USAID
FROM THE AMERICAN PEOPLE

Technical Brief 5

URBAN SANITATION SERVICES

USAID Water and Development

TECHNICAL SERIES

INTRODUCTION

In a global and increasingly urbanized world, cities play a key role in building a better future. Better managed cities with improved services contribute to improved health, governance, cleaner environments, dignity, and economic growth. However, human waste must be managed in ways that safeguard the urban environment, including water and food supplies, to maximize development outcomes.

The purpose of this technical brief is to provide an overview of the important factors to consider in the United States Agency for International Development's (USAID) urban sanitation programming. In addition to the USAID Water and Development Plan under the U.S. Global Water Strategy, this technical brief is aligned with USAID's Sustainable Urban Services Policy, Private Sector Engagement Policy, and Environmental Natural Resource Management Framework. This document focuses on human excreta management activities that are attributable to the Agency's Water Directive and does not include broader sanitation areas such as solid waste.

KEY TAKEAWAYS

- **Urban sanitation is more than just toilets**. Dense urban environments require consideration of the whole sanitation service chain to ensure safely managed sanitation: fecal waste containment, collection, transport, treatment, and final disposal or reuse.
- **Effective urban sanitation is city-wide and inclusive**. There is no simple solution – rapidly growing cities require a range of technical solutions across the sanitation service chain. Ensuring that everyone benefits from safely managed sanitation requires specific approaches to target the underserved.
- **Apply commercial principles to service provision.** Management of sanitation services is as important as the technologies involved, and financial viability is a critical element of sustainable services. Local governments and providers must understand what the costs are for safely managed sanitation and how costs will be covered.
- **Aim for strategic, incremental improvements**. The sanitation challenge in urban areas is likely to overwhelm any single actor, so it is important to identify a manageable gap for USAID programming to address. Large investments in master planning and infrastructure are required, but urban migration, political dynamics, and logistical complexity require an incremental, locally relevant, and dynamic approach.

September 2020

THE URBAN SANITATION CHALLENGE

Driven by rural poverty, potential for economic opportunities, and migration due to conflict, insecurity, climate change, water scarcity, disaster, or environmental degradation, the global urban population is rapidly expanding and swelling impoverished urban settlements, especially in Asia and sub-Saharan Africa.[1] Currently, 60 million new residents move to urban areas every year. As of 2018, an estimated 4 billion people, or 55 percent of the global population, were living in urban areas. Although precise numbers are difficult to come by,[2] it is estimated that more than one in four urban residents live in slums, amounting to over 1 billion people with inadequate housing, limited access to basic services and usually lacking land tenure security.[3]

As a result, urban population growth dramatically outpaces gains in access to safe sanitation. Even where piped water networks exist, sewerage and septic tank connections lag far behind. Only 47 percent of urban excreta is safely managed globally,[4] threatening human health and the environment. While figures show that overall WASH access and service levels are often higher in urban areas than rural, this masks deep inequities in intra-urban access to WASH services. Economic status is one of the major determinants of service level, with significantly lower coverage for the poorest households. Emerging evidence suggests that women suffer disproportionately negative outcomes as a result of a lack of attention to differences in men's and women's needs along the sanitation value chain.[5]

Poor urban sanitation causes many interconnected health, economic, and social impacts. Poor sanitation is the main cause of fecally transmitted infections, including cholera and diarrheal disease. In high-density urban areas especially, households are vulnerable due to repeated exposure to fecal pathogens that dominate environments where sanitation is poorly managed. Urban areas can become hotspots for public health risks, many of which affect both people with and without WASH services. In addition, economic losses from poor sanitation are significant. In 2012, the economic losses from poor sanitation in 18 African countries were estimated at $5.5 billion every year due to poor sanitation, with annual economic losses between 1 percent and 2.5 percent of GDP. [6]

What is Urban?

While the exact definition of urban is based within a national context, urban areas tend to offer a wider range of services and facilities than non-urban areas and span a range of forms, including central cities, small towns, and peri-urban areas. A small town will often be smaller than central cities and secondary towns, but larger and denser than rural villages. Countries generally have their own definition for classifying urban areas based on country-specific criteria.

What is Peri-Urban?

Peri-urban areas are physically just outside existing urban areas and have characteristics of urban conditions: dense populations, specific economic activities, and an intensive concentration of mobility, with the population living there usually utilizing services in the city.

What is an Informal Settlement?

