UNICEF Target Product Profile
Faecal Sludge and Wastewater Management in Emergencies – Treatment products

UNICEF Supply Division Innovation Unit
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Purpose of the UNICEF Target Product Profile (TPP):

UNICEF creates Target Product Profiles to communicate requirements for products which are currently not available on the market but which fulfil a priority need to be used in the unique context in which UNICEF and its partners operate. TPPs include information on how the new product will be used, by or for whom, and the minimum and ideal performance criteria. The purpose of TPPs is to guide industry to develop products that meet UNICEF's needs, however they do not act as the final procurement specifications but rather as a list of desired requirements that combined describes the ideal product considering the context. UNICEF recognizes that innovation is an iterative process, and that suppliers must balance sometimes competing requirements against product development progress. To allow for creativity, and the innovation process to take its course, TPPs are less prescriptive than procurement specifications, and can therefore be challenged by the industry.

For more information please visit our TPP page

Need for the Product

Access to low-cost wastewater and faecal sludge treatment options that are simple, affordable to maintain and operate, and deliver satisfactory performance remains a challenge in humanitarian settings. With this project UNICEF aims to engage with industry and manufacturers to identify viable treatment products in the area of emergency sanitation. Products need to be suitable for deployment during the emergency response phase and be functional beyond the immediate response based on need.

As UNICEF continues to respond to conflict situations and rapid onset emergencies, there is a need to have product options that treat faecal sludge and wastewater, that are quick to set up and make operational, and could function as a temporary solution or as a stop gap for longer term solutions. UNICEF and our humanitarian partners need options that take a different approach to traditional emergency responses that are not only flexible in implementation, but simple to install and maintain due to challenging access to the field[1].

Product(s) that could be prepositioned and/or supplied through the UNICEF catalogue[2] to relevant actors are of interest. Examples of suitable solutions could include but not limited to;

- Existing treatment products that work well and fit with UNICEF's needs below.
- Adapt and improve existing treatment products to fit UNICEF's needs below.

[1] https://www.communityledtotalsanitation.org/sites/communityledtotalsanitation.org/files/UNICEFFN24_SyriaUrban.pdf
[2] https://supply.unicef.org/

- Design and innovate new treatment products if no existing product can be adapted to meet the need described below.

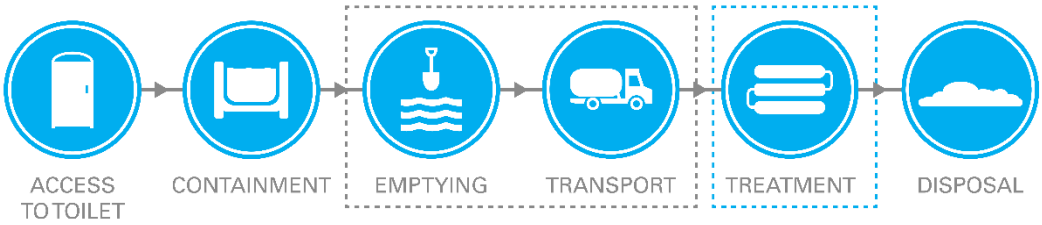

Figure 1: Outlines the Sanitation Value Chain and the scope of this project. The blue coloured dotted line represents the focus area, treatment products. In some scenarios we may need the product to be installed onsite, directly linked to the block of toilets or the containment part of the system. In other scenarios such as areas with limited space the product will be installed offsite leading to emptying and transportation of the excreta. The methods for emptying and transporting excreta vary depending on local context, including but not limited to pumping, transfer stations, manual emptying, modified motor bikes, trucks, flexible hoses, sewer etc. and the distance varies depending on context.

Project Background

UNICEF estimates that one out of every four children live in a country that faces violence, hunger or diseases due to conflict or other disasters, and that on average children under 15 are nearly 3 times more likely to die from diarrhoeal disease linked to unsafe WASH than violence in conflict[3]. In 2018, UNICEF estimated that around 48 million children across 51 countries were affected by war, disasters or other types of emergencies[4].

