

Wish for WASH

2016 Learning Report

December 2016

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The following Learning Report is derived from the research and experiences of Wish for WASH team members in the Chipata Compound from January to June 2016.

1. Introduction

1.1 EcoSan Toilets in Peri-Urban Lusaka

In 2007, SIDA-CARE partnered with the Zambian branch of Water and Sanitation for the Urban Poor, WSUP, to pilot forty-five EcoSan (Ecological Sanitation) facilities in Lusaka's peri-urban Chaisa Compound. The EcoSan model is a double vault design that separates urine and solid waste via a two-hole, squat pit latrine. Solid waste falls into an above-ground collection space below the squat platform allowing users to harvest their own composted waste after it has built-up and dried. The pathogen-free waste is then easily accessible as a fertilizer for household crops. The SIDA-CARE team reported that the EcoSan method of sanitation was selected as the sanitation system of choice for the Chaisa Compound because "it does not require water to operate; it can be built inside the house; the waste can be used as manure and in the case of Chaisa, it can serve as a source of manure for the greening component of the project; the ash required to sprinkle on the faecal waste to enhance the dehydration, decomposition and odour reduction is readily available." A (Nyambe 2010)

Three years after the EcoSan pilot installations, WSUP, Lusaka Water and Sewerage Company (LWSC), and Care International Zambia sponsored an evaluation of the facilities in the Chaisa Compound. The resulting analysis informed readers and practitioners how the product performed and was received by the community. According to the findings, the EcoSan toilet was highly preferred by owners over pit latrines, with the "main reason for this preference being that the facilities were permanent." In the case of functionality, less than 23% of the original forty-five EcoSan beneficiaries had used their human manure for agricultural purposes at the time of evaluation, and of the twenty-four non-EcoSan users interviewed, twenty of them said they'd like the toilet "because it looked better than the ordinary pit latrine," yet only half of them knew how the system worked.

There were several recommendations for improvements in future sanitation designs related to EcoSan's potential danger to children and difficulty of use for the disabled, pregnant women, elderly, and men. The report also mentioned need for improved back-end waste management servicing, as well as the potential for scaling. (*A more complete list of recommendations from this evaluation can be found in the Appendix*).



Image 1. EcoSan Toilet



Image 2. EcoSan Toilet-Urine Diverting Front End

A. All references, quotes, and statistics relating to the Chaisa Compound EcoSan study are from the following source: Nyambe, Imasiku A. 2010. *Final Report on Evaluation of EcoSan Facilities in Chaisa Compound of Lusaka*. Lusaka Water and Sewerage Company Limited and CARE International Zambia -- Water and Sanitation for the Urban Poor.

1.2 Chipata Compound

The Chipata Compound is peri-urban community with over fourteen thousand households located approximately thirty minutes outside of Lusaka, Zambia. The community, like many peri-urban areas, was developed with little infrastructure, by families moving closer to the country's capital and economic hub. Construction of "toilet" facilities were, and continue to be, the responsibility of the landlord or current plot owner. All maintenance of a sanitation fixture also falls under the individual owner's capacity and discretion. With no piped water and limited waste management services present, affordable, or continually available, any sanitation system seeking to serve this community must function within such parameters. As a result, self-dug pit latrines without a protective slab-- usually around a depth of six meters in hopes of lasting a large family (between five to ten individuals) approximately ten years -- have been the most common waste-disposal facility built by the resource-constrained families who have had neither sufficient expendable finances nor the ease of commercial outreach to put in an alternative, improved system, or "sanitation facilities that hygienically separate human excreta from human contact"^B. Additionally, there are many plots that do not even have a pit latrine.

In 2010, approximately three hundred households in Chipata became beneficiaries of the same EcoSan models installed in the Chaisa Compound three years before. According to WSUP, the toilets were purchased at a subsidized price of 250ZMK (for the home owner) and SIDA-CARE Zambia covered the remaining costs, which neared an additional 4,000ZMK per unit. (At the time of this project, 1 USD~10 ZMK).

By 2015, WSUP became aware that the majority of these EcoSan toilets were not being used as they were intended, while simultaneously, they seemed to be introducing a new strain on the sanitation scene in the community. Similar to Chaisa, the Chipata Compound consists of compact, un-cultivated plots of land. Very few households grow food next to their home and do not have use for fertilizer - especially one made from human waste, which is not viewed by as suitable soil for substance crops. WSUP observed that because the dried waste cannot be removed by the readily-accessible waste-management tools (i.e. hand tools or vacuums used by the local servicing companies, such as WSUP's fecal sludge management team), the EcoSan toilets could not be serviced other than by the family. The manual labor required for emptying dried waste is expensive and challenging at a large scale. Owners of the EcoSan toilet, instead, spend time and energy servicing the pits themselves only to bury the compost in futile, inconvenient locations around their yard or else leave the collection units full and dig another simple pit latrine where space allows.

1.3 Wish for WASH

Wish for WASH, LLC. (W4W) was established in December 2015 as a student-based social impact organization in Atlanta, Georgia with the mission of bringing innovation to sanitation through human-centered research, design, and education. The SafiChoo toilet, W4W's first sanitation relief product, was conceptualized and prototyped as a Georgia Tech senior design project in 2014 under the auspices of Sanivation. The original model showcased the innovation as a waterless, waste-separation system with a sit-squat seat, advantageous for refugee and land constrained communities. This original design was piloted for ten weeks in the Kakuma refugee camp in northern Kenya and was refined based on observations and results collected there. Over the next year, the W4W team grew in size and experience

B. To learn more about the World Health Organization's definition of improved sanitation visit:
http://www.who.int/water_sanitation_health/monitoring/jmp2012/key_terms/en/

with sanitation system designs for under-resourced areas. In July 2015, W4W founder and president, Jasmine Burton, moved to Lusaka, Zambia as a designer for a local community health agency. While working there, she connected with WSUP.



Image 3. SafiChoo Toilet 2.0

2. Objective

WSUP and LWSC partnered with W4W at the beginning of 2016 to design a retrofitted sanitation system that salvaged the superstructure of the EcoSan project while also making it a functional, desirable toilet facility. W4W implemented human-centered design practices to improve the front-end toilet interface offered by the SafiChoo toilet seat and the back-end collection capacity of an EcoSan superstructure in order to best address the needs and desires of both the users and waste management team.

