



# BIO-TOILET

Testing Technological Solution in the Field





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## About us

Based in Ahmedabad, Gujarat, Mahila Housing Trust (MHT) is an NGO which works towards organizing and empowering poor communities, enabling them to improve their habitats. A quality habitat is a home with clean water, toilets, electricity, and adequate light and ventilation. These quality habitats support livelihoods and help make the poor more resilient to combat heat stress, disease, and other hazards of climate change.

For MHT community driven work is led and sustained by women. Grounded in the belief that women best understand the needs and potential of their communities, they know how to work together to bring much needed services. Through grassroots programs in habitat development, climate change resilience, and participatory governance, MHT empowers women to exercise their rights and uplift living conditions for their families and neighbors.



## Meeting sanitation goals in India

Sanitation provisions remain a key concern in the development of India. One in every ten deaths in India is linked to poor sanitation while nearly 44 million children under five remain stunted. This means India loses the equivalent of 6 percent of GDP due to inadequate sanitation.<sup>1</sup>

Even though data collected by World Bank shows the percentage of Indian population using basic sanitation provisions has doubled over the last 15 years (growing from 21% in 2000 to 44 % in 2015), this point is regarding use, not access. In 2015, nearly 60 million people in urban areas lacked access to improved sanitation arrangements and more than two thirds of wastewater is let out untreated into the environment.<sup>2</sup>

To push for sanitation, the Government of India's Swachh Bharat Mission (SBM) or "Clean India Initiative," was launched in 2015. The Swachh Bharat Mission seeks to eliminate open defecation by 2020 by installing toilets in slum communities across India and educating residents on the benefits of toilet usage. SBM requires building infrastructure with wastewater treatment in mind, especially in areas with no sewer lines.

To test sanitation solutions, MHT decided to install a community bio-toilet in a slum. Their goal was to identify a toilet technology that does not require sewage connection and see if a bio-toilet could meet community needs.



*(Showing off the bio-toilet in Baliya dev no tekro)*

1. <https://www.worldbank.org/en/news/feature/2015/12/15/ending-open-defecation-achieving-clean-and-healthy-rural-india>
2. <https://journals.sagepub.com/doi/full/10.1177/0956247814567058>

## The story of installing a bio-toilet in Baliya dev no tekro

To see if bio-toilets were accepted by and met the needs of slum communities, MHT decided to run a bio-toilet installation case study.

The model MHT decided on was a Sintex-made plastics Bio-digester tank and accompanying toilet, underground water storage tank, loft tank, and regular water storage tank. As will be explained later, the bio-toilet design was modified to meet the needs of the community it was installed in. This toilet requires water connection and does not produce methane gas, as some models do. It uses enzymes to break down waste and recycles water back into the toilet. The toilet uses 1.5 liters of water per usage (standard soak pit toilets use 7-10 liters amount of water per use). Water and waste are then sent to the bio tank to break down the waste, meaning no sewage connection is needed. The recycled water is then reused as toilet water.

MHT initially had four potential sites they were considering for toilet installation. The toilet design was shared with and refined with input from each of the communities. Baliya dev no tekro was selected as the final site for bio-toilet installation for three reasons: there was a demonstrated lack of services, a considerable safety risk to open defecation, and an invested CAG. There are about 350 households in Baliya dev no tekro. About 100 households have water, sewer line connection, and toilets. The other homes have irregular water connection. None of the homes have sewer lines because the families do not have land rights. The families have been living for the past 35-40 years.



*(MHT staff shares the bio-toilet design with community members)*

When choosing which slum to install the toilet in, MHT knew they had an important connection in the Baliya dev no tekro community: the President of the Baliya dev no tekro Slum CAG, Parulben Panti.

Parulben knew that the girls and women in her community needed a toilet. It was a big risk for women and girls to openly defecate because there had been an increase in girls being assaulted or molested while they made their way to and from the open defecation site. It was also embarrassing for girls and women to defecate with men watching and taking pictures.

