential hazard due to the risk that a young child could fall into the hole (either injuring themselves, or risking contamination from the faecal sludge).

Figure 4 Full latrine pits that have not been safely covered or closed

Figure 4 Full latrine pits that have not been safely covered or closed

The emptying process could be more safely managed, with three key areas to address:

- Burial of any sludge that has been stored for less than 2 years.
- Closure of any openings into toilet containers containing fresh sludge.
- Use of personal protective equipment by manual emptiers.

Research in other countries confirms that even properly trained sanitation workers rarely wear protective clothing or use suitable equipment, even where it has been specially provided for their use (in part because it is often hot, and sanitation workers are often used to the conditions, thus do not understand the need for protective clothing or equipment). Therefore, emptying of full pits should be avoided unless absolutely necessary.

Addition of non-degradable waste to latrine pits

The excavation of latrine pits to create Biotay fertiliser has revealed the substantial amounts of solid waste that are disposed into rural latrine pits in Madagascar. The single pit excavation observed during the field visits contained clothes, glass and other solid waste.

The addition of non-degradable solid waste can reduce the pit filling time by almost 50%, which means that a pit designed to last 9 years may only last 6 years. This practice has a substantial effect on the investment made by rural households in building and maintaining their latrines, but households appear unaware of the negative impact of adding solid waste to their latrine pits.

Improved M&E required to spot unsafe toilets

Around 10%-20% of the toilets observed (during the field visits in the central highlands) were not flyproof, or not clean, and needed some improvement. Improved monitoring would identify these facilities, and trigger follow up to encourage upgrading and improvement to more durable and hygienic facilities. The FAA team suggests that the proportion of unsafe toilets (user interface) is likely to be higher in coastal and southern regions, hence that improved monitoring will be even more important in these areas.

The field visits also highlighted the importance of making random checks on ODF and household sanitation and hygiene outcomes. The FAA monitoring suggests high sanitation access and use in almost 22,000 villages, whereas the random field visits found 1/9 ODF villages were no longer ODF, and that no follow up had been conducted in this village during the last three years.

Recommendations

Most toilets observed in the GSF Madagascar programme are likely to be safely managed, as very few latrine pits are currently emptied when full (or emptied after less than two years of storage), no outflows were reported from latrine pits, and groundwater levels (at least in the Central Highlands) are relatively deep. Nonetheless, 10% to 20% of toilets are either not durable, not well managed, or the pits are not safely closed and covered when full. Further work is required to identify these toilets (through better monitoring), and address these problems.

The GSF Madagascar programme reports a very high level of shared use of toilets, and the field visits confirmed that some shared toilets are not well managed. Shared use of toilets, particularly by large numbers of people, also has an impact on the lifespan of the pit, hence on the frequency and amount of replacement costs. Improved monitoring of the safe management of these toilets over time would enable the FAA to identify the categories of shared use that are problematic, and recognise the shared use of toilets that are safely managed.

While the field visits did not cover the coastal or southern programme areas, the FAA team highlighted the different sanitation challenges faced in these areas, notably the greater sustainability challenge for households affected by flooding, tropical storms and high groundwater. More work is required to develop resilient toilet designs that are better able to resist these climate events (or easier to repair and rebuild after these events), including the consideration of sanitation finance and additional support to disadvantaged households that are unable to build more durable and resilient toilets.

Finally, the review and field visits confirmed that while the concept of SMSS is well understood by the FAA team (not least because of their medical backgrounds), the WASH sector in Madagascar has not yet incorporated SMSS into its systems or practices. The GSF programme should use these study findings to boost national attention to SMSS; collect data and case studies on SMSS that can inform and stimulate a national process to work towards the use of safely managed sanitation services; and trigger government and key institutions to improve SMSS policy and activities.

Tanzania country visit summary

Reason selected for country visit

Toilet quality is an historical issue in Tanzania, in part due to the legacy of high rural sanitation coverage from the 1970s villagisation process, with rural communities often accepting the use of unhygienic toilets as normal. The GSF Tanzania outcome survey data indicated a fairly high level (70%) of access to at least a basic sanitation service, especially when compared to the latest JMP report (29% of rural population with access to at least basic sanitation, WHO/UNICEF, 2019). A country visit was therefore proposed to understand how the programme has changed social norms and 'moved people' from open defecation and use of unimproved toilets, to use of improved and safely managed sanitation services.