The W4W-WSUP team ultimately hoped to find a design that was:

- Recognized internationally as an improved sanitation system in its functionality
- Used correctly and consistently by individuals living in peri-urban compounds of Lusaka
- Compatible and sustainable with the capacities of the local waste-management service, the Lusaka Water and Sewerage Company (LWSC)
- Safe and accessible for children, handicap, elderly, and pregnant women
- Scalable

Below are the leading questions that fueled our design process:

- Does the system separate pathogen-contaminated fecal matter from humans when still on-site?
- Are local waste-management providers able to service the unit? At a large scale?
- Are users operating the toilet correctly?
- Is using the toilet a safe experience?
- Is using the toilet a comfortable experience?
- Are individuals willing and able to invest in the sustainability of the system over other sanitation options? Would local sanitation organizations invest in this product over others in the market?
- Is the toilet system sought after by other households (with or without current EcoSan superstructure)?

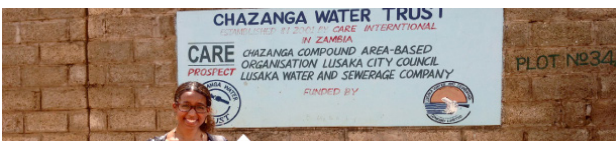


Image 4. Jasmine Meeting with Zambian water trusts

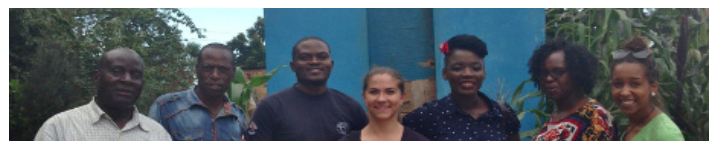
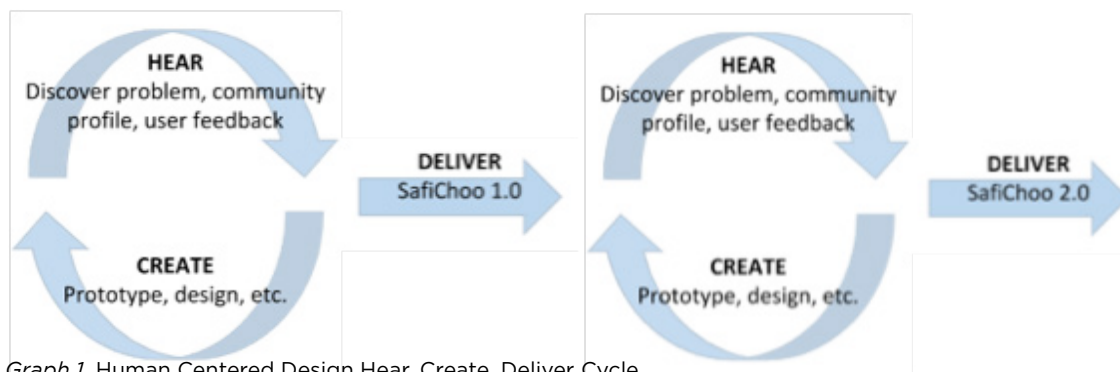


Image 5. W4W Meeting with WSUP + Community Leaders

The 2016 pilot of the retrofitted sanitation system was hosted on a single plot of land with five permanent residents of the Chipata Compound who had previously received an EcoSan toilet. The pilot logistics were conducted by a team of W4W and WSUP engineers, designers, and analysts. Although design iterations primarily came from results and feedback collected at the pilot site and from its household users, other individuals in the Chipata Compound both with and without EcoSan units were also consulted in order to collect a more inclusive perspective on the current state of sanitation in and the need for improved options.

4. Methodology: Human-Centered Design

Rooted in the principles of design thinking, the SafiChoo toilet first cycled through the **human centered design (HCD) process** when being tailored to the environment and population of the Kakuma refugee camp in Kenya during the Summer of 2014. Beginning with the 1.0 model that resulted from the Kakuma design study, the toilet then entered into a new HCD methodological process – comprised of the three stages: hear, create, deliver – when introduced to the Chipata Compound at the beginning of the 2016 pilot.



Graph 1. Human Centered Design Hear, Create, Deliver Cycle

4.1 Hear

4.1.1 Needs Assessment

In addition to the user experience grievances that WSUP was aware of from the previously-mentioned EcoSan evaluations in the Chaisa Compound, more information was gathered at the new pilot site. The process involved W4W conducting a baseline survey of the household selected by the Chipata community leaders to be owners of the pilot toilet unit. Fatness Banda and her family were chosen because of the diverse make-up of the household (gender and age), as well as their familiarity with WSUP and Ecosan toilets and relative proximity to a well. The Banda household needs assessment was taken to inspire designs for the first retrofitting of their personal EcoSan unit. *A copy of the questionnaire can be found in the Appendix.*

4.1.2 Pilot Household Monitoring

Wish for WASH worked with a local monitoring and evaluating assistant, Anne, to collect user feedback about smell, comfort, ease of cleaning, and overall impressions of the toilet experience throughout the 10 week pilot period. Weekly responses played into the W4W rapid iteration process, as well as general data collection for product effectiveness and reception. *A copy of the weekly survey used is included in the Appendix.* WSUP civil engineer, Kameya, also monitored (s) the area around the external liquid



Image 6. W4W discussing with Kameya

waste sand filter (that acts like a natural septic tank) for contamination.

4.1.3 Focus Group

During the sixth week of product iterations at Fatness' home, the W4W team turned toward other target customers and users living in the compound. In order to create a profile of the community and their present sanitation situation, W4W chose to collect feedback in both group and individual settings. An open focus group was held at the Phase I-site household, Fatness's home. The evaluation team intended to separate men and women to allow for a more frank and comfortable conversation. When ten women and one man (and many young observers) arrived for the focus group, the man was asked to leave with promise of an individual interview later. Among the ten participants, four of the women had EcoSan toilets; one had installed her own ceramic pour-flush toilet; and five had traditional pit latrines, or holes in the ground with slabs and hole lining (improved sanitation) or without slabs and hole lining (unimproved sanitation)^c, in their yard. The hour-long group discussion focused on:



Image 7. W4W engaging in the Focus Group

- Determining and ranking important toilet-system qualities
- Critiquing of EcoSan system
- Ranking the opinions of the user-interfaces (sanitation front-end or toilet seats).