U.N. Habitat defines informal settlements as urban areas with one or more of the following characteristics: poor structural quality of housing; overcrowding; inadequate access to water and/or sanitation and other vital infrastructure; and insecure residential status.

USAID recommends following the local definitions of these and other terms (e.g., "urbanizing" and "pre-urban"), while designing interventions to be responsive to the local context.

[1] United Nations (U.N.) Children's Fund. (2018). Advantage or Paradox? The challenge for children and young people growing up urban.
[2] M. Kuffer, C. Persello, K. Pfeffer, R. Sliuzas and V. Rao. (2019). "Do we underestimate the global slum population?" 2019 Joint Urban Remote Sensing Event (JURSE), Vannes, France.
[3] World Bank. (2014). Population Living in Slums and U. N. (2019). Make cities and human settlements inclusive, safe, resilient, and sustainable.
[4] UNICEF Joint Monitoring Programme
[5] Geertz, A and L. Iyer (2018) Gender and the Sanitation Value Chain: A Review of the Evidence. Bill and Melinda Gates Foundation.
[6] World Bank. (2012). Economic Impacts of Poor Sanitation in Africa.

In many countries, responsibility for the provision and regulation of urban sanitation is devolved to local government agencies (such as municipal governments), which often face significant financial and capacity constraints. Sanitation is also often underfunded in comparison to water services. Meeting the goal of universal, safely managed sanitation in urban areas would require approximately $45 billion annually.[7] This is approximately twice what is needed to achieve universal, safely managed water services, yet current expenditure on sanitation is about 25 percent less than expenditure on water, and most countries report insufficient financing to reach their national targets for urban sanitation.[8]

Progress in sanitation coverage is also slowed by the popular desire for sewer systems, which are expensive and difficult to build and maintain and out of reach for many countries due to financial, technical, and capacity shortages. In fact, on-site sanitation (non-sewered) and fecal sludge management services are far more typical, and attainable, in resource-constrained settings.

THE CITYWIDE INCLUSIVE SANITATION (CWIS) APPROACH

The sanitation challenge in urban areas is immense and likely to overwhelm any single actor, so it is important to identify an approach that focuses on manageable, incremental improvements. Municipal master planning efforts move slowly and are often unable to grapple with rapid urban migration, political dynamics, timelines for large infrastructure investments, and logistical complexity, so are not considered a solution to immediate sanitation issues, especially in informal settlements and other densely populated areas. However, long-term planning can be supported in parallel to the focus on incremental improvements, to ensure sustainable future progress.

USAID's approach to urban sanitation is aligned with the principles of CWIS and works in concert with government counterparts, service authorities, and development partners. Tailored and mixed technical solutions are employed along with support to facilitate institutional arrangements for operations and maintenance and non-infrastructure. This approach should be harmonized with other urban services such as water, solid waste, and drainage.

What is Citywide Inclusive Sanitation (CWIS)?
CWIS is an approach to urban sanitation that includes inclusive strategies to reach the whole of the urban area, including the vulnerable and informal; that delivers safe sanitation along the whole sanitation service chain allowing for a diversity of solutions and approaches; and that commits to working in partnership by embedding efforts in local governance and integrating across sectors and within urban planning. It was initiated by the Bill & Melinda Gates Foundation, Emory University, Plan International, The University of Leeds, WaterAid, and the World Bank for addressing urban sanitation challenges along the whole sanitation service chain.