Background

The GSF Tanzania programme (UMATA) was visited for one week in late July 2019. Meetings were held with regional and district officials from the Ministry of Health, Community Development, Gender, Elderly and Children, with the National Sanitation Coordinator and with representatives of other key organisations and institutions involved in delivery of sanitation, wastewater and water supply services in Tanzania.

Eight ODF villages were visited during a three-day field visit to the three programme districts of Bahi, Chamwino and Kongwa. In each location, as well as observing household toilet access and use, village representatives were interviewed to understand how toilets are managed and learn about key issues affecting safe management. Where possible, interviews were held with both private emptying service providers and local government officials responsible for delivery of services.
Overall, 2018 UMATA monitoring data indicates that 86% of the programme target population (0.6 million of 0.7 million) live in ODF environments, while 0.3 million have access to improved toilets. This suggests that a large proportion of household toilets in the UMATA programme remain unimproved. However, since access to an improved latrine is part of the UMATA ODF criteria, this difference is because the ODF population also includes some people who had access to improved sanitation at baseline (which tends to increase this figure), whereas the population with access to improved sanitation generally reports the population gaining access since baseline.

Toilet types

Remote rural areas: The most common type of toilet on the UMATA programme includes some form of pit latrine, which is typically either a direct, dry pit latrine or an offset pit toilet. The latter comprises a pan, slab and superstructure which, as the name suggests, is not constructed over the pit but is located several metres away, with an open pipe (laid at a gradient) connecting the pan (usually with no water seal) to the pit.

Construction materials and methods are the same for both direct and offset pit types. Typically, the pit is left unlined and covered with a slab made from timber and compacted mud. A screed of cement mortar is added when available (or affordable), which can make the slab easier to wash clean. Toilet superstructures are predominantly made from locally available materials. For example, unburnt bricks or mud and wattle walls, a thatched or recycled corrugated iron sheet roof, and a door fabricated from recycled corrugated iron sheets or rough timber.

Heavy rains in recent years reportedly resulted in a large number of direct pit latrines collapsing. The offset pit arrangement is therefore increasingly preferred by households because if the pit collapses (from flooding or due to loose soil etc) the superstructure and slab do not fall into the pit. The majority of the toilets observed during the field visit were connected to offset pits and the National Sanitation Campaign (NSC) Coordinator reported that their use is also increasing in other areas of the country. In addition, at least six offset type toilets were observed under construction (or recently completed) reportedly to replace old direct pit toilets, which suggests that sanitation behaviour change is being sustained.

However, as no data are collected on the pit configuration by UMATA or NSC, it is not known how many offset pit toilets have been constructed under the programme or under the NSC. Estimates from respondents ranged up to 50% of household toilets, while the outcome survey data indicates that as many as 94% of toilets surveyed in programme areas may be connected to an offset pit. Importantly, the majority of these (83% of toilets surveyed under the outcome survey) are likely to be 'simple' pour-flush pit latrines without water seals and are therefore classified by UMATA as improved traditional pit (Type B) toilets. The majority of the offset pit toilets observed during the field visit were of this type, while the UMATA monitoring data indicate that across the programme only 1% of toilets are 'proper' pour-flush with water seal toilets (Type D).

Rural on road and peri urban areas: Direct pit latrine and offset pit toilets are also favoured by residents in less remote areas. However, in these locations, where both household incomes and access to materials are higher, it is more common for households to have installed a toilet pan with a water seal connected to a lined pit (and added a more substantial, burnt brick type superstructure with a corrugated iron sheet roof). For example, UMATA monitoring data indicate use of (Type D) pour-flush toilets by 7% of Chamwino Ikulu township households and by 18% of Kongwa township households.

Safely managed sanitation services

Containment

The few unimproved (Type A) toilets observed during the field visit typically had slabs that were not washable (and/or not clean), no roof and/or incomplete walls or doors. The majority of these were direct pit latrines.