In April 2020, a global UNICEF survey found that in emergencies, treatment and safe disposal of faecal sludge and wastewater were perceived as the area with the biggest product gap within the sanitation value chain (Figure 1). UNICEF has no ready-to-deploy solutions that treat faecal sludge and wastewater, suitable for emergencies.

In emergencies such as the ongoing response to the Rohingya refugee crisis in Cox's Bazar, Bangladesh, there was a need for treatment solutions that could be deployed rapidly for immediate use in the congested refugee camps that had limited space available for installation[5]. Cholera outbreaks in emergencies, such as in the aftermath of the 2010 earthquake in Haiti[6], are partially due to unsafe management of excreta. In recent years there has been a growing interest in this topic with multiple decentralized faecal sludge management and wastewater treatment systems being trialled in emergencies, including lime treatment, filtration units, wetlands and activated sludge systems[7,8]. While there is evidence of some functioning well, there are still common challenges such as space and power requirements, the consistency of sludge and water requirements, excavation and civil work required increasing the time for implementation, effluent quality and cost[5,7,8].

UNICEF needs to ensure that products implemented can function across the variety of contexts in which UNICEF works, that may not require extensive excavation or civil works that delay implementation but could rather come ready for use, including all necessities for quick implementation by local actors.

[3] https://www.unicef.org/sites/default/files/2019-03/Water-under-fire-2019-eng.pdf
[4] https://www.unicef.org/eca/press-releases/unicef-seeks-36-billion-emergency-assistance-48-million-children-caught-catastrophic
[5] https://gsdrc.org/wp-content/uploads/2017/11/230-Wastewater-Treatment-Plants-in-rapid-mass-displacement-situations.pdf
[6] https://www.cdc.gov/cholera/haiti/index.html
[7] https://policy-practice.oxfam.org/resources/faecal-sludge-management-for-disaster-relief-technology-comparison-study-620943/
[8] https://octopus.solidarites.org/

Programmatic Relevance for UNICEF

UNICEF is mandated to respond to humanitarian crises and focus on dignified responses for women and children as access to water and sanitation is a human right. A key part of that humanitarian response is Water, Sanitation and Hygiene (WASH) and ensuring appropriate, dignified sanitation for those target groups[9].

Current Products or Response Used by UNICEF

UNICEF has no products that are easy to deploy as a response to humanitarian emergencies and that can be used to treat faecal sludge and wastewater to reduce the negative impacts on human health and the environment. In areas where UNICEF has conducted treatment activities it largely consists of civil works and permanent infrastructure that has large area requirements, long construction time and is not suitable to deploy during emergency phase.

Volume & Potential Impact

This project aims to deliver products that are suitable beyond UNICEF, for example to governments, UN-agencies, and NGO partners.

The area of sanitation has great potential for innovation, economic growth, and development, and is estimated to be a multi-billion dollar a year marketplace[10]. UN-Water concludes that the costs invested in faecal sludge and wastewater management are greatly outweighed by the benefits to human health, economic development, and environmental sustainability[11].

Use of Product in UNICEF Context

Use Case: During emergency response phase[12]

The immediate response phase starts immediately after an emergency event occurs and lasts usually up to three months[13]. During the emergency phase the situation is dynamic and fragile; people have often been forced to flee their homes and have lost belongings or loved ones. In many cases, people lack necessities such as shelter, food, water, and access to sanitation facilities. In these situations, local government, humanitarian, and UN agencies perform immediate actions to save lives and to meet basic human needs alongside protecting property and the environment.

In many situations temporary settlements and camps are established which involves setting up family shelters and communal toilets that function as an immediate, temporary facilities. These solutions are often operative beyond the first three months of the emergency phase, and in some cases for years depending on the situation. The toilet solutions being implemented are typically simple and quick to install; these can include a pit, plastic slab, tarpaulin, poles or similar. Whether people use water for cleansing and flushing, or not, depends on the local context and culture. A pit is excavated if the ground conditions are suitable and the distance to the groundwater table is more than 1.5 m, alongside if there is sufficient space to dig a new pit once the used one is full. Treatment solutions need to be compatible with these conditions and consider how they can integrate with these types of facilities.