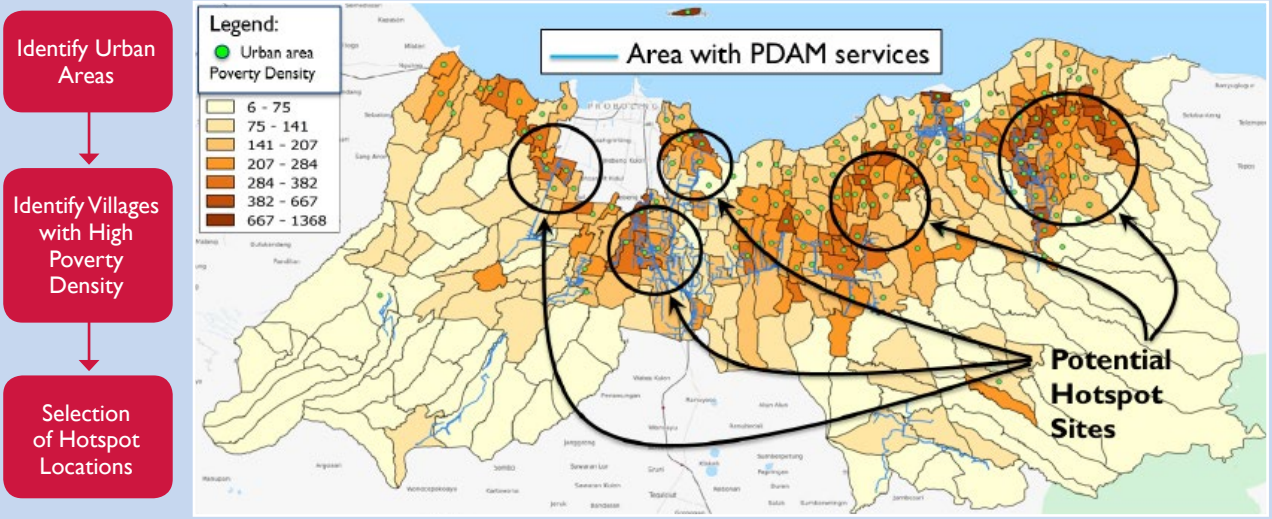
There is no universal solution to urban sanitation challenges. We must develop locally relevant and innovative solutions along the sanitation service chain that put customers first and focus as much on service management as on technology. City planners and other sector decision makers should consider the tradeoffs along the service chain between, for example, providing basic access to a toilet to all versus providing sewers and advanced wastewater treatment to the few.

[6] World Bank. (2016). The Costs of Meeting the 2030 Sustainable Development Goal Targets on Drinking Water, Sanitation, and Hygiene.
[7] U.N.-Water Global Analysis and Assessment of Sanitation and Drinking-Water (GLAAS). (2017). Financing universal water, sanitation and hygiene under the Sustainable Development Goals.

USAID/INDONESIA'S APPROACH TO REACHING THE URBAN POOR WITH SANITATION

USAID/Indonesia's IUWASH PLUS project supports the Government of Indonesia to specifically target sanitation interventions for the urban poor, including specific project targets for reaching the people in the bottom 40 percent by wealth (referred to as the B40). To reach the B40, the project developed an approach they are calling the hotspot approach that utilizes national census data identifying poor households to develop a map of villages with a high poverty density. With local government, these villages' service levels are confirmed, and contextualized interventions to end safely managed sanitation services—such as latrine and septic tank construction—and fecal sludge management services are introduced. After just three years into the five-year IUWASH PLUS project activities, monitoring data have verified the interventions are reaching the B40 more effectively than traditional approaches, sometimes twice as well.

HOTSPOT APPROACH – TARGETING OF URBAN POOR AREAS
(An example of Probolinggo District, East Java Province)



SANITATION SERVICE CHAIN

Urban sanitation is about more than just toilets. USAID focuses on the entire sanitation service chain, from containment to safe disposal (See Figure 1 on page 5). Achieving safely managed sanitation services requires that all parts of this service chain are functioning so that waste is safely treated and disposed. While facilitating access to and correct use of basic sanitation is a critical first step in separating humans from feces, the management of this waste after containment is also important. Safe services at every step in the service chain are vital to reducing pathogens in the environment and protecting human health. Technologies and approaches for each step in the service chain are tightly linked, meaning that programs must consider the entire chain before designing interventions. In urban or densely populated areas, sanitation systems may combine multiple steps in the chain, for example sewerage systems combine storage and transport with their piping and pumping systems. Sewerage is relatively rare in most of the cities USAID invests in, and the most common sanitation solutions will include on-site facilities (e.g., pit latrines, septic tanks), along with fecal sludge management and treatment services.

