

## **Reducing costs and improving quality in rural sanitation options through innovation and research**

John Ikeda, Water and Sanitation Specialist, World Bank and Rokeya Ahmed, Water and Sanitation Specialist, World Bank

While there have been numerous advances in rural on-site sanitation over the past few years, in many countries the cost of a typical option for improved sanitation often represents a month or more of income for the typical household. In addition, the fragmented, highly customized nature of most solutions means that households must spend significant amounts of time acquiring the raw materials, sourcing skilled labor and constructing facilities, resulting in greater inconvenience and oftentimes lower quality. Achieving the Sustainable Development Goals (SDGs) for universal access to sanitation by 2030 will require bold, innovative approaches that reduce the overall cost of ownership, simplify the purchasing process, and increase quality and durability.

The World Bank Water Global Practice's Water and Sanitation Program (WSP) has been working to address this challenge through a series of rural sanitation pilot programs in countries around the world. Each of these programs is testing a set of innovations designed to reduce costs and improve the quality of on-site sanitation. Through rigorous evaluation and research, as well as an action learning approach that allows program design to evolve over time, WSP is helping build an evidence base for innovation in rural sanitation.

Through its programs, WSP is testing several strategies to reduce costs and improve quality:

- Developing standard latrine models to improve consistency, increase economies of scale and meet customer demands
- Partnering with manufacturers to test innovative new products
- Testing microfinance products that allow households to spread the upfront cost of on-site sanitation over time
- Training and certifying construction firms to improve the quality of their products and reduce costs
- Addressing supply chain constraints to reduce the cost of inputs
- Building partnerships with governments, NGOs and business to coordinate behavior change activities and strengthen the enabling environment for rural sanitation

The following paper presents three case studies on WSP innovation in on-site rural sanitation. First, in Bangladesh, WSP is working with the government, small construction firms and leading microfinance institutions (MFIs) to market a standardized product. In Cambodia, WSP has worked extensively with several MFIs to test a water and sanitation microfinance product. Finally, in Indonesia, WSP has supported the development of a nationwide trade association of small construction firms working in on-site sanitation.

### ***Bangladesh: Building Partnerships Across Sectors***

Between 1990 and 2015, Bangladesh made great strides in reducing open defecation from 34 percent to just 1 percent of the national population. Much of this progress can be attributed to a national campaign focusing on stopping open defecation in rural Bangladesh, as well as the government's support for private sector involvement in rural sanitation. However, much remains to be done if Bangladesh is to

achieve universal improved sanitation coverage; nearly half of Bangladeshi citizens still depend on unimproved sanitation facilities.

The Government of Bangladesh, with support from WSP, is currently encouraging households to move from either open defecation or unimproved latrines to improved latrines and hygienic practices. To achieve these goals, WSP uses a sanitation marketing approach that leverages private sector resources to move households up the sanitation ladder. Sanitation marketing focuses on both the supply and demand sides of the market, using behavior change to drive demand for critical products and services, while also making sanitation an attractive investment for the private sector.

Over the last two decades, Bangladesh has emerged as the leader in experimenting with and implementing innovative approaches to rural sanitation in Asia. While these efforts substantially reduced open defecation, improved sanitation coverage is increasing at a slower rate – from 34 percent in 1990 to 61 percent in 2015 according to the WHO/UNICEF Joint Monitoring Programme. Basic latrines move households away from open defecation. The next step is moving up the sanitation ladder to fully hygienic latrines and practices like the offset single or twin pit latrine.

Hygienic latrines must be structurally sound and most importantly, fully confine waste from the user and the surrounding environment. “Basic” or direct pit latrines are problematic because they are often built poorly, quickly fall into disrepair, and may lack a water trap that prevents odors and gases from surfacing, which makes them undesirable inside the home. Offset pit latrines, on the other hand, use a siphon and are easier to clean. They can be more easily constructed inside or near the home. Contamination can also occur during the pit emptying process. Using a twin pit allows a longer period of time for waste to stabilize; nevertheless it will still need care in emptying, treatment, and disposal or reuse.

