




EVIDENCE SERIES

# Market-based Approaches to Sanitation



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# Introduction

Poor sanitation puts humans in close contact with viruses and bacteria present in fecal waste by way of vectors such as flies, helminths, and snails; contaminated food and water sources; and direct fecal-oral transmission from the hands to eyes or mouth. Infection puts a person at risk of disabling diseases such as trachoma and schistosomiasis, but the most common and most fatal illnesses are diarrheal diseases.<sup>1</sup> Diarrhea kills around 760,000 children per year and is the second-leading cause of death in children.<sup>2</sup> Evidence suggests that improved sanitation can reduce the prevalence of diarrheal disease by more than a third and as a result can dramatically lower healthcare costs by as much as \$7 billion per year.<sup>1</sup>

Beyond health impact, sanitation has social and environmental benefits. Private toilets promote dignity and safety for women, who may face a risk of assault when defecating in fields or using public facilities, and separate latrines at school allow girls to attend class while menstruating. By better managing fecal waste, communities may be able to recover water, fertilizer, and sources of renewable energy.<sup>3</sup>

## SITUATION ANALYSIS

The United Nations Millennium Development Goal 7 included a target of 77% global coverage of improved sanitation by 2015. A sanitation facility is considered “improved” if

it hygienically separates excreta from human contact.<sup>4</sup> Currently, 68% of the population uses an improved sanitation facility, missing the MDG mark. This gap equals 2.4 billion people lacking improved sanitation, most of whom live in Southern Asia, Eastern Asia, and Sub-Saharan Africa. Global coverage differs widely between urban (82%) and rural (51%) areas, and inequalities across income levels are pronounced in both residential areas.<sup>4</sup>

Of the population lacking improved sanitation, 13% still practice open defecation, 10% use unimproved facilities, and 9% use shared facilities. There is disagreement on whether shared facilities are considered “improved,” since as many as ten households may use the same latrine, so the reduction in open defecation is most often used to measure progress in sanitation. From 1990 to 2015, there was a decline in rates of open defecation in all regions, and the change was most dramatic in least developed countries.<sup>4</sup>

Still, there remains work to be done to grow demand for sanitation in communities where open defecation is accepted and entrenched in practice, while ensuring that a sustainable supply of affordable and appropriately-designed products and services are available to match the demand. For this reason, market-based solutions are increasingly recognized as an effective means of achieving improved sanitation at scale.

# Traditional Approaches to Sanitation

## GOVERNMENT SUBSIDY

Sanitation infrastructure was historically subsidized and supplied through government-led campaigns. While well intentioned, these programs did not achieve lasting success because they failed to show families the value of their new latrines – once constructed, many remained unused or were used for other purposes, like storing wood.<sup>5</sup> Product designs also tended not to account for the unique needs of women and children or the cost to families to maintain their toilets.<sup>6</sup> A 2014 study from northern India found that 43% of households with government-constructed latrines had members who still defecated in the open.<sup>7</sup>

## COMMUNITY-LED TOTAL SANITATION

More recently, an approach called community-led sanitation (CLTS) has worked to generate demand for improved sanitation and draw villages away from open defecation while remaining sensitive to existing norms and practices.<sup>8</sup>

CLTS aims to change behaviors by “triggering” communities into recognizing the danger of open defecation and the need for improved sanitation. CLTS rests on the assumption that providing toilets does not necessarily mean people will use them. In order to achieve sustained purchase, maintenance, and use of toilets, CLTS informs and empowers communities to develop their own village-wide solutions to become open defecation free.<sup>9</sup>

CLTS programs cost less than traditional provision programs, and there is some evidence of their effectiveness for increasing the coverage of improved sanitation facilities in communities, although only 39% of villages where CLTS was implemented completely eliminated open defecation.<sup>1,10</sup> Evidence suggests that CLTS may be more effective in rural communities, because urban areas have denser populations and limited space for waste collection, and thus require more systematic and service-oriented solutions that cannot be achieved through behavior change alone.<sup>1,8</sup>

# Market-based Approaches

Although adoption and use of improved sanitation does require changing the knowledge, attitudes, and behaviors of consumers, market-based approaches recognize that inefficiencies in the market pose barriers to behavior change.<sup>11</sup> Households will not buy toilets if they do not have the cash on hand to purchase them, and they will not use toilets that are uncomfortable to use or are made from materials that degrade over time. Like CLTS, market-based approaches aim to generate community demand for sanitation, but they also stimulate supply by mobilizing the private sector to offer a range of appropriate and affordable products and services.<sup>11</sup>

Market-based approaches can be applied to deliver a number of products (such as household, shared, or public toilets, using various designs and materials), services (like installation or waste removal and treatment) and forms of service delivery (free or pay-for-use). This review focuses on models for household pit latrine construction and fecal sludge management.