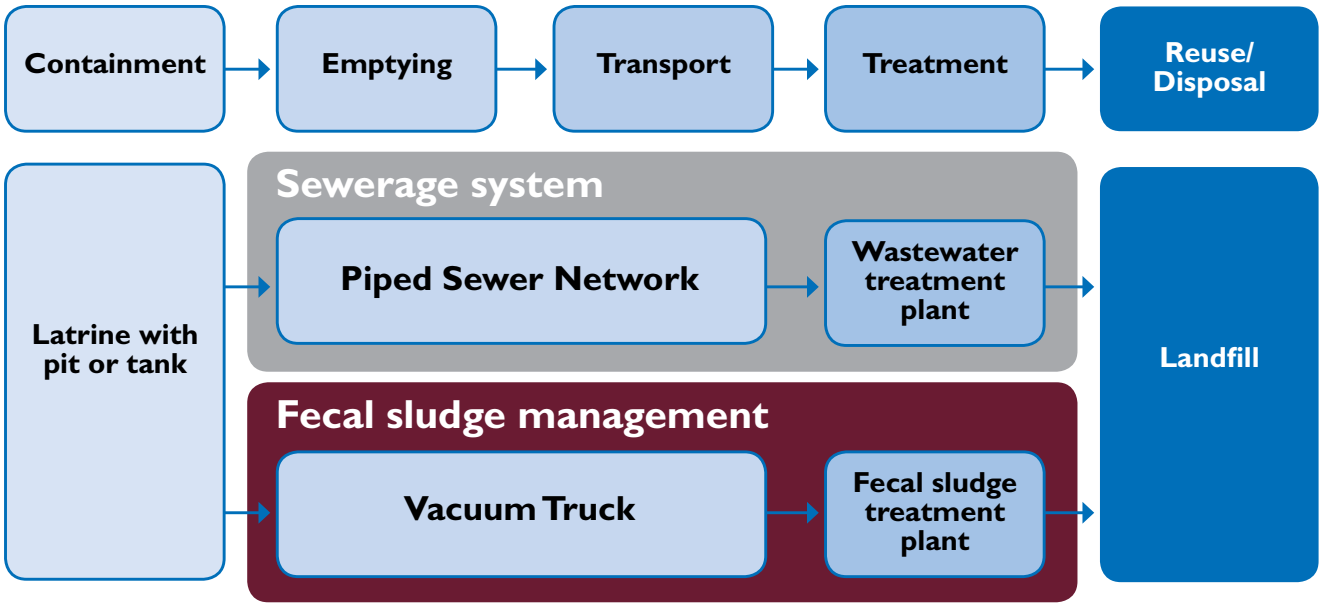


FIGURE 1: SANITATION SERVICE CHAIN

CONTAINMENT

The first step in the Sanitation Service Chain is the capture and storage of waste so that it does not come in contact with people or contaminate the local environment. This can include latrines connected to piped sewerage or septic tanks, pit latrines, or container-based sanitation. For more information on how to implement programming to increase coverage of household sanitation, see USAID's Rural Sanitation Technical Brief, which provides guidance on how to invest in governance, finance, markets, and behavior change. This guidance is applicable in both urban and rural areas, although the mix of specific interventions will vary based on context. The types of technology used for containment will affect the rest of the sanitation service chain. In general, in the cities USAID works in, the quality of household containment is inadequate and adversely affects owners' ability to have waste emptied. Poor-quality pits often cannot be emptied easily and are abandoned unsafely with risks to the environment and public health.

MARKET-BASED SANITATION IN WEST AFRICAN CITIES

USAID/West Africa's Sanitation Service Delivery project led by PSI uses market-based approaches to increase household access to basic sanitation and the utilization of sludge-emptying services in urban areas of Côte d'Ivoire. The project has partnered with the local government, vacuum truck operator federation, and a private partner to develop a centralized call center for vacuum truck orders. The service is collectively marketed as Vidange Plus (Emptying Plus). The project is also working to establish formal recognition for the truck operators by the national association and the municipal government as qualified and critical service provides, while establishing official monitoring services by municipal authorities.

While private household toilets are the preferred service level by most households and governments, sometimes they are unrealistic. It is important to note that urban latrines often have a high cost and may be unaffordable to many households because they must be built in confined spaces, above flood levels, and with sealed tanks. While standards do often exist for urban latrines, they are rarely enforced and it is not often a driving component of successful programs. Communal or shared sanitation facilities where compounds are common, or public latrine facilities are a common fixture of urban environments, especially in informal settlements. It is important that public facilities are well managed, typically with performance contracts, while the managers of communal facilities will often be the users or landlord.

An alternative to traditional latrines or toilets, container-based sanitation is a system where toilets collect waste (often separating excreta from urine) in removable containers that are then removed from the household and transported to a treatment facility. These services can be appropriate in dense urban settings where there is no space for other facilities, where water tables are too high for pit latrines, in temporary or rented housing, or for users who are unable to access other facilities. Households may pay for the initial toilet and are charged collection fees.

COLLECTION AND TRANSPORT

When focusing on the on-site sanitation systems that are most common in USAID's work, waste must be emptied from the households and transported to a designated site. This is done via vacuum trucks, other mechanical emptying technologies, or manually. Although some city authorities maintain a fleet of vacuum trucks that can provide emptying services, in most places, the private sector steps in to fill the gap. These service providers are often unregulated, largely because municipal governments see fecal sludge management as a "temporary" or stop-gap solution and primarily for illegal or informal settlements, and thus do not focus on the issue. As a result, unhygienic manual emptying predominates, especially in South Asia and Africa.

