Evaluation of Ecosan and Pour-flush toilets in Las Mercedes, Honduras

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Overview

This report presents the final results of a study comparing viability of Water Mission's pour-flush Healthy Latrine and the Ecological Sanitation (ecosan) latrine, a composting toilet that allows for the recycling of waste products as fertilizer. To date, Water Mission has installed more than 17,000 pour-flush latrines in developing countries around the world using a standard industry model consisting of a vented deep-pit latrine on a concrete slab, fiber-reinforced concrete privacy superstructure, and a pour-flush toilet that ensures the separation of waste from the user. With funding from Rotary International through Global Grant 1417066, Water Mission conducted a study comparing the ecosan latrine to Water Mission's standard pour-flush latrine to assess community preferences and inform future approaches in contexts where pour-flush toilets are not a viable option. Specifically, the study aimed to evaluate changes in function, use, and user satisfaction of the two latrine designs over time.

Study Background

Eighty-five latrines were constructed in the community of Las Mercedes, Honduras as part of the comparative analysis study. Additional latrines were constructed in the community as part of the grant, but the households were not included in the study. Sixty-seven households completed two rounds of surveys and were included in the study. Eighteen households were not included because they had either relocated to new homes or were not available for the second round of surveys. Baseline data collection began in January 2016 to assess the pre-existing sanitation environment in the community and household familiarity and perceptions on sanitation. 42 households were randomly assigned to receive the pour-flush latrine and 43 to receive the ecosan design. Due to a high dropout rate of those selected to receive the ecosan design, enrollment for ecosan recipients lasted until March 2017 and was not random as households had to agree at the time of the enrollment to receive an ecosan latrine. All households received extensive training on sanitation, hygiene, and latrine use and maintenance in the months leading up to the latrine installations, during installation and as well as extended direct support after installation for a period of 12 months. Latrines were constructed between July 2016 and June 2017 and an end-line survey was conducted in January 2018. Latrine function and use were evaluated by household responses verified by multiple observations.

Results

Baseline group comparisons

Data from 38 households assigned to receive a pour-flush latrine (Group 1) and 29 assigned to receive an ecosan latrine (Group 2) were included in the study. Baseline characteristics varied little between Group 1 and Group 2 (Table 1). Households were distributed evenly among the two groups with regards to wealth and living standard. Most households had either no facility or a simple pit latrine prior to the project and were familiar with the pour-flush design used in this study (Figure 1). While all households knew about pour-flush latrines and nearly all knew somebody who owned one, far fewer people knew what an ecosan latrine was. There was very low satisfaction with existing sanitation facilities. Ease of use and day to day maintenance were the two latrine attributes most commonly rated as "important" or "very important" (by 31%) to households in a new latrine. Cleanliness was important to 29% of households.

Table 1. Descriptive characteristics of households at the time of baseline survey collection, pre-project

Household Characteristics at Baseline	*Group 1 (Pour-flush recipients) (n=38)*	*Group 1 (Ecosan recipients) (n=29)*
Wealth	• 83% in middle wealth brackets	• 87% in middle wealth brackets
Existing household sanitation	• 37% no facility • 63% simple pit latrine	• 24% no facility • 69% simple pit latrine • 7% VIP latrine
Pour-flush familiarity	• 100% knew what a pour-flush was • 95% knew somebody with a pour-flush	• 100% knew what a pour-flush was • 86% knew somebody with a pour-flush
Ecosan familiarity	• 18% knew what an ecosan was • 18% knew somebody with an ecosan	• 52% knew what an ecosan was • 52% knew somebody with an ecosan
Satisfaction w. existing sanitation	• 4% satisfied	• 9% satisfied

Latrine Use

Pour-flush

74% (28) of pour-flush owners were using their latrines at the time of the end-line survey. Although all but one household with a pour-flush latrine reported all members of the household were using the latrine as their main facility, indicators of non-regular use or inadequate use such as items blocking access to the latrine and a few had feces visible outside of the latrine pit were observed in 24% (9) households.

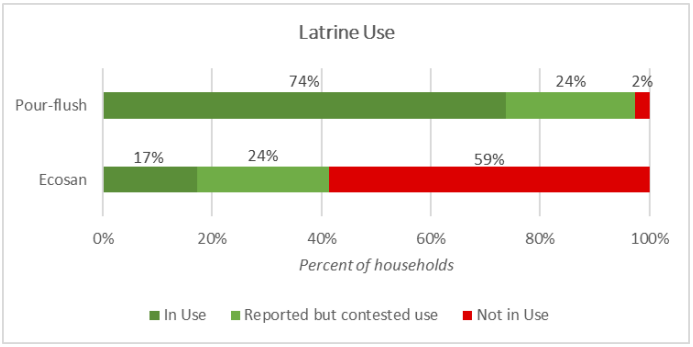

Figure 1. Percent of households using their new latrines at time of end-line survey, by latrine type

Ecosan

41% (12) of ecosan owners were using their latrines at the time of the end-line survey as determined by a combination of self-reports, presence of all parts necessary for use, the lack of feces outside the latrines and lack of physical barriers to latrine use. However, only 18% (5) of ecosan owners had a bucket with cover mix inside the latrine as required for proper use. Only one household had a scoop to use with the cover mix. 11% (3) of the households with an ecosan latrine were reusing the waste: one as cover mix for the latrine and the other two as fertilizer in a garden. All three were composting the waste for less than a month before using it.