In Bangladesh, households largely invest their own financial resources in latrine purchase and installation. However, the cost of a new or upgraded latrine can be prohibitive for rural households – ranging from around 36 to 93 percent of their monthly income. At the same time, low-cost, hygienic, and geographically appropriate latrine models may not even be available in the local market. Firms working in rural sanitation tend to be microbusinesses with fewer than five employees, and they struggle to gain access to credit. As a result, they are often unable to invest in the research and marketing necessary to develop new latrine models. They are also unable to offer poor households the option to pay in installments and spread the cost of the purchase over time.

WSP began piloting sanitation marketing in five villages in Bangladesh in 2009. In 2011, the program expanded to 10 Unions (approximately 100 villages) through collaboration with small businesses working in rural sanitation and two microfinance institutions (MFIs) – the Association of Social Advancement (ASA) and Bangladesh Association of Social Advancement (BASA). These MFIs later supported government and non-government organizations (NGOs) to scale the program to 1320 Unions across Bangladesh. Partners helping to scale the program include the Bangladesh Department of Public Health and Engineering, Dutch WASH Alliance, International Development Enterprises, Plan Bangladesh, Concern Universal WaterAid, CARE Bangladesh, Muslim Aid, and the Max Foundation. Today, the program has reached over 450,000 beneficiaries across rural Bangladesh.

Sanitation marketing is a catalyst in moving rural households in Bangladesh up the sanitation ladder by generating new demand for sanitation products, while enabling the private sector to meet the needs of this new demand with appropriate latrine products and services.

**Innovating new products.** Poor customers choose to invest in sanitation products based on both functionality and aesthetic value. To effectively build demand, there must be low-cost, high-quality products on the market that meet customers' preferences.

For years, only one latrine model was available in rural Bangladesh – a basic design introduced in the 1970s. The initiative listened to potential customers and helped introduce a series of new latrine models that are both hygienic and desirable. Between 2009 and 2015, the cost of these renovated toilets reduced significantly, and the designs improved. Initially an offset toilet with clay platform was introduced, followed by the higher-quality Bilash-Brick and Bilash-Box models. The clay platform model was dropped in 2013 because it was difficult to clean. In 2014, WSP supported the introduction of Aram and Aram Plus, prefabricated slabs that are cheaper than the Bilash toilets and do not require onsite construction. The latrine options are branded as 'Aram' meaning comfort, and 'Bilash' meaning luxury. Table 2 shows the renovated models.

Customers liked the improved comfort, sustainability, ease of cleaning, hygienic design, and affordability of the latrines. WSP found that about half of the households indicated that they would be willing and able to invest approximately USD 50 for a better toilet if they could find quality products in the rural market. This level of personal investment, coupled with a loan from a local microfinance institution, makes the Aram and Bilash toilets affordable even to poor customers. Key design factors favored by customers include:

- Comfortable, easy to clean, and colorfully painted cement platform
- High quality plastic or ceramic pan
- Large slab size
- Sturdy superstructure for privacy
- Flexible connection pipe

The offset pit latrine with dual pits has been a key product innovation in Bangladesh. It allows households to use a second chamber when the first one becomes full. The organic matter in the first chamber will have time to decompose and settle at the bottom of the chamber, and it can later be removed using safe means. However, constructing two pits is more costly, so to overcome the cost barrier, the initiative introduced a flexible connection pipe with a single offset pit. After the first pit is filled, a new pit can be constructed and the connection pipe transferred to the new pit. This allows the investment to be deferred to a later stage.

**Innovations in financing.** Partnership with MFIs can have dramatic positive impacts for both rural households and small-scale sanitation entrepreneurs. Increasing the availability of microfinance for sanitation simultaneously allows poor households to invest in improved sanitation products and allows sanitation entrepreneurs to increase their profit margins and sustainability, in turn expanding offerings and services for rural customers. However, many MFIs prefer to offer loans only for income-generating activities, making them reluctant to lend to households to purchase latrines.