The availability of safe sludge management services is often a challenge, especially for the urban poor. In dense areas, larger vacuum trucks often cannot access households, and manual pit emptying is the only option. Those providing manual pit emptying services are often marginalized due to the nature of their work, and may not have access to appropriate personal protective equipment to protect their own health. Starting a business to provide mechanized desludging services is capital intensive and requires business skills.

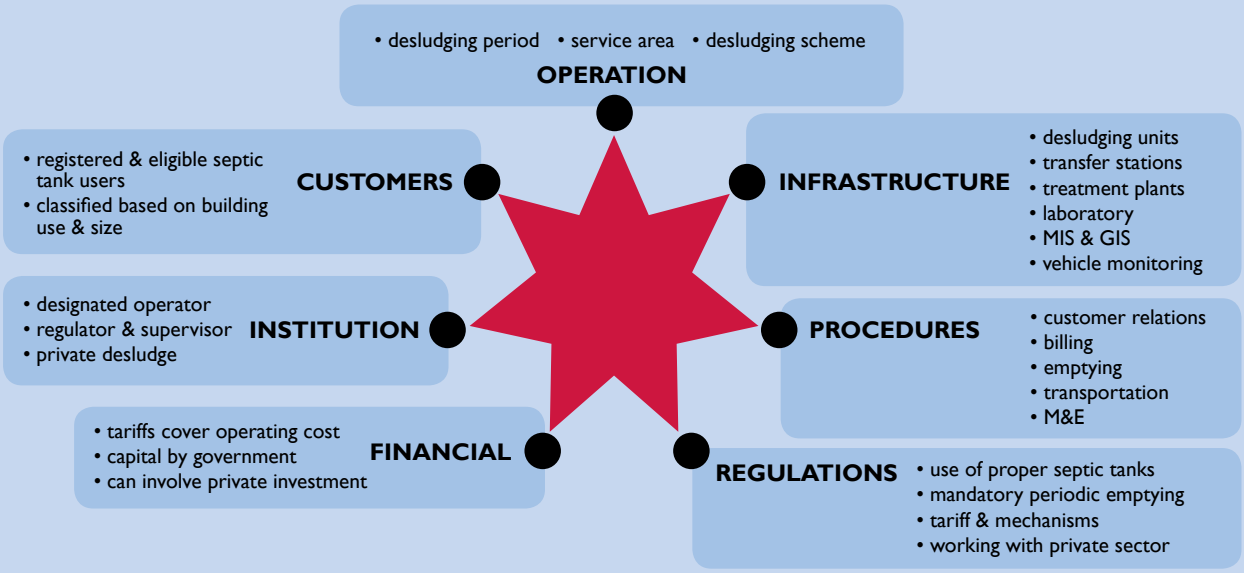
Household demand for safe desludging is often low; while households see a clear need for waste to be removed from their own property, they may be unable to afford formal or informal desludging services and be less concerned with pollution of the rest of the urban environment. With strong linkages between collection services and the type and quality of household containment systems, it is common to integrate approaches for containment, emptying and transport in a single program (e.g., upgrade household latrines when registering for desludging services).

Safe management of waste is a public good, so regulation is necessary to ensure that private sector actors are meeting environmental and public health standards. Developing methods to spread the payment for desludging services over time (such as by including these in water tariffs or structuring monthly payments) can also help with willingness and ability to pay for the services.

SCHEDULED DESLUDGING IN INDONESIA

In Indonesia, recognizing that many households' fecal waste currently enters the local environment through unsafe manual desludging, direct piping to drainage or rivers, or indiscriminate dumping by private vacuum operators, USAID/Indonesia's IUWASH PLUS project has partnered with 25 local governments to establish an innovative service for scheduled desludging of fecal waste. Scheduled desludging leverages efficiency in collection by desludging multiple households per trip to the treatment plant while eliminating septic tank owner anxiety of overflowing tanks, which are often below living quarters in dense urban settlements. The services are financed by a tariff on the regular monthly water service billing or added to property taxes. IUWASH PLUS developed a framework for scaling up regular desludging services based on seven key aspects.