Overall, the latrine slabs observed were generally complete, with no cracks or holes through which rodents could enter the pit; other key SMSS observations were:

- No toilets/pits overflowing/discharging to open ground, drain or elsewhere
- No toilets/pits close to (within 15 metres) of groundwater source
- No toilets/pits located up-gradient of a groundwater source
- No full pits left uncovered/abandoned

These observations confirm that the majority of the toilets observed could currently be considered as safely managed. However, a key feature of the commonly used simple pour-flush offset pit latrines is that they do not have a water seal, which means less water is required for manual flushing than in a conventional pour-flush latrine, but there is no water seal to limit smell or fly nuisance. And the addition of even relatively small amounts of flush water to a pit could adversely affect safety, as the pit is likely to fill more quickly – increasing emptying frequency or toilet replacement frequency - and the pit content drying time will increase – slowing the pathogen die off rate. Compared to the drier direct pit contents (used without flushing water) these offset pit contents could therefore be more hazardous to handle and dispose, especially if the contents of a closed pit are not properly covered (or emptiers do not wear personal protective equipment or dispose of the contents safely e.g. by safe burial). The management of these offset pits will therefore require careful monitoring, especially as they become full and households choose how to empty or replace them.

Management of full containers

Remote rural areas: Respondents shared the view that when pits fill up in the remote rural areas (which characterise the vast majority of the UMATA programme area) there was sufficient space for households to cover the full pit, arrange for another pit to be dug and the superstructure moved or replaced. And since the majority are low-cost (Type A and Type B toilets, which are generally made from locally available, often recycled materials) replacement is considered affordable.

The outcome survey reports only eight households (1.3% of 629) having emptied their pit, which is not surprising as it is estimated that pits take on average 7 to 11 years to fill and the programme is only 5 years old. The field visit confirmed that very few households had emptied a full pit so that they could carry on using the toilet. In addition, it was generally agreed that an unlined pit is very difficult to empty mechanically, as over time the contents dry and harden so that they require hand digging.

Rural on road and peri urban areas: There are no mechanical pit emptiers based in Chamwino Ikulu, Kongwa or Kibaigwa townships. Currently, private emptying service providers travel from Dodoma or Morogoro to provide services as and when required, with the emptied faecal sludge taken to the treatment plant in Dodoma or discharged locally either to a farmers' fields or "to a remote location". The service is expensive at around USD 30 per trip with more than one trip often required to fully empty a tank. The emptiers only service lined pits and tanks, mostly belonging to guest houses, hotels, schools, businesses and institutions; it is not known how many private households have sealed tanks or lined pits that are emptiable, with respondents of the opinion that the number was increasing but was still relatively small.

Manual emptiers also operate in towns offering a less costly service at USD 15 to 20 per pit emptied. They also only empty lined pits and bury the faecal sludge in a hole dug nearby, which is then filled in and covered. The service provided is very rudimentary with the pits being emptied by hand using only shovels and buckets. The operatives rarely wear gloves, boots and overalls, or take any precautions to prevent themselves, the household or local residents from coming into contact with the emptied faecal sludge.

The unregulated disposal of faecal sludge by mechanical and manual private emptiers is acknowledged as a concern by the local town officials. However, with no local treatment works or designated safe disposal location, they have found it hard to restrict the practice and there is no management plan in any of the townships. They also acknowledge that, as these small-town populations increase, the situation is likely to worsen. Chamwino Water and Sanitation Authority (CHUWASA) have commissioned the design of a sewerage system and there are plans to strengthen the water supply system in Chamwino Ikulu – the site for the new presidential palace. However, CHUWASA is not responsible for onsite sanitation or for management of faecal sludge emptied from pits and tanks.

Handwashing with soap

UMATA routine monitoring data for 2018 report that 71% of the target population (0.5 million of 0.7 million) had access to a handwashing facility with water and soap (HWWS), which is the JMP 'basic' handwashing service level and the target service level for the GSF programmes.

Handwashing is introduced to households during Follow Up Mandona interventions and when triggered to act, the outcome in nearly all locations is the construction of some form of tippy tap. These are made of locally available materials and are generally low quality and not durable. Respondents reported that tippy taps often last only two months, as they degrade in the sun, while theft and vandalism is also a problem. The country visit confirmed this finding with many households observed with no handwashing facility, or with a facility but no water or soap available. Respondents agreed that although awareness has been raised, handwashing practice is not sustained. This view is also supported by the 2018 GSF household outcome survey, which found only 29% of the population with access to HWWS and (from structured observation surveys) only 0%-11% handwashing at critical times (i.e. after defecation, after contact with faecal matter, before breast feeding, before feeding an infant, before eating, before preparing food).

Bathroom cubicles adjacent to the toilet cubicle, or space within the toilet cubicle for bathing, were observed at many of the household toilets visited. This feature is not routinely monitored and not included in the outcome survey, but it may indicate a change in hygiene behaviour that, compared to handwashing practice, is more sustained by households.