The initiative is addressing this challenge by developing linkages between MFIs and sanitation entrepreneurs. In Bangladesh, WSP partners with the Association for Social Advancement (ASA). WSP offers training and capacity building for sanitation entrepreneurs, and ASA offer loans with flexible terms and low interest rates to these entrepreneurs. Through 2015, WSP and its NGO and government partners supported over 1,300 sanitation entrepreneurs across Bangladesh. To support these local entrepreneurs, WSP partners disbursed over USD 1,700,000 to firms and nearly the same to consumers

for improved sanitation. Following several successful years of the program, in 2014 ASA officially adopted sanitation loans as a new product.

***Building demand is critical.*** The availability of high-quality products alone will not necessarily change community behavior and attitudes toward sanitation. To increase awareness, demand creation should be incorporated into the sanitation marketing approach. In addition to access to finance, sanitation entrepreneurs need help raising consumer awareness. The initiative trained sanitation entrepreneurs to use hygiene promotion as part of their marketing strategy. For example, one sanitation entrepreneur works with two volunteers to conduct hygiene promotion in communities on a regular basis. This provides households with a trusted person to help them make informed decisions about latrine purchases and maintenance.

In addition to sanitation entrepreneurs educating customers, MFIs with outreach programs can support demand generation activities directly or through partnerships with local NGOs. Regardless of the approach, the end objective of demand creation is to create a sustainable market environment in which high demand for improved sanitation products is sustained so that entrepreneurs, in turn, continue to innovate and improve products and services to customers.

***Building the knowledge and capacity of rural entrepreneurs.*** Traditionally, sanitation entrepreneurs have sold two basic parts of the direct pit latrine and not addressed construction of the latrine housing, known as the superstructure. Today, sanitation entrepreneurs trained under the initiative are offering the full suite of materials for latrine construction in a “one stop shop” model, and providing installation services.

Entrepreneurs are also producing high quality latrines following the renovated design. The Aram latrine, which has become popular in rural communities, is prefabricated and does not require onsite construction. Entrepreneurs are also trained to address not only the toilet itself, but also the superstructure. In Bangladesh, superstructures are typically made of plastic sheets, dried bamboo leaves, or bamboo fencing. The initiative introduced a renovated concrete pillar to be used in construction of the superstructure. Streamlining the process to purchase and construct a latrine encourages greater uptake from customers and use of the latrine by all household members.

### ***Cambodia: Working with Microfinance Institutions***

From 2000 to 2012, access to sanitation in Cambodia’s rural areas increased by only one percent per year. By 2012, 75% of rural Cambodians lacked access to improved sanitation, and 66% practiced open defecation. Though open defecation rates are highest among the poorest rural Cambodians at 86%, they are still quite high among the richest at 32%. Lack of access to sanitation imposes significant economic and social costs on rural Cambodians, from higher child mortality due to diarrhea, other fecal-borne diseases, and stunted growth of children.

WSP is supporting the Government of Cambodia in its efforts to accelerate access to sanitation among rural households. Achieving this goal requires effective demand generation for sanitation, highly-engaged local governments that work closely with the private sector to encourage service delivery, and a well-functioning value chain that leverages the capabilities of domestic sanitation businesses as well as providers of sanitation financing products and services.

In Cambodia, extensive previous experience with sanitation marketing approaches illustrates there is strong household demand for sanitation and the domestic sanitation market is capable of meeting it. At the same time, challenges remain in reaching low-income households that do not have the cash to meet upfront payment costs to purchase sanitation products.

Over a 13-month period, WSP worked with a number of partners, including the inter-national non-profit Program for Appropriate Technology in Health (PATH) and International Development Enterprises (iDE), to pilot a sanitation financing program to address the challenge of reaching low-income households with improved sanitation solutions. This learning note presents the lessons from this pilot to promote scale-up in Cambodia and to inform similar efforts in other countries. This pilot is also part of the broader initiative co-funded by the Bill and Melinda Gates Foundation and Stone Family Foundation.