4.1.4 Community Household Interviews

The team returned to the Chipata Compound the day following the focus group for a community walk-around with Anne and three young women who had attended the focus group and volunteered to help translate and guide the route. Three-hours resulted in twelve individual survey interviews. The team was generally focusing on answers related to the following topics:

- Their satisfaction with their current toilet system
- Their primary concerns or complaints regarding current toilet systems
- Creating, servicing, and maintaining their current sanitation system
- The amount spent/spending on current system
- The openness to and capacity for spending on new/different system.

Interviewee-selection was primarily a convenient sample based on the presence of residents and ease of approaching the household. Interviewers also intentionally chose households diversified by current facility type, familiarity of SafiChoo product, gender, and landownership. In the end, the twelve individuals were interviewed and the data pool consisted of the following:

- **Current Facility Type:** 2 EcoSan, 8 Pit Latrine, 1 None, 1 Unknown
- **SafiChoo Familiarity:** 5 Heard of and Seen; 3 Heard of but Not Seen; 4 Not Heard of and Not Seen
- **Gender:** 8 Males; 4 Females (*2 of which were present at focus group, previously)
- **Plot-Relation:** 9 Landlord, 3 Resident or Renter.



Image 8. W4W Conducting Interviews



4.2 Create

4.2.1 Rapid Product Iteration

Members of the W4W and WSUP design and engineering teams remained on the ground in Lusaka throughout the course of the pilot. This presence allowed for quick problem-solving in response to user concerns, product deficiencies, and system failures. The first phase of iterations began after the initial needs assessment was taken (see section 4.1.1). This stage of “create” took two weeks and involved most of the retrofitting work, especially that of the back-end design. Elements of the design (*including the seat, the toilet modularity, and the inserted smell protector or pour-flush component*) were iterated over the following six weeks in response to the monitoring results using a lean manufacturing approach.



Image 9. Retrofitting the EcoSan Back-end



Image 10. Retrofitting the EcoSan Back-end 2



4.3 Deliver

The delivery stage of this pilot is recognized as the EcoSan-SafiChoo unit produced after the final iteration was made to the Banda household toilet and the household monitoring results remained satisfactory with the product “as is” for several, consecutive weeks. Although W4W representatives left the pilot site in July 2016, the Zambian based WSUP monitors and engineers continued to be present for sporadic monitoring and updates; therefore, we consider the system to have been in this phase until July of 2017.

5. Results

5.1 First Phase of Iterations



Hear: The Banda household is headed by Fatness, a fifty-two-year-old woman, who considers herself financially independent and responsible for the economic decisions and/or costs concerning the home’s sanitation situation. Fatness’ twenty-eight-year-old daughter, another adult tenant, and two children below the age of fourteen also live in the one-room house. There is also a male adult renter who shares their toilet system. Although they do not have running water in their home, Fatness told the team that she is within fifty meters of a community well provided by the community water trust (and financed by



Image 11. Needs Assessment with Fatness

CARE), which they use for drinking and cleaning water. In 2010, Fatness paid 250ZMK to be a beneficiary of the SIDA-CARE EcoSan toilet in a structure outside of her house. Her Ecosan toilet is an above-ground twin pit latrine housed in concrete. One of the two back wooden doors opening to the compost pit is broken. There are four concrete steps leading to the entrance of the toilet. Fatness explained that the EcoSan toilet was intended to be cleaned out by the owner, but says she only knows one EcoSan toilet owner (a man) who actually empties it by hand and uses the waste as fertilizer. Instead, owners pay to have their toilets serviced or stop using them altogether; the latter, she stated, is more common as her community largely does not need nor want to use composted human waste. The household is responsible for general cleaning and maintenance of the toilet, as well. In her case, the first of the two pits filled up after two or three years of use, so the Banda household switched to using the second pit. Fatness has not yet had the first pit emptied. During the needs assessment, Fatness revealed that she has arthritis, so using traditional squatting methods to use the toilet has been painful. She also discussed how it was difficult to use the EcoSan “seat” that requires the user to pee into one hold and poop in another (while squatting) as shown in Image 2.

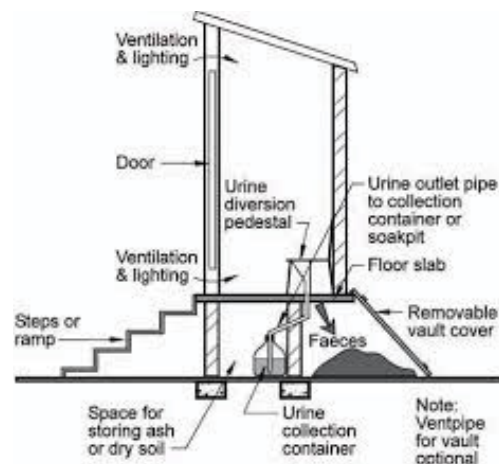


Image 12. General Schematic of EcoSan ([Source](#))

When shown an image of the Wish for WASH SafiChoo toilet similar to Image 15, **Fatness recognized it as a toilet.**

Create: Construction began with W4W paying for the necessary toilet-emptying of the family’s EcoSan pits facilitated by WSUP’s Fecal Sludge Management Team. WSUP and W4W engineers then converted the EcoSan composting pits (as seen in Image 12) into a semi-filtering fecal-sludge pit, making one side into a shower and extending the compost vault cover in the back as depicted in the 8.4 schematic in the appendix. Waste, therefore, remains in a sludge consistency, which enables waste management teams to more easily and economically remove it with their current servicing tools.

The trademark SafiChoo toilet seat was installed on the user-interface side of the system. In its 1.0 version, piloted in Kenya in 2014, the SafiChoo toilet separated waste from the front-end via a two-holed seat similar to the EcoSan urine diversion concept;

however, due to past user-experience issues related to this toilet interface design among Chipata users, the W4W team decided to separate liquids and solids instead from the



Image 13. Fecal Sludge Management Waste Removal



Image 14. SafiChoo Toilet 1.0 (Kenya Pilot)



Image 15. SafiChoo Toilet 2.0 (Zambia Pilot)

back-end (via the waste collection component) rather than on the front end (via the toilet seat). The draining liquid allows for the container to hold more waste for longer amounts of time and offers an improved user experience. To note, the SafiChoo toilet seat installed in Chipata initially did not have a pour flush smell trap (as seen in Image 17) or a lid because the original SafiChoo design was intended to be a dry urine diversion system^D. The SafiChoo toilet was also installed without the riser in order to test its appeal as a squat toilet.