## HOUSEHOLD LATRINE CONSTRUCTION

Pit latrines contain three parts: pit, slab, and superstructure. The pit is generally 1.2 meters wide by 1.5 meters deep, but the dimensions depend on the family size and the quality of the ground nearby. The slab on top of the pit can be designed in a number of ways based on the desired drainage and the comfort of the users. It should be easy to clean and move yet be strong enough to avoid collapse. The superstructure can be made of any material but should have a sturdy floor and walls for safety and privacy. Adding a ventilation system will control flies and odors.<sup>12</sup>

The distance between households, the terrain and rainfall, and whether there is a market for end products are all factors that influence the model and materials selected for the latrine.<sup>13</sup> Strong designs aim to minimize the materials, labor, and maintenance needed and consider what is technically possible for local businesses to produce and sell given their skills and available materials.<sup>13-14</sup> It is essential that designs incorporate consumers' preferences so that solutions are satisfactory and usable.

Designers should seek input from potential consumers about which products they are already familiar with and desire and identify models that have not worked in the past. When developing prototypes, programs should consult manufacturers to understand what the latrine will cost and how it will be made, transported and installed.<sup>13</sup> This information must be communicated to consumers so they can make an informed decision about whether the product will work in their homes.<sup>12</sup> Programs may offer a portfolio of

products at varying price points and levels of sophistication to meet the demand from different socioeconomic segments of the market.<sup>8,13</sup>

A viable and sustainable market for household latrines relies on a strong supply chain, which stretches from raw materials to manufacturing to distribution. Market research is a critical first step in understanding the landscape for local sanitation suppliers; how they procure resources, set prices, and reach consumers; and how their business fits alongside other sectors (such as housing). Tracing inputs along the supply chain helps identify inefficiencies and barriers to supply.<sup>13</sup>

The most promising businesses to contract for construction are those that are already up-and-running, have a diverse portfolio of products, are willing to take risks and make investments, have steady cash flow, and are willing to serve rural and underserved populations.<sup>15</sup> While project implementers should support local businesses to start their sales, it is important that they let market forces work and not attempt to set prices or impede expansion, competition, and innovation.<sup>15</sup>

Likewise, programmers should remember that businesses are driven by profit. To be motivated to enter the market, businesses must expect that their income will exceed their costs (including indirect costs, such as investments in training and licensing).<sup>15</sup> Because sanitation is a taboo space, programs may need to share market research to demonstrate to businesses that consumer demand for latrines is present and worth their effort.<sup>16</sup>

## FECAL SLUDGE MANAGEMENT (FSM)

Market dynamics can also create a safe and effective system for fecal sludge management (FSM). A review of FSM in 12 cities in Central America, Asia, and Africa found that almost two-thirds of households in the cities studied rely on on-site sanitation facilities, which collect fecal waste rather than flushing it away (pit latrines are one such example). On average, fecal waste from only 22% of households is safely managed.<sup>17</sup>

Most market-based approaches to FSM focus on strengthening the service supply chain, which includes emptying, transport, treatment, and reuse or disposal of waste.<sup>17</sup> The mechanism used at each stage varies by the type of latrine, which affects the volume and liquidity of the waste to be removed, and the end products to be derived from the waste.<sup>18</sup> It also depends on the tools and expertise of local service providers.<sup>19</sup> In many communities, there is even greater stigma around FSM services than latrine construction. Formalizing the FSM service sector through

training, licensing, and business incentives can motivate local providers to enter the market.<sup>19</sup>

A dual challenge is to generate demand among community members, who may not see the value of the service since it is not as present in their day-to-day activities. Beyond educating families about the health risks of unsafe FSM, creating a market for end products can be an effective way to build interest in the service.<sup>20</sup>

End products produced by composting waste, such as fertilizer, soil conditioner, and fly larvae or worms, are often desirable in farming villages. Some treatment systems also produce reclaimed water or clay-like material that can be used to make cement or bricks. Community preferences for end products should be canvassed during market

research and should inform the design of latrines and other technologies along the FSM service chain.<sup>18,20</sup> The promised benefit of end products to consumers will, in turn, support demand generation activities and facilitate community buy-in when outlining transport routes and placing treatment plants.<sup>19-20</sup>

In some cases, the revenue stream from the sale of end products can be used to recover the cost of FSM services, potentially reducing the expense to both households and service providers and creating a sustainable business model.<sup>20</sup> More evidence is needed on the health, environmental, and economic benefits of effective FSM; how to create an appropriate regulatory environment; and how to engage stakeholders like local governments and public utility providers.<sup>17</sup>