[9] https://www.corecommitments.unicef.org/ccc-2-3-7

[10] https://www.toiletboard.org/media/52-Scaling_the_Sanitation_Economy.pdf
[11] https://www.unwater.org/publications/un-water-policy-brief-water-quality/
[12] https://drive.google.com/file/d/1DYkGVN-qdzBLhCTULxFFilaSwvzS6Wyg/view
[13] https://www.susana.org/_resources/documents/default/3-2455-7-1455802974.pdf

There is a need to have products that can offer treatment solutions in these scenarios where the conditions to dig a pit are not met and/or in situations with limited space available. Examples of these scenarios can be but are not limited to:

1. Crowded areas where many people share public toilets, resulting in quick filling-up of the pits, where there is a need to have a temporary solution (stopgap) to be able to treat faecal sludge removed from pits so that these existing pits can continue to be used, and while more toilets and pits are being constructed, (e.g. Camp setting and where people are displaced).
2. In areas with high groundwater table and in locations that have challenging ground conditions (e.g. rocky terrain or urban areas) where pit excavation is challenging and not feasible.
3. In areas where existing infrastructure is damaged e.g. natural disaster or conflict areas and where a stopgap and temporary solution is needed to ensure treatment while other infrastructure is repaired.

Table 1: Use case: During emergency phase.

	Treatment Considerations During Emergency Phase
Use environment:	Needs to be suitable as an immediate response and during the emergency. Feasible for use beyond the emergency phase and function as a transitional piece of infrastructure allowing UNICEF, government, and WASH partners to move into the recovery phase and longer-term solutions. The solution may be operative from months to several years (3.8 Table 3)
Function:	To treat faecal sludge and/or wastewater (solid and liquid phase) derived from human excreta including water from flushing and anal cleansing, toilet paper and other body fluids/solids. (Table 4, treatment objectives.) The product is applicable to receive faecal sludge and/or wastewater (Table 2) from: 1. Direct drop dry toilets and pits (dry sanitation) 2. Pour flush toilet and/or septic tanks 3. High flush toilets and/or septic tanks The toilet waste is generated from family, communal and temporary toilets including institutions. In this phase toilets are often being overutilized and solutions that could help release pressure on the toilet and containment part (Figure 1) of the system is typically useful. The toilet waste may contain solid waste as toilets often are a dumping place in emergency context (3.6 Table 3)
Pre-positioning	Products for use in emergencies are often pre-positioned in countries and regions known for recurrence of emergencies. Products can remain pre-positioned in-country for several years under difficult storage conditions (indoors and outdoors) due to climate conditions, frequent handling, or absence of warehouse equipment.
Ordering	Products are typically ordered by UNICEF staff in programs and operations and they usually rely on what is prepositioned in warehouses globally, regionally, or locally for the immediate response. Needs assessments from the field are typically estimations with limited technical details due to the sudden impact of the emergency and will be used to support ordering of products in the first phase.
Transport	International shipment of supplies in the immediate phase is typically done through airfreight. Transport modes in-country are commonly by road (all sizes of trucks, cars and lorries at narrow roads of various surfaces and in steep terrain) but may also involve small boats off-loaded by people. The *last mile* transport can include carrying by hand, by donkey, carts, tricycles with flat beds, tuk-tuks or by similar means. During the transport the products are handled frequently and often under less optimal conditions including poor roads, heavy rain, high temperature etc. therefore packaging should be durable for such conditions.
Space:	Typically, there is limited land available for installation due to high population density and a large number of displaced people. Another common issue is having challenging ground conditions such as high water-tables, rocky soil or uneven terrain. There may be some contexts where there is some space available for installation of products in close vicinity to the toilets itself (onsite installation) while in other areas the product must be located further away and not in close vicinity (offsite installation). This varies in each situation.

Assembly and re-use	The staff responsible for the installation are likely to not have received specific training and will rely on set-up instructions included with the product that must be universally understood, simple and self-explanatory. The situation on the ground is often fluid and needs may change, therefore it is useful that the product can be cleaned, dismantled and relocated to new site when needed.
Operational and maintenance (O & M)	Operators that are responsible for installation, operation and maintenance of the product are typically field staff of NGO partners, contractors, or the government with support from WASH committees, community volunteers, and low-skilled labour. Most likely the operators have not received any specific training on the product and can be technical and non-technical staff. O&M requirements are usually kept to a minimum and on a need basis with limited testing facilities to monitor performance standards.