The first Hear-Create cycle resulted in the following:

- A single pit that filters on back end rather than front end of system
- Liquid waste that collects with solid until it reaches the T-Bar pipe for external draining (powered by gravity)
- Liquid that flows to soakaway sand and rock filter beside EcoSan unit and is absorbed
- A squat-seat SafiChoo toilet set over one of the previous EcoSan latrine holes
- A shower space over left pit (*See the Appendix for the full schematic*)

5.2 Second Phase of Iterations

Once the retrofitted EcoSan-SafiChoo unit was completed at the pilot household, user monitoring began. Over the next ten weeks, a series of user responses were heard and rapid iterations were created. The following is a timeline that documents the concerns that arose through weekly monitoring and conversation with Fatness and other household users, as well as the team's response to the concern.

1

Concern: After two weeks of using the squat seat, household users asked for sitting version.

Response: The riser piece of the SafiChoo toilet was brought in to lift up seat to sitting height.



Image 16. SafiChoo + Riser

2

Concern: Smell increasingly worsened during the month without a pour-flush smell trap/lid insert.

Response: The resolution was adding a pour-flush insert (smell trap) into the seat hole that was created with a local P-Trap PVC piece and that used a small amount of water for “flushing” and thus trapping the smell in the collected water.



Image 17. SafiChoo Toilet with P-Trap Smell Trap

3

Concern: As a result of the newly-fitted pour-flush insert, leaking developed between riser component and the seat.

Response: Rubber was placed around interior wall of seat, between riser and seat to stop leaking. Future designs have this seal incorporated in the manufactured parts.



Image 18. SafiChoo Toilet with Rubber Seal

4

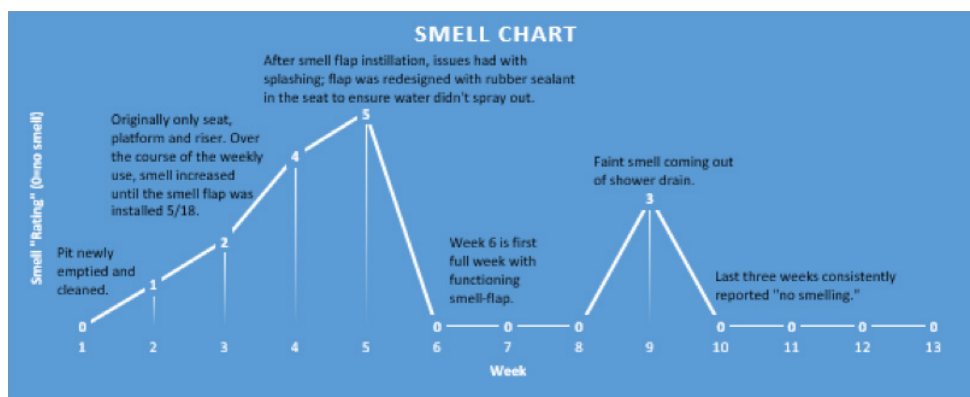
Concern: After the smell trap insert had been installed, smell stabilized at a comfortable “0” (no smell) rating for three weeks, until the family began mentioning that a faint smell was coming from the un-plugged shower hole located where there was previously the second pit.

Response: The team worked on installing a one-way valve plug to keep the smell in the vault below, but that also enabled water to flow into the vaults from the shower above.



Image 19. One Way smell trap for shower (testing)

The **progression of “smell”** as monitored by weekly surveys is illustrated below



Graph 2. Smell chart illustrating weekly user rating of unit smell (0, no smell, to 5, awful smell) and the explanation for the given grade, where necessary.

The second Hear-Create cycle resulted in the following design:

- A single pit that filters on back end of system (design not changed from cycle 1)
- A Sit-squat SafiChoo toilet with riser and pour-flush smell trap insert
- A shower space over the left pit with a one-way valve smell trap in drain hole

5.3 Community Feedback

The following are results of the focus group and twelve household interviews completed by the W4W team. Full documentation is in the Appendix.

EcoSan Users

Wish for WASH found a common theme of dissent among users who were unhappy with the back-end system, as well as some common front-end complaints. Grievances included the EcoSan unit being too high (non-EcoSan owners also mentioned this as a disadvantage of the system), and that the steps leading up to the unit were wearing and becoming dangerous. There were also safety concerns regarding the opening to the pits in that small children could potentially fall into them. One family had never used their EcoSan unit because they were not happy with the composting twin-pit design; one woman explained that after hers was built in 2010, “we did not use it, not even to wee-wee.” They have, instead, gone back to using simple pit latrines in their front yard. Overall, there are few users who reported to actually have used their EcoSan toilet as it was intended. The second EcoSan owner interviewed, an older man, has continued to use the system, although he has not yet had to empty the waste and is concerned he will not have a place to put the waste. He is happy, however, to have a permanent, durable toilet.



Image 20. Some Chipata EcoSan Users

Unimproved Sanitation (Pit Latrine or Other) Users

The majority of families in the Chipata Compound, as with most informal settlements in Lusaka, are currently using pit latrines, most of which have been self-dug and without a slab (classified as unimproved). The superstructure surrounding the latrine usually consists of discarded cardboard, plastic, and scrap metal tied together. Some found during the

community walk-around, did not have roofs or doors. All individuals interviewed who use pit latrines describe them as “uncomfortable.” During conversations with the eight pit-latraine users, other issues highlighted were weak superstructures (which are highly damaged during rainy season and lead to toilets overflowing or collapsing), strong odor, lack of cleanliness from overflowing, difficulty for infants/elderly to use, and the pit latrine’s connection to illness. When the pits become full, owners typically dig a new pit to use. There are waste removal services that can remove waste from the pit latrines, ranging in price from 380ZMK to 500ZMK (depending on the size of pit), but most choose to dig another latrine as opposed to paying to empty and reuse an “old” one for largely cost related reasons. Some pit latrines visited were of higher quality than others; for example, they were deeper to allow for a longer usability and/or their buildings were reinforced by higher quality materials. Nonetheless, owners with these pit latrines still expressed a desire for a more “permanent, durable, and modern” solution.