Uganda country visit summary

Reason selected for country visit

The USF was selected to learn how and to what extent one of GSF's largest and longest-running government-led programmes has enabled households to access improved and safely managed sanitation services. A country visit was therefore proposed to investigate key issues, including:

- how full pits are managed by households (with some household pit-type toilets approaching ten years old)
- the outcome of the programme's sanitation finance and marketing initiatives, such as the Water for People loan scheme
- the potential benefit of clustering of FSM services (that has been piloted for delivery of services to small towns in Uganda) in rural programmes.

Background

The country visit in the last week of July 2019 included field visits to Soroti and Lira districts implemented under Uganda Sanitation Fund (USF) phase 1 (from 2011) and phase 2 (from 2014) respectively; as well as meetings in Kampala with Ministry of Health (MoH) officials and members of the National Sanitation Working Group.

The fieldwork included visits to four ODF villages, and meetings with district-level implementing officers, representatives from an implementing partner (Water for People (WfP)), a service provider (Saniwaste Solutions) and a masons' group (Kole Masons).

The villages visited were all certified ODF and coverage was reportedly good in both districts: Soroti = 67% and Lira = 85%. Overall, 2018 USF monitoring data indicated that 75% of the programme target population (5.1 million of 6.8 million) lived in ODF environments, while 1.7 million had access to improved toilets. These data suggest that a large proportion of household toilets in the USF programme remain unimproved. However, since access to an improved latrine is part of the USF ODF criteria, this difference is generally because the ODF population includes some people who had access to improved sanitation at baseline (which tends to increase this figure), whereas the population with access to improved sanitation reports the population gaining access since baseline.

Toilet types

The majority of the toilets observed were direct pits and all were fitted with a slab (only one pour flush toilet was observed). Slab types observed included compacted murram (on a timber base), compacted murram with cement screed, precast concrete slab or sanplat. Flyproofing methods observed included the use of squat hole covers and the fitting of SaTo pans, with some toilet pits were fitted with vent pipes (however, few of these were fitted with a suitable mesh fly screen, which means that the toilets are not fly-proof).

All toilets were enclosed by four walls, covered by a roof and fitted with a door, and therefore all provided a good degree of privacy. The superstructure materials used varied too; the majority were made from locally available materials (unburnt mud bricks, mud and wattle and grass thatching), while those implemented through the Water for People loan scheme featured market-bought materials, e.g. burnt bricks, concrete blocks and iron sheets.

Anal cleansing materials were present in most of the toilets while the majority were observed to be clean, with a clear path indicating sustained use. Compounds observed during transect walks were generally clean with no visible OD and drying racks commonly in use.

Safely managed sanitation services

Containment
Latrine slabs observed were complete, with no cracks or holes through which rodents could enter the pit. Other key SMSS observations were:

- No toilets/pits overflowing or discharging to open ground, drain or elsewhere
- No toilets/pits close to (within 15 metres) of groundwater source
- No toilets/pits located immediately uphill from a groundwater source
- No full pits left uncovered/abandoned

Overall, the toilets visited were safely managed.

Management of full containers
Respondents all shared the view that full pits in rural areas are covered, closed and then replaced with a new toilet and pit. There were no reports of full pits being emptied in the villages visited and only one report of a full pit having been replaced. No issues were observed, or raised by households, with respect to the safe covering of excreta in full pits. Faecal sludge emptiers (trained by WfP) were interviewed in Soroti and reported that to date they had not emptied any rural pits, and they felt that there were limited business opportunities. Reasons cited included a) the use of deep pits (minimum depth of 5 metres) and therefore the long pit filling time (over 10 years) e.g. two pits were observed that were built in 2006 and not yet full; b) the majority of pits are unlined; and c) the widespread use of cover and replace to manage full pits.

Formal emptying, transport and treatment services

There are a limited number of formal FSM service providers in Uganda and these operate only in towns and cities. Similarly, faecal sludge (and wastewater) treatment facilities are found only in towns and cities and although the number is increasing, there are still very few and the functionality of these is reportedly poor.