Requirements

Please note that UNICEF does not specify the influent characteristics of faecal sludge and wastewater. What type of influent characteristics the product can handle must be defined by the supplier to meet the treatment objectives specified in this document (Table 4). Table 2 gives a generic description of the faecal waste generated at the different types of toilets and may vary with different sanitation approaches and context (e.g. unlined pit vs lined pit). Table 2 are included as guidance only. See Appendix II for examples on influent characteristics from the field and literature.

Table 2: Description of sewage generated in dry, pour and high flush toilets.

	Dry toilets	**Pour flush toilets(<3l)**	**High flush toilet (>3l)**
General Description	Dry toilets indicate toilets where there is typically no water for flushing (e.g. a pit latrine) though some water may be used for the purpose of anal cleansing[14]. Dry toilets may need fluidising of solids to enable emptying or may have to be emptied manually.	Pour flush toilets can be flushed manually by the user by using a cup or from a cistern above the toilet (filled manually)[14].	High flush toilets usually received water from the cistern above the toilet that is connected to piped water network[14].
	Usually high solid fraction	Usually medium solid fraction	Usually high liquid fraction

Product Requirements: During emergency response phase

The following table outlines UNICEF desired product profile characteristics. Acceptable can be treated as a minimum requirement. Ideal is an overall ambition for perfection. UNICEFs understands there will be trade-offs and opportunities to iterate and innovate and not all products will meet all ideal characteristics.

Table 3: Outlines product requirements

Attribute	**Expected Product Performance**	
Functional requirements	**Acceptable Performance**	**Ideal Performance**
1.1 Key functions	Provides treatment of faecal sludge and wastewater. Treats both the liquid and solid fraction before end use/disposal. (See treatment objectives Table 4).	
1.2. Application	Product must state its compatibility with the different options available at the containment stage of the sanitation value chain taking into account the following two scenarios:	
	Scenario 1: Product can be directly linked to a block of toilets (onsite). In this scenario, the product must be feasible to be directly linked to toilets with pit/holding tank below and above ground-level.	

[14] https://www.susana.org/en/knowledge-hub/resources-and-publications/library/details/3145

Attribute	Expected Product Performance	
Functional requirements	**Acceptable Performance**	**Ideal Performance**
	Scenario 2: Product can be offsite (following pit emptying and transportation of faecal sludge and wastewater to treatment site).	
	Be applicable for scenario 1 or 2.	Be applicable for both scenarios, 1 and 2.
	To treat influent from minimum one of the following; dry toilets or pour flush toilets (Table 2).	To treat any influent and not be affected by the fraction of liquid and solids (copes with low to high solid fraction and low to high liquid fraction) (Table 2).
1.3 Effluent discharge	Liquid: Onsite infiltration, discharge into a water body, evaporation or other suitable discharge means[12]. Solids/sludge: Burying, burning, reuse or other suitable discharge means.[12]	
2.0 Operating requirements		
2.1 Area m^2 requirement per m^3 treated	$\leq$ 40 m^2 per m^3 treated per day.	$\leq$ 5 m^2 per m^3 treated per day.
	The product should be adaptable for multiple connections/treatment modules to increase treatment capacity (m^3) where needed.	
2.2 Treatment objectives	Meet the effluent standards defined in Table 4.	
2.3 Time for product to meet treatment objectives after assembly	14 days	Immediately after installation (within 24 hours).
2.4 Odour	Should not have any noxious odors or attract insects.	
2.5 Runtime, h	Continuous flow, 24 hours/day.	Continuous and periodic flow, as per need 0-24 h /day.
2.6 Downtime	No wait time between uses and remains operable after a period of non-usage of 60 h without causing malfunctions or requiring additional efforts to resume operations that exceed normal operating procedures[15].	
2.7 Power requirements	Can connect to all major sources of external power	No external power supply required. Integrated power is based on renewable energy.
2.8 Climatic conditions	The product will be used worldwide and must operate in any climatic condition's with temperatures from 5 to 50°C, including areas that are prone to heavy rainfall and direct sunlight.	
3.0 Product requirements		
3.1 Accessories	The product will include all necessary accessories and tools to be fully operational and maintained including but not limited to pumps, pipes, tanks, tools for assembly, maintenance equipment, equipment to monitor operational and performance parameters, etc.	
	For scenario 1: The product must include all necessary accessories to allow directly linking the product to the toilet(s)/pit(s)/containment including but not limited to pumps, pipes etc.	
3.2 Spare parts	Product to be supplied with sufficient stock of critical spare parts.	Product to be out of parts that are regularly available and not of special character, and therefore can be changed and replaced by spare parts locally.
3.3 Time to assemble and make operational of the product itself	7 working days	2 working days
3.4 Site application	Are prefabricated and applied on ground-level. Only levelling and construction of a foundation required	Are prefabricated and applied on ground-level. No civil work and excavation required other than product assembly.
3.5 Relocation and Re-use	Can be cleaned and deactivated but no potential for relocation.	Can be cleaned and relocated to new site when needed i.e. change of location within the country or emergency response
3.6 Solid/domestic waste	The product must screen and/or allow for containment of solid waste as the influent is likely to contain solid waste and other materials such as stones, sand, plastic bags, packaging paper, menstrual hygiene products, diapers and similar.	