Image 21. A Non-EcoSan Pit Latrine



Image 22. Focus Group Toilet Views Activity

General Perception of SafiChoo

Overall, there was a positive, public perception regarding the SafiChoo toilet design (and the back-end collection model). Many potential users commented on the durability and cleanliness of the toilet. The comfortability of the design was also mentioned; one man in the Chipata Compound remarked how “even a European could use [the SafiChoo Toilet].” Members of Chipata Compound who participated in the focus group demonstrated that they associated the SafiChoo toilet with modern and aspirational sanitation, and many felt that adopting the technology would improve their current sanitation experience. The group, when shown a series of front-end toilet pictures (from “pit latrines” to a “modern flush toilet”), they most commonly ranked the flush toilet as the most desirable sanitation system; the second most popular choice from the pictures was either

the familiar, ceramic pour-flush toilet or the sit version of the SafiChoo toilet. The last three were consistently the squat SafiChoo toilet, an improved pit latrine, and then the “outside/ground (an unimproved pit latrine)” in that order. *(It should be noted that there may be some biases, particularly social desirability bias, because of Wish for WASH’s involvement in the community, and some people may desire the SafiChoo toilet simply because they believed it is what the interviewers wanted to hear or because there may be potential financial benefits -- i.e. that SafiChoo toilets may be given away for free. The team did their best to avoid leading answers or giving off the impression that the community members would be beneficiaries).*

Individuals who were unfamiliar with the SafiChoo toilet were also interviewed and expressed, unprompted, how they desire a toilet that is comfortable, durable, permanent, and clean. Several neighbors who have seen and/or heard of the SafiChoo-EcoSan model expressed interest in obtaining the system, which suggests that the allure of the SafiChoo seat is enough of a draw to overcome the grievances of the pre-existing EcoSan superstructure

design, such as the raised building.

Future Sanitation Interests

A group of community members, ranging from those who have used the SafiChoo toilet to those who had never heard of it, collectively ranked the most important features of “their perfect toilet,” as follows:

1. Low Cost*, 2. Easy to Keep Clean, 3. Not Smelly, 4. Where you Don't Come in Contact With Waste, 5. Safe for Children & Elderly, 6. Comfortable, 7. Low Cost*, and 8. Easy to Install.

*(*Low Cost is included twice because the focus group changed their answer from position 7 to position 1 at the very end of the discussion, stating that it is most important to make decisions with knowledge of price).*

These characteristics pertain mainly to the front-end of a sanitation system, which is where the SafiChoo toilet plays a role. While interviewing several members of Chipata Compound, it was discovered that landlords and landowners would be willing to pay a monthly fee in order to receive the combination of a SafiChoo/EcoSan system with a monthly or quarterly waste removal service. When individuals were asked how much they would be willing to pay for a toilet, responses ranged from 50ZMK/month to 200ZMK/month and averaged around 100ZMK/month. The willingness to pay goes back to the individuals interviewed valuing a toilet that is cleaner, safer, and more comfortable than those they are currently using.

6. Next Steps

Wish for WASH seeks to continue working with WSUP and LWSC to begin scaling a packaged toilet and waste management service to other community members within the Chipata compound. The teams are now working to gain funding for a larger manufacturing run, shipping and to subsidize the collective products/services so that is affordable to all members of the Chipata compound, and across Lusaka peri-urban communities at large.

Important testing to be done prior to up-scaling should include:

- Having local waste-management providers practice servicing the EcoSan-SafiChoo unit to ensure that they can safely and effectively manage the consistency of waste of the lique-solid waste mix with their current cleaning tools
- Continuing to test for contamination in and around the toilet unit to insure that it is a hygienic system.

Lastly, the team did not have the time or resources during this pilot to incorporate any improved hand-washing models, which was mentioned as a necessity both by the SIDA-CARE evaluation team as well as the Chipata residents. W4W agrees that to consider the system as a successful sanitation improvement, hand-washing must also be present in a sustainable manner moving forward.



Image 23. Focus Group Sanitation Interest Activity

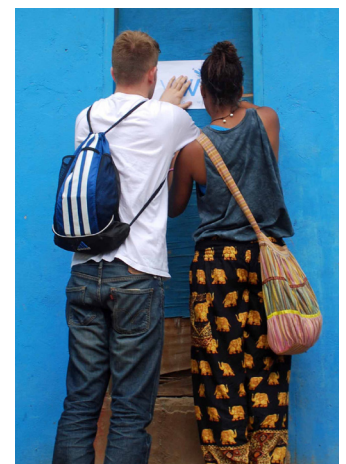


Image 24. W4W team at the site

7. Discussion Questions

Does the system separate pathogen-contaminated fecal matter from humans when its still on-site?

Working towards this solution included making an easy-to-clean, intuitive toilet seat, which would decrease the presence of waste and the misuse of system on the front-end, and retrofitting the waste collection unit so that it could be more easily and more regularly serviced (in a preferred manner), which improves functionality and sustainability of the sanitation system from the back-end.

Are local waste-management providers able to service the unit? At a large scale?

Theoretically the project addressed this problem by retrofitting the unit to collect waste in a sludge form rather than a compact and dry form, which is a consistency that the present waste-management company in the Chipata Compound has the means to service.

Are the users operating the toilet correctly?

Based on 10 weeks (plus an additional 3 at the end of the pilot) of monitoring the household usage of the system, the toilet seat and surrounding “bathroom” was kept clean. Users sat on the seat correctly -- facing forward and not standing or squatting on top of seat. Once the smell insert was installed, no clogging took place as a result of user error, such as trying to dispose of large pieces of trash. **The designers and monitoring team was never asked to explain how to use system correctly after a very brief, initial orientation, which demonstrates to us that was intuitive for users in this sample.*

Is using the toilet a safe experience?

The concern of children falling into a pit, as before, should be eliminated by the new seat design that has a shallow insert “bowl” piece, which would not be pleasant to slip into, yet would not cause any immediate danger to a child or to anyone else. The Banda household was comprised of 2 children (under the age of 14), 2 adults (between 14-50) and 2 elderly people (above the age of 50); therefore, this pilot tested users from a range of abilities. In the future, it was thought to consider testing different toilet seat riser heights so that children have easier access to sitting on the seat. Safety for pregnant women and elderly is also assumed to be improved with this design as the seat allows them to sit, requiring very little effort or strength. There was still the concern that, because of the above-ground storage feature, EcoSan superstructures will always require stairs, which many view as dangerous, especially for elderly. If retrofitting does continue, we would recommend that hand-railings, at least on one side of the staircase, be installed at all units.

Is using the toilet a comfortable experience?

Although the original SafiChoo squat seat was an improvement compared to the urine diverting Ecosan interface (see Image 2) technically from the slab-squat pit latrine, the pilot household did ask for the raised-seat to be installed, and they did not ask to return to the squat model after this change was made. The fact that the SafiChoo toilet is modular and easy to configure to be a sit or squat system makes it so users could use it how they preferred. Largely though, the sit option was preferred and we can conclude that the sitting seat offered an improved level of comfort for the family.