Clustering of FSM services, where a treatment plant is located between two or more small neighbouring towns, has been trialled in some parts of Uganda. Typical of these is a pilot faecal sludge treatment plant operated by a small-scale service provider (Saniwaste Solutions) that serves the towns of Kole and Lira. Faecal sludge delivered to the plant is first dried before being processed ('carbonized') into solid fuel briquettes that are sold in the market. Saniwaste Solutions also provide an emptying service (using a gulper), which is less costly than that provided by local cesspool emptiers (who use large vacuum trucks). However, even the gulper service only serves households with lined pits (or tanks), and the charge of USD 40 to 70 per household toilet means that the service is often too expensive for rural households to use. Observations during the field visit confirmed that maintenance of the treatment plant is minimal, the trash screen had not been cleaned recently and the anaerobic filters are no longer functioning, which, along with the high cost and limited market for emptying, highlights the challenge of running a formal FSM service in rural Uganda.

Sanitation marketing

As part of their sanitation marketing sub-project, Water for People enabled households in Soroti to access loans (through Post Bank) to construct improved toilet facilities (that also included features such as satopans or pans with water seals) with permanent superstructures. Around 300 loans were successfully issued in Soroti district, and the field visit confirmed that a number of households have benefitted from the arrangement and have upgraded to - or constructed new - 2-stance toilets made from market bought materials. These typically include SaTo pans or pour-flush pans connected to lined pits. However, the data suggest that the total number of these toilets in Soroti and Lira is less than 1,000, which is less than 1% of the 105,000 households with toilets in the two districts. The majority have constructed less costly toilets made from non-market, locally available materials.

Considerable project effort has also been expended in training masons, not only in construction techniques but also in marketing and business skills. The chairperson of the Kole mason group explained during the field visit that since their formation in 2013 they had supported only 20 households to build toilets, and upgraded a further seven by applying a cement screed which, considering the membership of 28 masons, is less than one toilet per member, and therefore a poor return on the resources used in their training. The group is still functioning and their skills have presumably been useful in the other construction work in which they have been more active, which is clearly beneficial to other sectors in Uganda, if not directly to sanitation and hygiene.

When the level of support and resources expended in supporting the mason group and facilitating loans is viewed in terms of the small scale results, it is clear that in remote rural areas of Uganda (where the GSF programme operates) the less costly non-market technical support approach, which has had a much larger reach, appears more appropriate.

Handwashing with soap

USF routine monitoring data for 2018 report that 62% of the target population (4.2 million of 6.8 million) has access to a handwashing facility with water and soap (HWWS), which is the JMP basic handwashing service level and the target service level for the GSF programmes.

Handwashing is introduced through the CLTS approach during triggering and then during follow up visits (e.g. using Follow Up Mandona). When triggered to act, the outcome in nearly all locations is construction of some form of tippy tap. These are made of locally available, often recycled materials and are generally of low quality and not durable. Respondents agreed that although awareness has been raised and many have access to a facility, handwashing practice is not usually sustained.

Many of the tippy-tap handwashing facilities appeared to have been recently repaired, which may indicate sustained behaviour change but it may also be because the facilities were no longer working and therefore households were encouraged to fix or replace them ahead of the field visit by MoH officials (and an external consultant).

The USF is not alone in facing this challenge, as changing hygiene behaviours so that handwashing becomes the norm is an issue common to many rural sanitation and hygiene programmes across Africa. And, although it is a hardware not a software solution, an innovative, affordable, durable handwashing facility could be the catalyst needed to change handwashing behaviours.

A practical solution observed during the field visit was use of a small live tree to support the tippy tap, rather than timber posts or branches driven into the ground, which over time, tend to become loose and fall over. By using the live tree, the handwashing station becomes permanent and cannot be knocked over or broken accidently.

A second innovation, which is still under development, is the Egesa handwashing facility. This has been developed by a MoH Environmental Health Assistant working in Lira and, much like the tippy tap, it comprises a water container supported by a frame and is not operated by use of a hand (that may not be clean). Instead, the wrist is used to start and stop the flow and the container is supported by a stand so that it is at a convenient height. A range of container sizes (from 10 to 250 litres) have been tried and tested and prototypes have been installed in schools in Lira. The feedback has been positive but as the frame is fabricated from metal, the cost remains relatively high when compared to the very low cost tippy tap. The price of a 10 litre Egesa is approximately USD 8, whereas a simple tippy tap can be constructed for less than USD 1. (The larger Egesa models cost USD 13 = 20 litre; USD 27 = 50 litre and USD 100 = 250 litre).

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