While there is strong demand for improved latrines in Cambodia amongst the rural poor, this demand goes unmet largely because these consumers cannot afford to pay upfront for a latrine that meets their preferences. Research showed that 77% of Cambodians were considering constructing a latrine, yet ownership remains low, especially in rural areas. 95% of households who do not own a latrine reported they were too expensive or they did not have enough money to purchase a latrine upfront. Having access to microloans could help alleviate this challenge; however, microfinance institutions (MFIs) often perceive non-productive loans as high-risk, particularly when the borrower is not a trusted existing business client. Yet, if a household with an income at the national poverty level (US\$900 per household per year) could save just 5% of its income, it would have enough money in one year to buy a basic but upgradeable aspirational latrine at current market price of around US\$ 40-45. In other words, if paying for the cost of a latrine can be spread out over a period of time, more households, including the poor, will likely be able to afford one.

As part of WSP's support to the Government of Cambodia to increase latrine uptake, especially among the poor, consultations with MFIs, NGOs, and other potential stakeholders were conducted to evaluate several sanitation financing options including saving groups, revolving funds, and supplier loans. While any of these approaches could be viable under the appropriate market conditions, the research concluded that savings groups relied too heavily on donor support and supplier loans were too complicated for businesses. A household loan product offered through an MFI was determined the most scalable and sustainable approach in Cambodia. WSP and partners (PATH and iDE) sought to partner with MFIs with established scale and penetration in rural areas, a commitment to serving poor Cambodians, and an interest in participating in a pilot project. Through this process, VisionFund Cambodia in Kandal province (Jul 2012 – Mar 2013) and KREDIT in Prey Veng province (Nov 2012 – Jul 2013) were engaged in the pilot.

***A sanitation loan program may increase uptake among the poor.*** Disbursed sanitation loans for both MFIs included a greater proportion of poor households taking up the loans. For VisionFund Cambodia, sanitation loan has enabled them to reach poor households three times more than their normal loans. For KREDIT, the proportion of the sanitation loan taken up by poor households has been proportionate to poor population in the province. In other words, both loan pilot programs were more poor-inclusive than their traditional loans. As most of the loans issued were group loans and not requiring collateral, this mechanism proved to be generally poor-inclusive.

Because many households, especially those with lower income levels, cite an inability to pay the upfront costs of a latrine as a major barrier to accessing improved sanitation, the option to purchase a latrine on credit may help increase sanitation uptake rates. During the initial months of the pilot, latrine cash orders exceeded latrine credit orders. However, as households became more comfortable with the

idea of paying for a latrine with a loan, credit orders increased significantly. Ultimately, latrine uptake rates increased fourfold among the poor comparing cash on delivery and six month spread payments.

***Dedicated loan officers can stream-line and expedite the loan process.*** Households faced long delays while waiting for loan approvals, especially during the initial months of the pilot. Interviews with latrine producers and sales agents found that dedicated loan officers reduced the time households spent waiting, sometimes by as much as three weeks, thereby increasing loan volume and interest revenue for MFIs. Sales agents and latrine business owners expressed that they rely on strong relationships with the loan officer for their own sales and revenue. As such, dedicated loan officers can make a sanitation loan program more attractive for latrine business owners as well, improving the effectiveness of the program so long as latrine businesses are capable and ready to deliver latrines.

Interviews with sales agents indicate that customers are most motivated to buy a latrine after a group sales meeting, especially when they learn they can purchase the latrine on credit. Because rural poor households have many competing demands on their time and resources, this motivation can dissipate after a delay, reportedly often leading to a cancellation of a purchase. Thus, dedicated loan officers who process loans immediately after a sales meeting can have a significant impact on loan volume and interest revenue by minimizing delays. However, it is difficult for MFIs to support dedicated credit officers for a small loan program like this without additional support from development partners. Therefore, the additional benefit of a dedicated credit officer needs to be weighed against the costs of human resources for MFIs.

***Reducing loan processing times can increase sanitation uptake, but may require removing regulatory barriers for loan approvals.*** Giving loan officers the authority to approve loans immediately is another way to reduce loan processing times. However, the Credit Bureau of Cambodia (CBC) requires a credit check for any loan. This step adds a delay to loan processing times, as credit checks can only be completed in an MFI's district branch offices. It also increases an MFI's operational costs as bank staff must travel between villages and offices to process credit check information. Furthermore, the CBC charges MFIs a US\$0.18 fee for each credit check for a loan under US\$500. Obtaining a waiver for loans under a reasonable threshold (e.g. US\$50, US\$100) could facilitate faster loan processing, reduce the delay between the household's decision to purchase a latrine and its delivery, and ultimately increase sanitation uptake rates.