Are individuals willing and able to invest in the sustainability of the system over other sanitation options?

All interviewees (excluding one gentleman who refused to be asked about a “new toilet”)

said they would be willing to begin paying monthly (with a reported average of 100ZMK/month) for improved sanitation, which was self-defined by them with adjectives durable, comfortable, and clean. The team gets the general idea, therefore, that people are willing to spend money on sanitation (at least in theory as this was a stated willingness to pay). They are unhappy with what is available to them now and they see better options as things that worth investing in. A monthly “sanitation bundle” could consist of the front-end SafiChoo toilet combined with the back-end EcoSan retro-fit and WSUP fecal sludge management service. However, due to the personal preferences of different community members, there may be significant value in preparing multiple sanitation options with varying front-end and back-end products and services. For example, families currently using simple pit latrines may wish to install a SafiChoo toilet to alleviate some front-end discomforts, but may not yet be ready to afford the back-end service. Therefore, ‘aspirational sanitation’ could be achieved incrementally up the sanitation ladder^E.

Is the toilet system sought after by other households (with or without current EcoSan superstructure)?

Based on results from our community focus group and household interview sample, this toilet and back-end system is a desirable sanitation unit. It’s appeal particularly comes from the front-end (seat) being easy to clean, having an improved smell, while also improving safety and comfortability.



Image 25. W4W members with focus group participants

E.To learn more about the Sanitation ladder visit: <http://www.usdp.or.id/id/?p=4638>

8. Appendix

8.1 Recommendations from 2010 SIDA-CARE evaluation of EcoSan Units in Chaisa Compound

Recommendations considered in SafiChoo front-end designs:

A. To improve on the safety of the EcoSan facilities, the opening for the faecal matter should be reduced to a size that does not pose a danger of falling in to children.

B. It is necessary to have custom designed vaults to suit the situation for places where the facilities are to be implemented than to have standard designs for all households. This would enable all facilities attain the minimum desired retention time necessary for preliminary treatment before the vaults are emptied.

C. The EcoSan facility should be made user friendly to the disabled, pregnant women, elderly and men. This is in form of accessing the toilet and also the user interface. A person on a wheel chair can easily access a facility provided with an access ramp as opposed to stair cases. For all users, the pedestal type of interface is friendlier than the squat slab.

The report spoke to the needs of back-end servicing, as well:

D. Since the harvest from the facilities is expected to be in solid/dry form, there is need to design tools/equipment for removing the dry solid matter. To the inclusion of solid waste management, CBEs could be empowered to include in their responsibilities the aspect of sludge collection from the EcoSan facilities. Whereas the CBEs involved in the desludging would be paid per facility desludged, it was recommended that residents pay a monthly fee to the Water Trust who would then take up the financing of the desludging aspect when the facilities are due.

E. The CBEs should work with LWSC, LCC and ECZ on the aspect of collection and disposal. It was proposed that once collected, the sludge should be taken to the LWSC drying facilities without intermediate storage within the compounds. The sludge so disposed of at the LWSC drying facilities would then receive the required tertiary treatment (further dehydration) before being sold to customers together with the sludge from the conventional treatment plants.

Other recommendations related to complementing the toilet system, such as:

F. As EcoSan facilities are not ordinary toilets, there is need to include instructions on use to minimize misuse of the facilities. It is recommended that instructions are put on the door before one enters and also on the walls the user faces when entering and during the utilization of the facility. This is to minimize risks of first time users misusing the facilities due to 'ignorance'

G. Hand-washing is one of the most effective barriers in the faecal oral route of disease transmission. Almost all the EcoSan facilities that were evaluated did not have any provision for hand-washing. All future EcoSan facility designs should incorporate hand-washing facilities with the wastewater draining into the soakaway provided for the grey water and urine;

H. WDCs, LCC and ECZ to monitor the operations of the CBEs in the collection and disposal of the sludge.

8.2 Pilot Household Profile: Baseline survey conducted by Jasmine Burton and Brandon Philbrick.

Household Profile

Number of on-site family members or residents living in household for at least three-fourths of the testing period:

5 people total

No. of Adults (above 14)

3 (Fatness Banda, tenant, 28-year-old daughter)

No. of Children (between 4 and 14)

2 Children (One 7-year-old; another young child)

Access to Water:

Source and proximity of drinking water

Very close CARE and the community water trust provide water (50 meters)

Source and proximity of water for cleaning and hygiene
Very close (community well)

Service(s) available for physiological needs: ex. Public pit latrine 50m away; household latrine

Not answered

Access to Fecal Sludge Management:

Do you have a service available in your area?

Yes, but Ecosan is intended to be cleaned out by the owner (use the waste that has become compost for fertilizer)

If yes: Is the service private or public?

Private (water trust – WSUP)

State of sanitation service: ex. Household latrine: concrete walls, pit, no roof or door, no septic tank
Roof, door, concrete – all (no lock)

Party or Person(s) responsible for general cleaning and maintenance

Owners

Party or Person(s) responsible for waste servicing
 Owners (hadn't done it yet)
 In the last year, have you made any modifications to your sanitation situation (i.e. built a new wall for latrine, installed a hand-washing station)? Explain.
 Changed holes because the other filled
 If no, why not?
 N/A
 Who is the main decision-maker in the household with regard to finances?
 Fatness

Individual Profile

Age
 50+
 Gender
 Female
 If not the individual named in No. 7 above: Relationship to financial decision-maker/head of household:
 Are you financially dependent or independent?
 Yes - independent
 Does Individual in No. 7 above consult with you about financial decisions concerning household? Ex. Schooling, Additions to home, Jobs around household
 N/A
 Any pre-existing health issues that could affect one's interaction with sanitation system: ex. Uses cane, chronic diarrhea, etc.
 Older, arthritis
 Location(s) you use for physiological needs: ex. Neighbor's latrine; household latrine; open air.
 People who own Ecosans used them until they were full
 Are you satisfied with the state of your latrine/toilet and sanitation experience?
 Like because she can use it
 If no: How would you like to improve it?
 Not answered
 Have you received any lessons in sanitation and/or hygiene care?
 Yes
 When and where?
 5 years ago, presented by WSUP
 Would you consider sanitation to be important for your health and the health of your family or community?
 Yes