Additionally, not having a toilet also made menstruation a time of shame for women—lack of toilet access made feeling clean and hygienic very difficult. The residents of this area are primarily vegetable sellers, and because of stigmatization around menstruation, women and girls were not allowed to handle fruits and veggies during this time of the month. This meant forgone wages for women.



There were also considerable open defecation risks for men as well as women. Community members had been bit by scorpions and caught in mud slides at the open defecation site.

Parulben was directly impacted by the risks and difficulties of not having a toilet because of her three young daughters and one son. Not having a toilet meant Parulben was forced to compromise providing for her family with the safety of her three daughters. Escorting her daughters to and from the open defecation site was necessary for safety purposes, but this took away time from her business selling fruits and vegetables. When MHT approached her CAG about constructing a community toilet, they asked Parulben if she would also be willing to provide space by her home. Parulben knew this was an opportunity to improve the lives of her family and community, so she agreed to allow for construction of the toilet outside her home and began gather the support of community members for the project.



Parulben and the CAG had to overcome resistance from some community members to installing a community bio-toilet instead of individual soak pit toilets. To get people to support the project, the CAG got the names of community members who wanted to use the community toilet. It helped when people had it explained to them that this was a custom designed toilet with unique water saving abilities. It also helped when people were reminded that there was not enough space in their homes to install individual toilets. Though enough people indicated they would use the community toilet on to justify installation, this did not fully eliminate some community member's desire for individual toilets.

Choosing the exact location for the toilet was difficult. Even though Parulben had offered up space, her home is across from a temple and residents felt it would be disrespectful and inappropriate to build a toilet in front of a temple. This meant that the toilet had to be moved closer to Parulben's doorstep, as not to be directly in front of the temple.

Four additional community forums were held before installation began in order to select the exact location for the toilet and get input on the installation process. Even though the toilet design had already been modified during the community meetings held before Baliya dev no tekro had been selected as the installation site, community members were not comfortable with the water going directly back into the toilet. MHT addressed this concern by adding an additional water storage tank. The community approved the modified toilet design.

After all the preliminary issues were cleared up—which took around two or three months—bio-toilet installation began. It was an enormous project, as the toilet has below and above ground components. The ground had to be dug up, and soil blocked up the narrow street, making getting around difficult during the one-and-a-half-month installation period.

Construction was held up because contractors ran into electric wires underground and had to let the electric company know. Parulben took it upon herself to move the dirt out of the street by hand because a tractor was too expensive. Contractors also realized that the walls of Parulben's house were not strong enough to support the toilet leaning against it. To fix the problem, the walls were re-enforced with iron.



Some residents were confused and did not know why their street was filled with dirt. In order to make sure people were informed, MHT sent a staff member to visit the installation site every other day and answer people's questions.

Additionally, the type of enzymes used to break down waste in the toilet had to be switched because the original enzymes created a bad smell. MHT also held an informal community meeting to teach community members how to properly clean and use the bio-toilet.



*(Pictured: the extensive excavation required in install the bio-toilet tanks)*

## Insights from the Baliya dev no tekro community

In August 2019, 8 months after the bio-toilet's installation, MHT staff went back to Baliya dev no tekro to find out their thoughts on the toilet. Currently, the bio-toilet is used by 20-22 households, equivalent to 80-90 people. Women and men both express that they feel safe and comfortable using it.



*Parulben Pantti (left) stands outside of the bio-toilet in front of her home*

Community members discussed the changes that needed to be made to the toilet post-installation. Soil was added to make the ground the toilet was placed on higher, since water had been running into Parulben's house. Additionally, one of the water tanks is moved to the other side of Parulben's door contingent on water connection. The tank is moved because it takes up a lot of space and it is not necessary to have it taking up space when water connection is not running.

Since the toilet was installed right outside her door, Parulben says there are some privacy issues and would recommend that if this toilet were to be installed in another community, that it not be situated by homes.