***Households may be willing to pay a slightly higher interest rate in exchange for a closer and more convenient payment location.*** In the initial KREDIT individual loan design, borrowers were required to make repayments at district branches. However, very few people were willing or able to travel to the district capital (sometimes 25 km away) to do so. Thus, in April 2013, the KREDIT individual loan model was modified to a "community bank" model, where field tellers collected loan repayments in each village. As a result, individual loan demand increased, even though interest rates increased as well from 2.65% to 3% per month. In fact, demand increased to such an extent that credit officers could no longer process loan applications in a timely manner.

***A close partnership between an MFI and a latrine business is critical.*** Selecting business partners with the desire and capability to deliver latrine products effectively is an important part of setting up a successful sanitation loan program. Ineffective business practices can be a risk to a loan program. For example, during the pilot, some sales agents offered latrines on credit to households that had not been approved as creditworthy by credit officers, leading to processing delays, lost or canceled orders, and general household frustration with the process. Additionally, because delivery is largely a fixed cost, a latrine business owner may wait to deliver latrines until volume has increased, maximizing the use of a single delivery trip. However, late delivery of latrines by a latrine business owner may cause households

that have decided to purchase a latrine with cash to abandon the purchase decision. This is especially true during the initial months of a sanitation loan program, when latrine order and delivery volume is low.

In the future, MFIs may consider developing detailed scopes of work with their business partners, drawing on learnings from the pilot to establish clear expectations of roles and responsibilities. For example, MFIs may be able to align their incentives with those of latrine business owners by providing working capital loans to business owners who seek them. MFIs may also benefit from technical assistance from an external support organization who has experience in a sanitation loan program to understand the capabilities and constraints of potential latrine business owner partners. These might include ability to access capital necessary to produce latrines and the ability to deliver latrines on time.

***Sanitation loans can have social and economic benefits for MFIs.*** Neither MFI experienced loan defaults or delinquent payments over 30 days. Default rates under this pilot were lower than those for KREDIT and VisionFund Cambodia's other loan portfolios. This could be because of the relatively low risk profile of small sanitation loans, and maybe also due to the methods used by MFIs to manage the loans. Both MFIs followed up promptly with households who were late on their payments. This may have reduced the rate of portfolio at risk.

By the end of the pilot, both MFIs achieved loan self-sufficiency ratios greater than 100%, indicating that costs of offering sanitation loans can be covered by the loan interest revenue. Loan performance data indicates MFIs go through a learning curve in which loan self-sufficiency rates improve over time. Pilot data seems to suggest that MFIs with previous experience implementing and scaling up social loans may reach loan-self-sufficiency faster than those without.

Similarly, average acquisition cost per loan, or the direct costs of sales meetings and the loan application and approval process, decreased and stabilized after peaking in the third month of the pilot. This indicates MFIs learned how to acquire loans more efficiently during the pilot.

Generally, larger loan sizes were associated with greater revenue. MFI 1 provided a larger average loan size than MFI 2 (US\$ 70 vs. US\$ 55, respectively). The average revenue per loan for MFI 1 was US\$5.53 compared with US\$4.89 in MFI 2.

Plateaus in loan self-sufficiency ratios, like that shown during months 4 and 5 are attributed to increases in sales meetings (at greater cost) before greater latrine sales and revenue was realized. Both MFIs disbursed a greater number of loans each month until the final month of the pilot, which saw a taper.

Both MFIs allowed existing and new clients to take out loans under the sanitation loan pilot, with each MFI waiving prohibitions against clients maintaining more than one loan at a time as long as one of the loans was for sanitation. The MFIs reasoned that sanitation loans were small, so they did not pose the same over-indebtedness risk to borrowers. Existing clients made up only around 25% of each MFI's total loan portfolio.