SEVEN ASPECTS OF SCHEDULED DESLUDGING



TREATMENT AND DISPOSAL/REUSE

Treatment and disposal or reuse of fecal waste is the final step in the Sanitation Service Chain. This important step is often neglected, and illegal dumping by private pit emptiers into the sea, rivers, and landfill sites is common. In effect, this creates the same health risks as open defecation, but with waste concentrated, usually in poorer areas or near informal settlements. This type of dumping also creates environmental hazards.[9]

There is a lack of treatment facilities designed specifically for fecal sludge. Usually fecal sludge is dumped into an existing wastewater treatment plant, which may jeopardize sewage treatment due to the higher concentration of biosolids in fecal sludge.[10] In many places there are insufficient treatment facilities of any type, and often communities oppose the construction of new treatment facilities in their area. USAID rarely invests in constructing complete fecal sludge or wastewater treatment plants because of the high cost for construction, operation, and maintenance coupled with the low number of people receiving services from the investment.

[9] Investments in managing fecal waste must align with USAID's policies and requirements for environmental compliance (22 CFR 216).

[10] Lopez-Vazquez, C. et al. (2019) "Co-treatment of Faecal Sludge in Municipal Wastewater Treatment Plants." In Englund, M. and Strande, L., (Eds). Faecal Sludge Management: Highlights and Exercises. Eawag: Swiss Federal Institute of Aquatic Science and Technology. Dübendorf, Switzerland.

USAID typically plays a facilitation role to support reform of policies and regulations, institutional procedures, and tariffs and provides technical assistance to develop and build capacity for viable business models for existing infrastructure. Relatively low-cost treatment models exist for both fecal sludge[11] and wastewater from piped sewers;[12] however, the governance, limited technical capacity, and financial viability are the weak points for sustainable service provision from infrastructure investments.

Developing a Framework for Fecal Sludge Management Services in Nepal

USAID's WASH Finance (WASH-FIN) activity seeks to close financing gaps to achieve universal access to water and sanitation services. One of the objectives of WASH-FIN's work in Nepal is to assist in the development of an institutional and financial framework for sustainable Fecal Sludge Management (FSM) service delivery. WASH-FIN has been performing benchmarking studies to understand whether and how municipalities are currently considering integration of FSM and solid waste.

In Guleriya municipality, WASH-FIN conducted baseline surveys to understand FSM practices and performed engineering assessments of an unused fecal sludge treatment plan in order to make recommendations for repairs, improvements and tariff setting. This information enabled WASH-FIN to design an optimal tariff for commercial viability of solid waste and FSM and a detailed financial forecast that includes capital investment requirements to the Municipal Executive Committee. WASH-FIN is preparing to support the municipality for drafting an agreement for contracting out management of solid waste and fecal sludge to a private service operator, including Standard Operating Procedures and maintenance manuals for the private operator to follow.

Waste treatment facilities usually charge "tipping fees" to desludgers who bring waste to the site. However, these businesses often have little incentive to bring waste to the designated site if they can dump illegally for free and without consequences. Either regulation or a restructuring of incentives is necessary to address this challenge. For example, some cities have strong monitoring systems to ensure that each truckload of waste makes it to the designated site, such as through GIS-based monitoring of desludging trucks. Alternatively, systems can be set up whereby payments for desludging are not made until there is verification that it was properly disposed of.

An emerging area of interest in sanitation is the reuse of treated waste. There is potential to use waste as fertilizer or an energy source, including briquettes for cooking. Despite the experiments in reuse by service providers, academic institutions, and funders, reuse of fecal waste is still uncommon globally. While the concept of the "circular economy," where all waste is reused or sold is conceptually attractive, has technical solutions, and makes strong environmental sense—there are still few, if any, financially viable or scaleable models. Social, cultural, and regulatory barriers to reuse also limit the viability and scalability of these approaches. Further work via investments in innovation funds and small pilots will be needed before such solutions can be scaled.

[11] Montangero, A. and M. Strauss. (2012). Faecal Sludge Treatment. Eawag

[12] Ulrich, A., Reuter, S. and Gutterer, B. (eds) with Sasse, L., Panzerbieter, T. and Reckerzügel, T. (contributors). (2009). Decentralized Wastewater Treatment Systems (DEWATS) and Sanitation in Developing Countries. WEDC, Loughborough University, UK in association with BORDA, Germany.