Parulben oversees and maintains the toilet. Her CAG collects Rs.5 per day from households that use the toilet. This money goes towards regular maintenance of the toilet, paying for the electricity to run the toilet, and purchasing new enzymes as necessary. The CAG is also responsible for adding the new enzymes, which is done by simply pouring them into the toilet. The bacteria breaks down all the human waste, so there is no need to remove waste from the tank.

There was also confusion when the AMC water connection was cut off for three months. MHT had to communicate to residents that they only had to manually add 3 half liter buckets of water to the bio-toilet, instead of the 15-20 buckets required for the regular soak pit toilets.

But any inconveniences that the toilet poses are small compared to the benefits. Community members resoundingly stated that the toilet was good, and they would definitely recommend it to other communities. Parulben and other community women no longer worry about taking time away from work to ensure the safety of their daughters. Menstruation is no longer an unhygienic time of shame for women, as they have a safe, clean, toilet to use.

After the toilet was installed, people who had been skeptical about a community toilet now ask Parulben if they have permission to use it. Also, when families who live too far away from the toilet to use it regularly have guests, they send the guest to the bio-toilet instead of the open defecation site.

## What MHT staff learned during bio-toilet installation

To inform future bio-toilet installation, MHT staff – like community members – said the biggest issue was finding a good space for the toilet. The narrow streets and abundance of temples make it difficult to find a good location.

The Baliya dev no tekro Slum case study demonstrated that to successfully install a bio-toilet, the community needs to be informed and invested. Had it not been for the involvement and investment of CAG President Parulben Panty and her willingness to provide space outside her home, the Baliya dev no tekro bio-toilet project would not have been successful. Before installation, it was determined that enough households would benefit from the toilet to cover the cost of upkeep. The CAG also continuously works to maintain the toilet: a bio-toilet installed in a community without an invested CAG would not be a feasible project.

It was also very important to send MHT staff to the site every day to speak with the community during the installation. Keeping them informed about what was happening around their homes was vital to the successful installation of the bio-toilet.

This project set the template for estimating the specific places where the tanks should be installed and at what spacing. Before installing the toilet in Baliya dev no tekro, the contractors didn't know how to properly space the tanks before site excavation. MHT staff also now knows to make sure contractors find out where electric wires are placed underground before they start digging.



(MHT Staff speaks with the community one year after the bio-toilet was installed)

## Baliya dev no tekro Bio-toilet price breakdown

### Bio-toilet Cost Breakdown

Description	Rate (Per Unit Rs.)
SINTEX Toilet Block	22,210/-
(2) SINTEX 1500 Litre Water Storage Tank	18,630/-
Sintex 3000 litre Bio-digester tank including Bacteria for 1 year	69,955/-
(2) Sintex 1000 litre Loft Water Tank	11,860/-
Sintex 1000 litre Underground Water Tank	10,950/-
(2) Hand Pump	8,200/-
<b>Total</b>	<b>141,805/-</b>
<b>Total w/GST@ 18 %</b>	<b>167,330/-</b>

### Bio-toilet Cost Compared to Soak Pit Toilets

Type of toilet	Rate (Rs.)
Individual soak pit toilet cost	12,000/-
Per household Community Bio-toilet cost for 20 households	8,366.5/-

When installed instead of individual soak pit toilets, Bio-toilets result in Rs. 3,633.5/- worth of savings per household.

## Bio-toilets moving forward

To continue meeting sanitation goals, MHT is considering hooking up one bio-digester tank and water tank to individual home toilets in the future. The size of the tank can be adjusted to process the waste from however many household toilets are connected. This would meet the community demands of individual toilets without requiring sewage connection.

Sintex products are available in every state MHT works in, and bio-toilets can be installed in any topography. Getting the enzymes poses no difficulty, as they can easily be ordered from the supplier.

Coupled with the necessary community investment and education, bio-toilets have the capacity to be an excellent means to meet sanitation goals for communities without sewer connection. As demonstrated by the Baliya dev no tekro slum case study, residents' lives have greatly improved, and they would definitely recommend this technology to other communities.



*(Members of the Baliya dev no tekro slum community)*





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