Allowing new clients increases risk somewhat, but enables MFIs to broaden their customer base. VisionFund Cambodia and KREDIT were both able to convert about 15% of new clients to larger, income-producing loans by the end of the pilot. Though 15% retention rates are not considered very high by MFI standards, both MFIs were able to realize new revenue as a result of retaining clients. During the pilot period, the MFIs participating in the sanitation pilot were able to disburse approximately US\$54,845 in 195 follow-on loans to new clients.

## ***Indonesia: Leveraging Social Business Models***

Ranked second in the world for number of open defecators, Indonesia's poor sanitation costs the country an estimated USD 6.3 billion in lost revenues each year, equivalent to about 2.3% of annual GDP. Nearly 31% of the rural population – 37 million people - practice open defecation, and an additional 24% use unimproved facilities. Given this massive public health challenge, the Government of Indonesia recognized the need for innovative, scalable solutions.

Community-Led Total Sanitation (CLTS), a structured method of behavior change to shift community attitudes around open defecation, was adopted as the primary national approach to scaling up rural sanitation after successful pilots in 2005. Taking it a step further, in 2008 the Indonesian Ministry of Health launched the National Strategy for Community-Based Total Sanitation (STBM), an approach that combines CLTS with efforts to increase the ability of the market to provide sanitation products and services and strengthen the enabling environment for implementation.

STBM marked a significant departure from previous publicly-funded toilet construction programs in Indonesia. Not only did it recognize the power of local communities to take collective action to stop open defecation, it also explicitly identified a role for the local private sector in meeting the increased demand for affordable, desirable sanitation products and services following CLTS.

WSP worked with the local private sector to refine the one-stop shop business model previously introduced. Traditionally, households interested in purchasing a toilet needed to design the structures themselves, source the raw materials and hire and supervise masons – an expensive and time-consuming process. The one-stop shop business model offers customers with a range of affordable, desirable sanitation solutions delivered by one-stop-shop sanitation enterprises. It provides households a complete turnkey solution, including home delivery of all building materials, on-site construction services, and flexible payment options.

WSP also supported the development and evolution of an industry association of sanitation enterprises called APPSANI (in Indonesian, *Asosiasi Pengelola dan Pemberdayaan Sanitasi Indonesia*) to support the Government of Indonesia with replication and development of these enterprises within the context of National Strategy for STBM.

WSP helped introduce a number of new innovations that have led to significant increases in access to improved sanitation in Indonesia, in addition to providing valuable learning on developing sanitation firms that can be applied in other countries. Specific innovations tested included:

- The use of fiberglass molds and new concrete casting techniques to mold concrete septic tank rings, reducing costs and simplifying the installation procedure
- Working with banks and microfinance institutions to develop new loan products for purchasing improved sanitation, helping households afford this purchase by spreading the cost over time
- Shift to a more integrated and flexible approach on 'sequencing' of product promotion by the enterprise and CLTS triggering event by district health staff to better coordinate supply-side and demand-side interventions

Evaluation of the private sector approach found that villages where trained APPSANI entrepreneurs worked saw an increase in improved sanitation five percentage points higher than other villages. Using

propensity score matching, villages with CLTS triggering (control, n=9,958) were compared with villages that had also had an APPSANI firm present at some point in the previous three years (treatment, n=92). It was hypothesized that having a firm present in the village would strengthen the ability of the private sector to respond to the increased demand for improved sanitation generated by CLTS activities, increasing the overall rate of coverage in the treatment villages in November 2014. Based on the analysis, controlling for other effects, villages with both CLTS triggering and an APPSANI firm present have improved sanitation coverage rates (as of November 2014) 5 percentage points higher than villages with only CLTS activities.

These findings are statistically significant at the 5% level. Due to the limited sample size of treated villages (n=92), future analysis based on updated data on APPSANI activities should provide additional insights. For example, the subset of villages with APPSANI firm present (n=137) included 92 villages that also had CLTS triggering activities and 45 villages with no CLTS triggering. Due to the small sample size, it was not possible to compare the incremental treatment effect of CLTS triggering in this case.