[15] https://www.iso.org/standard/72523.html

Attribute	Expected Product Performance	
Functional requirements	**Acceptable Performance**	**Ideal Performance**
3.7 Monitoring	Possible to collect samples safely within the treatment process to be analysed in laboratory to measure treatment efficiency.	Equipped with sensors (online monitoring or handheld instruments or similar) that measures real-time parameters needed for monitoring.
3.8 Product life span (after first use)	Minimum 1 year	2 years +
3.9 Durability	Needs to be durable against conditions such as, but not limited to, direct sunlight, high and low temperatures, wet environment, corrosion, dust and rough roads.	
4.0 Supply Chain Requirements		
4.1 Transport	On pallets or in wooden boxes that fit on a pick-up truck and is feasible to be hand-carried if needed.	
4.2 Weight transport, kg.	The product should be packed in boxes ≤ 100 kg that allows for handling by hand and must have appropriate carry handles to facilitate carriage by multiple people.	
4.3 Consumables	Not to be classified as dangerous goods and thereby be transportable by air and shall not necessitate their use in a manner or to a degree that exceeds acceptable health or environmental risks.	Not required.
	Any necessary consumables should be packaged with the system for minimum use of 3 months and consumables that is not found in-country should have a shelf-life of a minimum 3 years	
4.4 Equipment list	The product must include a table of content including quantities. Type and quantity of consumables per m^3 must be specified.	
5.0 User Requirements		
5.1 Required personnel onsite	As few operators as possible.	No operators required.
5.2 Educational level	Local technicians with basic practical skills (e.g. mechanic or plumber)	Low skilled labour
5.3 Operating and maintenance requirements	Operation and maintenance as simple as possible with settings being tamper-resistant if needed.	Maintenance in line with ISO 30500 4.14[15]
	To be designed in a way that allows for safe regular cleaning and maintenance by field personnel	
5.4 Training in set up and use	1-day on-site training including onsite demonstration, assembly, operation, troubleshooting and maintenance.	Virtual training including demonstration, assembly, decommissioning, operation, troubleshooting and maintenance.
5.5 User manual	A user manual with clear and definitive instruction to service personnel for installation, configuration, adjustments and maintenance shall be provided. User manual with pictograms and/or videos that clearly illustrate and define all necessary procedures, activities and schedules for configuration, adjustment and maintenance that are essential to keeping the system safe and operational. Must include critical spares list and operation and maintenance schedule.	
5.6 Language requirements	Minimum: English, French, Arabic and Spanish.	As many languages as possible.
6.0 Commercialization Requirements		
6.1 Safety Requirements:	Ensure safe handling of sludge with limited risk of cross-contamination to people and environment with standard PPE.	
	Design should minimise/mitigate risks to personnel health and safety during construction, operation, maintenance and demolition/disassembly.	
6.4 Children's Rights and Business Principles:	Adherence to UNICEF's Children's Rights and Business Principles.	