### CASE STUDY: DEVELOPING A BUSINESS MODEL FOR FSM IN BIHAR, INDIA

Demand for FSM is low in Bihar, India. The Sustainable Sanitation Solutions (3SI) program, implemented by PSI in partnership with PATH, the Deloitte Monitor Group, and Water for People, with funding from the Bill and Melinda Gates Foundation, recently conducted a landscaping activity to understand barriers to FSM and identify promising solutions. Results indicate that households are concerned about the how quickly their latrine pits fill up with waste, yet most pits are only emptied when they become too full for further use. Latrine owners are often unaware of the consequences of inadequate emptying, including damage to the pit structure and risks to family health and the environment if the structure leaks.<sup>21</sup>

Most fecal sludge emptying is done manually, but the Indian government recently banned this practice in favor of more sanitary and techniques. Consumers prefer mechanical pit emptying due to its speed and lower cost, and this method also promotes the dignity of service providers, who often come from lower socioeconomic classes. However, mechanical emptying is limited in rural areas due to supply-side barriers; businesses are reluctant to serve rural areas because of the low volume of latrine-owning customers and poor road conditions impede transport of sludge. Those who do serve the area are small entrepreneurs with just one emptying vehicle. Because local banks perceive the FSM industry to be high-risk, most service providers are entirely self-financed.<sup>21</sup>

The results from the landscaping study will be used to develop three business models with the following objectives: develop commercial systems for pit emptying and waste disposal and treatment, increase awareness of and demand for mechanized FSM, and create an enabling environment that facilitates public-private partnerships. The 3SI team hopes that pilot results will provide a proof of concept for an effective and sustainable FSM business model.

# Combined Approaches to Sanitation

The evidence largely suggests that combined CLTS and market-based approaches reinforce each other and achieve greater impact and sustainability: CLTS sparks behavior change to ensure use of latrines and demand for FSM services, while more efficient markets make it easier for households to access and afford them.<sup>16</sup>

Some implementers argue that, theoretically, CLTS demand creation activities must happen first to guarantee that there is a consumer base for sanitation. Behavior change

communications continue as other program components begin to strengthen the supply chain.<sup>8,11,16</sup> In practice, however, programs may determine that some supply-side interventions, such as training masons or engaging financing institutions, need to be completed in time for the launch of demand generation activities to offer newly-motivated customers an immediate solution.<sup>14,16</sup> The balance of the two approaches must be carefully coordinated in response to unique market conditions.

## Financing Mechanisms

Even if potential consumers recognize the value of improved sanitation, many do not have the cash on hand to purchase one. To help the poorest households afford sanitation products, market-based approaches often introduce financing schemes. Evidence of the effectiveness of financing is limited to individual program experiences; each program uses a different scheme adapted to the local context.

In Tanzania, an action-research project led by WaterAid Tanzania registered two local NGOs as micro-finance institutions (MFI) to help households construct latrines. The loans were not provided directly to households but were lent to hardware stores, which then disbursed the funds to customers. Under one scheme, the loan was provided to households in cash form; the other offered the equivalent amount was offered in the form of materials for construction. Findings from the pilot study indicated that the material loans had repayment rates averaging only 30%, so these were later re-designed as cash loans. Loan officers raised awareness of the program through door-to-door outreach, allowing 43.5% of households in Tanzania to access financial services.<sup>22</sup>

WSP, in collaboration with International Development Enterprises, used a variety of financing mechanisms when working in Cambodia. One MFI, KREDIT, offered loans to groups of households using a balloon repayment method, which left a large balance to be repaid in one sum at the end of the loan period. KREDIT also offered a scheme for individual households to repay their loans using a declining balance method, in which payments are spread out evenly across the loan period. KREDIT tested whether offering loans with no collateral would increase demand; to reduce its own risk, it increased the interest rate and came to the

villages to collect payments. An MFI called VisionFund offered group loans that could be repaid with either a balloon payment or declining balance method; 90% of customers chose the declining balance method.<sup>23</sup> Findings from a randomized evaluation of the program demonstrated that only 12% of non-latrines owners were willing to buy a latrine in cash for the market price of 50 USD, but 50% of non-latrines owners purchased a latrine at the same price when they were offered a loan.<sup>24</sup>

Programs may also introduce financing models to support local businesses and motivate them to join the sanitation sector. In Tanzania, a series of loans totaling TZS 15 million allowed a liquid waste enterprise to expand its staff from four to six employees, purchase new equipment, and fund repairs.<sup>22</sup> Water and Sanitation for the Urban Poor (WSUP) uses two finance models to support local businesses. Professional service agreements coordinate workplans, resources, and ownership and share risk between service providers and WSUP; progress-linked finance offers conditional funds to incentivize service providers to demonstrate effective and scalable service delivery to poor consumers.<sup>24</sup>

Like local businesses, MFIs may need incentives to enter the sanitation market, but some may find it relatively easy to add to their portfolio because loan products and operations are quite similar for sanitation as for other sectors. Some MFIs also see the space as a means of improving their social image.<sup>22</sup> More research from different contexts is needed to demonstrate the effectiveness of financing for stimulating both supply and demand for improved sanitation. Efforts should also be made to examine whether financial services are sustained over time and whether they reach the poorest consumers.