Latrine Function

Pour-flush

100% (38) of pour-flush latrines could be flushed at the time of the end-line survey. However, 29% (11) were in need of minor repair that prevented the latrine from functioning exactly as designed such as latches missing on doors or water not remaining visible in the toilet trap after flushing. These issues were resolved during subsequent follow-up visits.

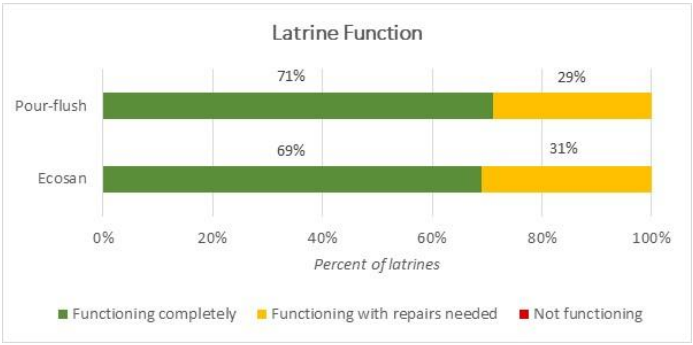

Figure 2. Percent of latrines functioning at time of end-line survey, by latrine type

Ecosan

100% (29) of ecosan latrines could be used (i.e. had a toilet bowl) at the time of the end-line survey. One household (3%) had converted an ecosan latrine to a pour-flush toilet. Additionally, 31% (9) latrines had less essential parts missing or in disrepair such as door latches and toilet covers.

User Satisfaction

100% (38) of pour-flush owners were satisfied with their latrine and none wanted to switch to the ecosan design. Conversely, 28% (8) of ecosan owners were satisfied with their latrines and 93% (27) wanted to switch to a pour-flush design. This is higher than the 76% (22) who said they had wanted the pour-flush prior to the project.

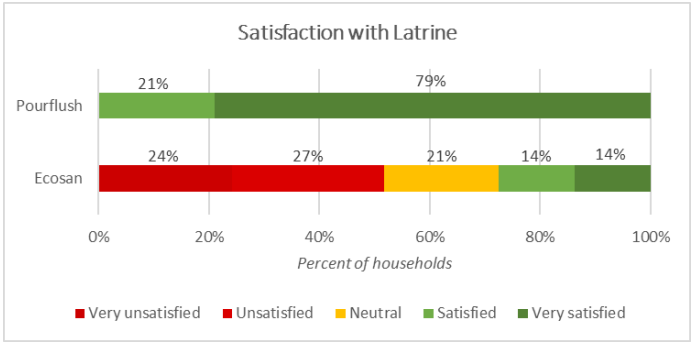

Figure 3. Percent of households satisfied with the latrine they received, by latrine type

Time and money spent

Prior to the project, households reported spending an average of 37 minutes (pour-flush group) and 45 minutes (ecosan group) per week cleaning their latrines. At end-line these pour flush owners reported spending an average of 28 minutes (-24%) and ecosan owners reported spending an average of 21 minutes (-53%) per week on cleaning. Although it was anticipated that ecosan owners would spend more time cleaning and maintaining their latrines than pour-flush owners, the fact that ecosan owners are not using their latrines as much as pour-flush owners is in alignment with the finding that they are spending a similar amount of time. Prior to the project, households reported spending an average of 24 Lempira (pour-flush) and 25 Lempira (ecosan) per month on cleaning. At end-line, pour-flush owners reported spending 33 Lempira (+38%) and ecosan owners reported spending 21 Lempira (-16%) per month on cleaning.

Conclusions

- All latrines were functioning without need of major repair at the end of the study
- Confirmed use and user satisfaction was much higher among households who received pour-flush latrines than ecosan latrines
- Most households that received ecosan latrines wished to convert their latrine to a pour-flush latrine

The pour-flush latrine had more favorable results than the ecosan latrine in all categories that were evaluated, most notably in household use, preference, and satisfaction. Less than half of households were using their ecosan latrines at the end of the study and those that did were not always using it correctly. Proper waste handling was even more uncommon among ecosan owners as only three households were reusing the waste and all three were doing so after less than a month of composting despite instructions to wait one year. No real conclusions can be drawn from the finding that reported time and money spent by households cleaning and maintaining each solution was similar because ecosan owners were not using their latrines at the same rate as pour-flush owners. In fact, perceived complexity of daily use and waste management requirements with ecosan latrines appears to be the driving factor in the preference towards the pour-flush design, especially since ease of maintenance and use were the two most highly rated aspects of importance in a latrine at the beginning of the study. The fact that pour-flush latrines are a viable technological option in Las Mercedes could have exaggerated dissatisfaction of ecosan latrines as most households were aware of the alternative prior to the project. Ecosan latrines may see higher rates of use and satisfaction in contexts where pour-flush latrines are not viable.

Acknowledgements

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Project Photos

Water Mission compiled a photo album of the activities conducted in support of this study. The link to this album is as follows:

https://photos.app.goo.gl/AWihGVqrtuI8PKHy1