Treatment objectives

In 2006, the Global WASH Cluster was formed with the mandate to improve coordination in emergencies. UNICEF is the Cluster lead agency and is responsible for creating broad partnerships that include setting standards and policies, consolidating and disseminating standards, and identifying "best practice" for areas requiring technical expertise[16]. The Faecal Sludge Management (FSM) Technical working Group (TWiG) of the Global WASH Cluster[17] was created in 2019 and have developed a set of standards and treatment objectives to improve the quality of sanitation services in emergencies.

The Sanitation Quality Standards for Emergencies[12] includes a set of key indicators and standards used by sanitation practitioners in emergencies. Indicator 2.4 addresses how faecal sludge is safely treated and disposed of during emergency phase.

Table 4: During emergency phase treatment objectives[12]

Liquid
Focus on pathogen reduction, monitor E. coli in liquid effluent (<100 CFU/100ml)
Solids
Focus on pathogen reduction, monitor helminth eggs in the solid effluent (< 1 n/g).

Supporting documents

- The Sanitation Quality Standards for Emergencies, May 2021(Link).
- Faecal Sludge Management Terminology factsheet, May 2021(Link)
- The Sphere Handbook is one of the foundations of humanitarian work and outlines the Humanitarian Charter and Standards for humanitarian agencies.

Glossary

Downtime: Time interval for which the item is in a down state which the treatment unit processes are not conforming to the expected in terms of performance, safety, operability, and maintainability as specified by the manufacturer[18].

Dry toilet: It's a pit latrine/dry sanitation and is a type of toilet that collects human feces in a hole in the ground without water for flushing.

Faecal Sludge: Sludge generated from the storage of human excreta in pit latrines, septic tanks or other onsite sanitation systems that may be mixed with flush waster, domestic waste, anal cleansing materials and other liquids[18]. Faecal sludge is the mixture of human urine and faeces, water and anal cleansing materials (such as paper), and comes from on-site sanitation technologies, i.e. it has not been transported through a sewer[19]. It can be raw or partially digestive, a slurry or semisolid[20]. Compared to wastewater, faecal sludge is normally several times more concentrated with solids.

Faecal Sludge Management: When there is no sewer system and on-site facilities like pit latrines and septic tanks are used, the sanitation service chain consists of the emptying, transportation, treatment and end use or disposal of faecal sludge[19].

[16] https://washcluster.net/about-us
[17] https://washcluster.net/twigs/FSM
[18] https://www.iso.org/standard/75633.html
[19] https://drive.google.com/file/d/10yFwO580fXshhHBdhV0AHZGnzvhdCegG/view
[20] https://www.iwa-network.org/wp-content/uploads/2016/06/Compendium-Sanitation-Systems-and-Technologies.pdf

First phase emergencies/during emergency phase: Includes the immediate emergency phase that typically lasts from several weeks up to three months[13].

High flush toilet: A toilet that use water (> 3 liters) for flushing.

Input/influent: Substances fed to the treatment unit. Primary faecal sludge and wastewater which may include other substances such as liquid and solid domestic waste and may include different forms of biomass[15].

ISO 30500: ISO (the International Organization for Standardization) is a worldwide federation of national standards bodies. This document specifies general safety and performance requirements for designs and testing as well as sustainability considerations for non-sewer sanitation systems[15].

ISO 30800: ISO (the International Organization for Standardization) is a worldwide federation of national standards bodies. This document specifies requirements and test methods to ensure performance, safety, operability and maintainability of community-scale resource recovery faecal sludge treatment units that serves to approximately, but not limited to, 1,000 to 100,000 people[18].

Liquid Effluent: Treated liquid discharged from the backend of the product[15].

Low skilled labor: Workforce with limited skill set with no or low educational background.

NGOs: Nonprofit organization that operates independently of any government.