Usability Test (Taken before any detailed explanation of the product is made)

Tester states, "The next series of questions you will be asked concern a new product that may be available to your area, soon." Take notes on all spoken and acted-out answers.
 Can you tell me what this product is? What about it tells you it holds that purpose? Success: "a toilet" or "where I can take care of my physiological needs"; "the hole shape" or "there is a hole and a collection area"
 Yes - toilet
 How would you teach a child to use this device? (Introduce product from different angles for different

hole shape" or "there is a hole and a collection area"
 Yes - toilet
 How would you teach a child to use this device? (Introduce product from different angles for different testers, so "front" is not always obvious) Success: Sits over peanut-shaped hole facing so that the smaller hole-opening is in the front
 Not answered

Additional Notes

2010: Ecosan built toilets
 Used in 2011
 Left is full keep it fills up in 2-3 years
 Hard to follow the usability instructions (i.e. pee in one hole and poop in another)
 Back door broke
 Used right by one man in the community whereas most people have stopped using Ecosans once they filled up since they do not need/want composted waste

Conclusions

Household of five (3 adults, 2 children). Has access to water through a CARE and community water trust. WSUP was responsible for the construction of the household's Ecosan toilet, as well as sanitation training, in 2010. By the family's own description, the Ecosan toilet is a twin pit latrine housed in concrete with a wooden door; when one pit fills, users are supposed to use the other pit; once the waste has composted and dried, families dig out the waste and use it as fertilizer. While Fatness' household had switched to their second pit, they have not dug out the first one. The homeowners are responsible for paying for the toilet to be serviced, but they have yet to do so; they are also responsible for the cleaning and upkeep of the toilet. Fatness has arthritis, so using traditional squatting methods may be painful and dangerous. Mentions that the Ecosan could also be potential dangerous for young children. When shown an image of the Wish for WASH SafiChoo toilet, Fatness understood its purpose.

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8.3 Wish for WASH Toilet Pilot: Weekly Monitoring Assessment

Date of Assessment:

With whom did you speak about the toilet:
 How long was your visit:
 Did you use the SafiChoo toilet this week?
 Circle one: Yes or No
 If you did, about how many times did you use the SafiChoo toilet per day?
 Circle one: 1 time 2 times 3 times 4 times 5+ times
 If you did not, what other latrine did you use and why not the SafiChoo toilet?
 Was it comfortable: Yes or No
 Why or Why not?
 Was it easy to use: Yes or No
 How so?
 Did you primarily sit or squat: Sit or Squat

testers, so “front” is not always obvious) Success: Sits over peanut-shaped hole facing so that the smaller hole-opening is in the front
Not answered

Additional Notes

2010: Ecosan built toilets

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Circle one: Yes or No

If you did, about how many times did you use the SafiChoo toilet per day?

Circle one: 1 time 2 times 3 times 4 times 5+ times

If you did not, what other latrine did you use and why not the SafiChoo toilet?

Was it comfortable: Yes or No

Why or Why not?

Was it easy to use: Yes or No

How so?

Did you primarily sit or squat: Sit or Squat

Was it clean: Yes or No

If not, what was unclear about it?

Who cleaned it?

Was it smelly: Yes or No

On a scale from 1 -5 (very low -very high), how smelly was it this week:

(No Smell) 1 2 3 4 5 (Awful Smell)

Was anything broken or in need of repair: Yes or No
If so, what was broken and who fixed it?

Any other observations or suggestions this week? (add extra notes/comments here):

8.4 Focus Group Data

Present:

4 EcoSan owners

5 pit latrines

1 self-installed pour-flush

Toilet Characteristics Discussed:

Easy to keep clean

Easy to install

Comfortable

Don't contact waste

Low cost

Not Smelly

Safe

Characteristics Ranking:

(Low Cost)

Easy to keep clean

Not smelly

Don't come in contact with waste

Safe for children and elderly

Comfortable

(Low Cost)

Easy to install

Observer Notes:

Owner cleans the toilet -- should be easy to clean

Need water and soap to wash hands

Needs to be clean, don't throw trash in it

Need clean water

Would like to have a sink -- no one has, but everyone wants

EcoSan installation fee: 250K

Juliet's personal toilet installation: 2,000K

Her superstructure is cracking/falling apart

The superstructure is just as important

Flat toilet is ideal -- no stairs

EcoSan toilet is too high up

Don't like kneeling (kneeling = squatting)

Strong toilet -- don't get destroyed

Rain washes away and destroys toilets

EcoSan toilet isn't destroyed, but the stairs and area behind the toilet are

Big Paper/Group Notes:

Easy to clean

Can't throw trash in

Place to wash hands (with clean water)

Can call someone to empty it

Built safely (children can't fall in)

Railings to help elderly enter

Has water to flush and clean hands (ideal)
Sitting, not kneeling ("when sick, you cannot manage to kneel" and pain on knees)
Good to know cost!

No stairs (eco san steps and behind get destroyed)
Sit > squat
Permanent toilet (rain proof)
Strong toilet
"Town has good toilets" -- clean, comfortable, safe, water

Toilet Ranking (1):

Flush
Pour-flush (or 3)
Sit SafiChoo (or 2)
Squat SafiChoo
Pit latrine
Outdoors

Additional Notes:

Last three options always remained in bottom half and always in that order
"Modern" toilet, Pour-Flush toilet, and SafiChoo Sit toilet were always ranked as top three, however in various orders
Modern flush toilet seen as most desirable and almost always placed first (familiar with model "from town")
One woman, who had ranked Flush toilet second to the SafiChoo Sit toilet, said, observantly, that they had no water, so the flush toilet would just sit there and not function correctly. While discussing further, it was decided therefore, that a pour-flush should therefore be ranked above the modern toilet, as well. Finally, she also moved the pour-flush above the SafiChoo while saying "I like the lid. It covers the smell."

Quotes:

"This kind [SafiChoo] is very nice. You can pour water there. I want my toilet to be like this one."
"The toilet must be clean."
"You must wash your hands after coming back from the toilet. With soap!"
"[The toilet] should be clean every time."

8.5 Compound Walk-Around Interviews

Cost Information (EcoSan):

Originally designed for self service; emptying dry compost through
Empty the toilet: 250K - 400K -- for EcoSan (avg 3 yrs to fill one pit)
Not sure how accurate this is b/c wasn't actually Anne's husband giving information, as we'd thought.
Collection volume: 2 x 2 x 5 m³
Takes a long time to fill the EcoSan toilet, and don't have to pay often
Different companies service
Again, not sure if this true.