ASSESSING THE SANITATION SERVICE CHAIN

Urban or densely populated areas often have multiple, interrelated sanitation services operating at any given time, although rarely is all waste adequately managed to protect human and environmental health. This is especially true in the developing world where a majority of fecal waste pollutes residential environments, drainage systems, or surface water, even when a large proportion of the population has access to toilets. For example, in a 12-city study led by the World Bank Water and Sanitation Program, on average only 22 percent of on-site sanitation facilities were safely managed.

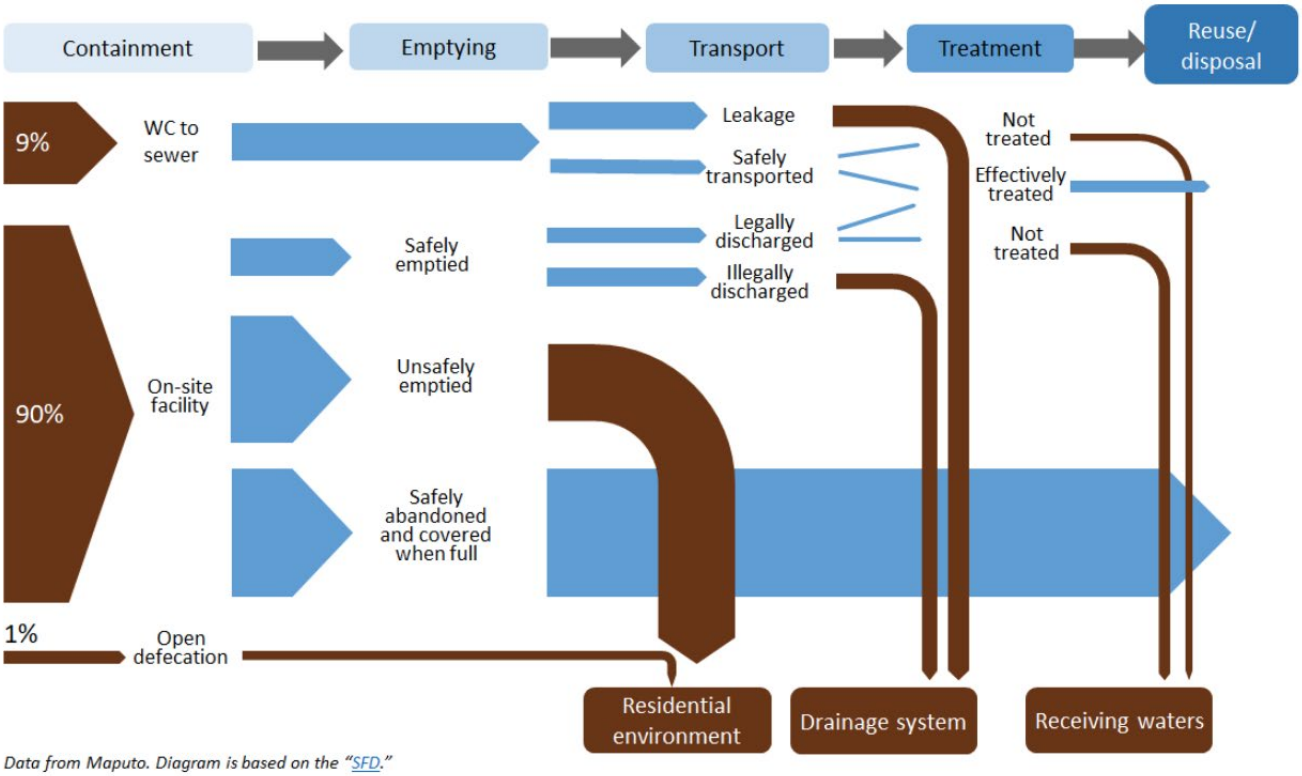


FIGURE 2: FECAL FLOW DIAGRAM (FFD) FOR MAPUTO, MOZAMBIQUE.
Adapted from Peal, A. (2015). A Review of Fecal Sludge Management in 12 Cities. World Bank Water and Sanitation Program, Urban Global Practice Team.

A key step in designing urban sanitation interventions is to understand where the gaps are in the Sanitation Service Chain. This will generally be done after target cities are identified, likely as part of activity design or even to inform work planning. One tool for this, the Fecal Flow Diagram (FFD), illustrates where the sanitation service chain is breaking down in a specific city context, and can provide insights on where programming and advocacy should focus.[13] Figure 2 shows a FFD for Maputo, Mozambique. In this case, it can be seen that unsafe emptying of on-site facilities is the primary cause of contamination.[14]

FINANCING THE SANITATION SERVICE CHAIN

There is a huge gap in available finance for achieving urban sanitation goals. Financing urban sanitation requires a mix of public finance, private finance, and household sources, and the final blend of these sources will depend upon the specific context or setting. Household and institutional sanitation facilities, the containment step of the service chain, is typically their own responsibility although these facilities can be supported with targeted public or private subsidies, especially where expensive construction is required.