Non-usage: Non-usage is when there is no intentional shut down of the system by the user. In addition, the system is not used nor has any human interaction for a period of 60 hours[15].

Onsite treatment solution: A sanitation system in which faecal sludge and wastewater are collected, stored and treated onsite in close vicinity to the latrine[21].

Offsite treatment solution: A sanitation system in which faecal sludge and wastewater are collected and transported away from the latrine trough sewer network, vacuum trucks or similar and treated at a separate location[21].

Pour flush latrine: A small amount of water (< 3 liters) is used to flush human excreta out of a collection pan or toilet.

Runtime: The period of time which the product is running/operational.

Solid/domestic waste: Solid waste can be broadly defined as any unwanted solid product or material generated by people or industrial processes that has no value for the one who discards it. Other terms for solid waste are “garbage”, “trash”, “refuse” and “rubbish”.

Solid effluent: Treated solid discharged from the backend of the product[15].

Start-up and operational req. (Bacteria Culture or chemicals): To start or support the treatment process or to clean the system, including but not limited to chemical substances and/or biological agents.

Wastewater: The term wastewater is generally used to refer to the mixture collected in and transported through a sewer system, using flushing water to transport faeces and urine. In addition to flushing water, wastewater generally also contain greywater, e.g. the water from showers and sinks[19]. In this paper wastewater includes blackwater or greywater originated from households, communities and institutions.

[21] https://www.emersan-compendium.org/en/

Annex I: Different pathogen and total solids found in pit latrines and septic tanks

Table 5 Illustrates the different range of pathogens and solids found in pit latrines and septic tanks and is based on literature review and results from field samples in Cox's Bazar, Bangladesh and Nairobi, Kenya.

Table 5: Illustrates the different pathogen and total solids concentrations found in pit latrines and septic tanks. Specific information from Cox Bazar emergency response and informal settlements in Nairobi has been included as a context specific examples.

Parameter	Units	Typical (from literature) Pit Latrine/Public toilet sludge[22]	CXB Pit latrine (average)[23]	Nairobi pit latrine (average) [24]	Typical (from literature) Septic tank[22]	CXB Septic tank (average)[2 3]	CXB Influent (combined pit and septic tank) average[23]
E. coli	cfu/ml	1 x 10^5	6.25 x 10^5	-	1 x 10^5	194	7.43 x 10^5
Nematode/Helminth eggs	No./l	20 to 60,000	967	-	4,000	No data	967
Total Solids (TS)	mg/l	30,000 – 52,500	15,490	39,740	12,000 – 35,000	5,014	15,292

CXB: Cox's Bazar, Bangladesh

Note: Pit latrine most similar to a dry toilet (Table 2)

Annex II: About UNICEF Supply Division

UNICEF is one of the largest United Nations procurement agencies and delivers sustainable access to essential products and services for children in need. UNICEF Supply Division (SD) has its headquarters in Copenhagen and has the biggest humanitarian warehouse in the world as a preparedness measure and to ensure timely response to emergencies[25]. UNICEF emergency supply and logistic operations supported 143 countries in 2020, reaching a global procurement value of $682.5 million[26].

UNICEF is collaborating with governments, partners and the private sector to drive development of innovative products to meet specific need and to bring those to market[26]. UNICEF works with these partners in more than 100 countries, and in 2020 UNICEF spent $182.8 million to deliver solutions for WASH[27]. UNICEF aims to influence markets through balancing demand and supply to deliver equitable, sustainable access to products and services that improves children's lives through engaging with suppliers, procuring supplies at a sustainable price, drive innovation and, activate and stimulate demand[28].

[22] https://iwaponline.com/ebooks/book/384/Faecal-Sludge-ManagementSystems-Approach-for
[23] UPM excel sheet titled 'WP3 FSTP (23.01.19)
[24] https://www.mdpi.com/2071-1050/12/21/9040
[25] https://www.unicef.org/supply/about-us
[26] https://www.unicef.org/supply/media/8246/file/Supply-Annual-Report-2020.pdf
[27] https://www.unicef.org/supply/water-and-sanitation
[28] https://www.unicef.org/supply/influencing-markets