Cost Information (Alternatives):

6 to 7 meters deep. Could take up to 10 yrs to fill.
380K-500K to empty (small vs. large pit)
Different construction
Ground level toilet
Self-cleaned
Will just abandon and dig a new toilet when full -- don't pay to service
Don't have money to service
Don't pay anything for self-dug toilets

Notes:

Most houses use one toilet
Owner of plot is in charge of cleaning/paying
Other users don't help
All responsibility lies with the owner

Quotes:

Referring to current situation:
"Flush toilet is my dream"
Referring to Fatness's SafiChoo model:
"Men are never comfortable using a toilet like that [SafiChoo]."
"It is nice because it is durable and permanent. I wish I had this one [SafiChoo]."
"It is a comfortable toilet. Very good provision where one can sit comfortably."
"Even a European could use it."
Referring to EcoSan model:
"Where to throw [waste], it is very difficult for me."
-- talking about EcoSan
I empty it and find a place [indicating the small plot of dirt/land behind his house] to bury it. I put it here and there. Finding a place to put it is hard.

Homeowner Interview 1: Nice Pit Latrine + Heard/Seen SafiChoo + Landlord + Male

Want a durable and permanent
"It is nice because it is durable and permanent. I wish I had this one [SafiChoo]."
One own toilet and one for their tenants -- very deep (7 meters)
7 meters down, built 3 years ago
Waste is still at the bottom
Would take 10 years to fill
380K - 500K to vacuum out (small v. large vacuum truck)
"Flush toilet is my dream"
Rainy season fills up the pits (no roof) and results in a faster need for removal
Would pay 100K - 200K/month for SafiChoo & service

Homeowner Interview 2: EcoSan System + Heard/Seen SafiChoo + Plot Owner + Male EcoSan toilet

Started using second pit -- took 3-4 years for first pit to fill
First pit is dry

Don't pay someone to remove waste
 When filled on both sides, he will dig a hole and bury the composted waste
 "Where to throw [waste], it is very difficult for me."
 Built for him -- had to pay 250K to build
 The old toilets were free
 Is using it and is happy
 Would change to other toilet [SafiChoo] because it's clean
 Cannot afford to have it serviced
 Would be ok to pay for "nice, clean" toilet
 50K - 100K/month to service
 Separate bathing room

Homeowner Interview 3 (William Zambo, 359 Stro 22): None + Heard/NotSeen SafiChoo + Plot Owner + Male

Don't have toilet -- go behind house
 Lived here 20-30 years
 Will abandon and dig a new toilet
 Would be happy to pay for servicing
 1000K(/month?) for SafiChoo
 Will have more people using (over 12 people)
 Can't manage flushing toilet
 Pour-flush would work
 4 men, rest are women

Homeowner Interview 4 (Mr. Banda -- Anne's neighbor): Pit Latrine + Heard/Not Seen SafiChoo + Male

Willing to have SafiChoo
 Currently using pit latrine
 Dug themselves

Homeowner Interview 5/7 (grandson/Joyce Mwanza): Pit Latrine + Heard/Not Seen SafiChoo + Not Owner + Male/ Pit Latrine + Heard/Seen SafiChoo + Plot Owner + Female

20 years, lived here
 Comfortable
 Would change toilet and bathroom
 Biggest problem: the toilet is not safe
 Owner would pay, but tenant could assist
 Would be worth it to pay for a nicer toilet
 50K/month

Homeowner Interview 6: Not Heard/Not Seen SafiChoo + Owner + Male

Wouldn't pay for a new one
 Comfortable with what they have currently
 "Men are never comfortable using a toilet like that." -- observed by our young friend and guide

Homeowner(s) Interview 8: Pit Latrine + Not Heard/Not Seen + Renters + Females

Landlord not present -- almost not willing to give opinion because no control over facilities
 Not comfortable because overflowing -- responsibility of landlord
 When questioned further, only continued to emphasize

lack of use/discomfort from filling

Homeowner Interview 9 -- Heman Banda and Wife: Pit Latrine + Heard/Seen + Plot Owners + Male and Female

They're not comfortable
 The toilets are full
 Landlady's job to take care of the toilet
 They can get sick from using
 They dug their own hole
 They have a new toilet, but it's very small and will soon be full
 Not comfortable
 Has a smell
 100K/month

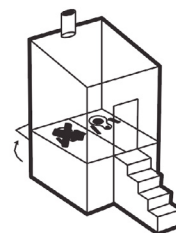
Homeowner Interview 10 -- Andrew Zulu (350/22): Pit Latrine + Not Heard/Not Seen + Landlord + Male

A lot of people use the toilet
 It's never emptied, they just dug and started using a new one
 Not comfortable, don't like -- want a new one
 100K/month
 Doesn't like EcoSan -- too high
 Government put in house

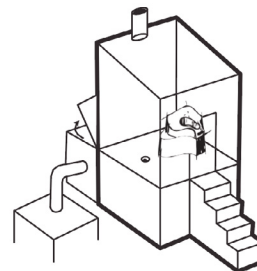
Homeowner Interview 11 -- Violet Gond (351 Stro 02): EcoSan + Not Heard/Not Seen + Plot Owner + Female

Not using their EcoSan toilet
 It was built in 2010
 Have never used it -- "Not even to weewee!"
 Don't like the 2 chamber design -- aka back end
 250K to build
 Separate bathroom they have built to wash

8.4 Schematics of the Ecosan-SafiChoo retrofit



This is the original EcoSan toilet design. It is a VIP Twin Pit with a urine-diverting front end experience, a staircase, and elevated, above ground waste collection vault. The waste in one pit latrine chamber is intended to compost while the other pit is in use and the composted waste is intended to be removed from two small doors that are perpendicular to the ground.



This is the original EcoSan-SafiChoo retrofit design where the right hand chamber was converted to the SafiChoo toilet and the left hand chamber was converted to a shower. The waste collection vault was extended outwards and made into one connected unit with T-bar PVC pipes connecting vault 1 with vault 2. When the liquid waste reaches the height of the T-bar it begins traveling out of the system (via the force of gravity) to an external liquid waste, sand/rock based sockaway. Having the liquid waste with the solid waste in addition to extending the vault doors outwards improves the user experience of the waste management providers and the SafiChoo toilet improves the user experience of the end user.



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#everybodypoops