[13] Blackett and Hawkins. (2016). Fecal Sludge Management Services Diagnostic and Decision-Support Tools: An Overview. World Bank Water and Sanitation Program

[14] For further information on FFDs, please visit the global site that includes details on how to develop them.

Collection and transport services are typically delivered by the private sector and paid for by collection of household tariffs. Payment may be through fees set per service delivered or through regular (e.g., monthly) billing. Treatment and disposal is almost always publicly funded but can also be offset with disposal fees. Repayable finance from banks, bonds, and other sources can be used to support expansion of services but is usually not an attractive option for financial institutions, as the sanitation sector is viewed as a risky investment. Countries that have achieved large scale sewerage systems and wastewater treatment have done so with large investments of public funds. Therefore, USAID programming should look to mobilize a range of investments across the sanitation service chain, recognizing that public and private funds are appropriate at different points on the chain.

MEASURE SUCCESS AND ENSURE LEARNING

It is important to select standard and custom indicators that measure how the activity is working and ensure the program is learning from its experience. Indicators should go beyond tracking the number of people reached to capture both near term and long term impacts, changes in the market and governance systems, and progress with market actors and household behaviors.

Once metrics are developed, it is critical to ensure the complimentary staffing, systems, and opportunities are in place to regularly collect, review, and pivot implementation. This is especially critical with regard to market activities which require lots of iterative development and dynamism to scale up.

MEASURING SUCCESS FOR URBAN SANITATION ACTIVITIES

USAID has standard indicators for sanitation, which focuses on first time access and service quality improvements, as well as tracking improvements in finance and institutional capacity:

- HL.8.2-2, Number of people gaining access to a basic sanitation service as a result of USG assistance
- HL.8.2-3, Number of people gaining access to safely managed sanitation services as a result of USG assistance.
- HL.8.2-7, Number of people receiving improved sanitation service quality from an existing "limited" or "basic" service.
- HL.8.3-3, Number of water and sanitation sector institutions strengthened to manage water resources or improve water supply and sanitation services as a result of USG assistance.

Custom indicators are also a critical component of monitoring for the likelihood that these services will be sustainable in the long run. Illustrative examples of these are:ng improvements in institutional capacity:

- Percent of population using formalized emptying services
- Change in profitability of FSM service providers
- Municipal budget allocated to off-grid sanitation
- Number of sanitation policies established by national or local government body(s)

CONCLUSION

Sanitation provides demonstrated health, economic, social, and environmental benefits that are essential for cities to become vibrant economic centers. Urban sanitation is a complex issue, requiring multiple solutions for different populations and for different parts of the sanitation service chain. Ensuring households have access to toilets is not enough. It's critical to think about how the waste is transported, treated, and eventually disposed of. Centralized conventional sewers and wastewater treatment plants are not the only way to solve the urban sanitation crisis. On-site sanitation is the typical form of sanitation service in urban areas of most low- and middle-income countries, especially in peri-urban areas and informal settlements. City-wide solutions should seek to apply tailored and mixed technical solutions and specifically address the un/underserved and more vulnerable, while supporting robust institutional arrangements, operations and maintenance, and harmonization with other urban services.

There are resources available for urban sanitation in most countries, but these need to be used more efficiently. There is latent demand for sanitation in cities. Even the poorest are willing to pay for sanitation, and often then end up paying more than richer people who have access to subsidized sewerage systems. By aiming for strategic, incremental improvements, urban sanitation programs can take advantage of this demand and available resources to extend services.

SELECTED RESOURCES

1. Panesar et al. (2015). Shit Flow Diagram (SFD) Promotion Initiative. Sustainable Sanitation Alliance.
2. Blackett and Hawkins (2016). Fecal Sludge Management Services Diagnostic and Decision-Support Tools: An Overview. World Bank Water and Sanitation Program.
3. City Sanitation Planning Tool
4. Fecal Sludge Management Toolbox
5. Strande, L. et al. (2014). Faecal Sludge Management Systems Approach for Implementation and Operation. IWA Publishing.
6. World Water Council. (2018). Increasing Financial Flows for Urban Sanitation.