## CASE STUDY: INFUSING CAPITAL TO ACTIVATE THE SUPPLY CHAIN FOR FINANCING

The 3SI program introduced a quality toilet to the market in Bihar that consumers consider affordable and prefer over other products. However, market research indicated that roughly 88% of households would need loans to purchase a toilet.

Micro-finance institutions had a weak presence in Bihar – fewer than 3% of households had ever received a loan. Sanitation loans were considered by MFIs to be especially risky. In January 2015, PSI partnered with a fund manager, Friends of Women's World Banking India (FWWB), and local MFIs to introduce a risk-free capital infusion that would activate the supply chain for sanitation financing.

Results from the first year are positive: 1,187 consumer loans and 39 enterprise loans were disbursed within 8 months of the launch, and all were repaid. More than a third of consumer loans were granted to families below the poverty line, facilitating greater equity in access to toilets. More than 91% of households constructed their toilets within 30 days of loan disbursement and nearly all 39 enterprise loans were used to purchase materials for toilet construction and manage stock. PSI aims to infuse over \$1.5 million into the supply chain over the course of the project.<sup>26</sup>

# Players in Market-based Sanitation Programs

Beyond service providers, manufacturers, and consumers, there are a number of players involved in the design and implementation of market-based sanitation.

NGOs have an established presence within the communities they serve. They know the consumer based and are likely to be skilled at generating demand and monitoring quality, coverage, and use. They also have the resources to administer trainings, design products, and conduct market research.<sup>14,27</sup> MFIs typically only finance sanitation, but some may want to be involved in toilet construction – it is in their interest to monitor quality to ensure that customers are satisfied and repay their loans.<sup>14</sup>

Program sustainability is more likely if there is a clear plan for the NGO to hand off responsibility to local actors. Many programs deliberately minimize the branding of the implementing NGO in order to promote ownership by the government.<sup>16</sup> Governments at all levels play a role in sanitation. National governments are positioned to enforce adequate coverage of improved sanitation, lower regulatory

barriers to allow more efficient use of subsidies and loans, set quality standards for products and services.

Sub-national governments often play a bigger part in supervising and regulating construction of toilets, providing incentives for training and licensing, measuring changes in sanitation coverage, and exchanging lessons learned; while community leadership helps to facilitate sales by connecting households and businesses and monitors coverage in the community.<sup>19,27</sup> Local governments can also introduce and enforce regulations for the management of fecal sludge, designate sites for treatment and prohibit unsafe dumping, and ensure occupational health benefits for service providers.<sup>21</sup>

Donors and development agencies set priorities for sanitation, coordinate approaches to market research and activities across programs, advocate for better policy, build national and local capacity, and monitor and report outcomes of programs.<sup>27</sup>

# Measuring Improvements in the Sanitation Market

The success of market-based sanitation is often measured by the increases in household latrine purchase, construction, and usage and the changes to the sanitation supply chain. Together, these indicators let programs track household access and behavior and understand how the private sector is responding to new demand.<sup>28</sup>

Most research on sanitation programs has focused on coverage of improved facilities and not the sustainability or health impact of improved sanitation. Monitoring of open defecation free villages is weak, and there is little evidence on how latrine use is sustained in the long-term.<sup>8</sup> In 2015, the first controlled pre-post intervention study evaluating health impact of sanitation was conducted in an informal urban setting in Maputo, Mozambique. The study

measured the prevalence of intestinal infections and self-reported diarrheal disease among children and modeled how the route of exposure to these diseases changed following introduction of shared latrines. The research also demonstrated the effect of population density on the impact of the program. Post-intervention, the prevalence of infection in higher density areas was 67%, compared to 52% in lower after adjusting for baseline differences.<sup>29</sup>

Programs should continue to measure sanitation coverage, sustainability, and health impact and be sure to differentiate between improved and unimproved latrines and monitor how equitable access is across economic quintiles. In the future, the use of standard indicators will allow for aggregation and comparison between programs.<sup>10</sup>



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