Evaluating Functionality and Use of a Subsidized Pour-flush Latrine Project

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Presentation Adapted for Online Viewers
Key Messages

• **Sustainability**: Continued *function* and *use* in over 80% of latrines

• **Mechanics**: Doors are an important area for improvement due to their common failure and impact on *use* of latrines

• **Affordability**: Ongoing costs are achievable for most households, however lack of planning often limits capital maintenance needed for sustainability
Water Mission has provided over **3.2 million** people with access to safe water.
Water Mission has installed **20,000** pour-flush latrines in 5 countries

- Roughly 80% are in Honduras

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**52** Countries served to date

**10** Countries with full-time staff

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Honduras
Safe Water Colón

15,664 latrines to 103,303 people

Latrine Installations by Year


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The Healthy Latrine

Latrines have a single off-set pit that is lined on the sides with a cement slab on top to protect the environment from the waste.

Households were responsible for the labor and materials needed to construct the pit.
The Healthy Latrine

Privacy structures are made using our custom mold and poured fiber-reinforced concrete. Use of the mold lowers cost of construction.

Inside the superstructure is a pour-flush toilet. There is a bend in the pipe to create a sanitary seal with water so that nothing that goes in – waste, insects, odor – can come out.

Water seal creates a physical barrier that separates waste from the environment, preventing the transmission of disease and eliminating odor. Siphon improves flush efficiency, decreasing the amount of water needed.
An independent health impact study was conducted on Safe Water Colón in 2012 and found large drops in pediatric diarrheal rates and infant mortality, significantly greater than in Gracias a Dios and at almost twice the rate of reduction seen in the rest of the country (sources at watermission.org/research).

Anecdotally, Water Mission has received positive feedback from families over the years as Water Mission staff continues to visit the communities. Outside of anecdotes, however, Water Mission did not have proof of overall level of function or use. As opportunities for more sanitation projects arise, Water Mission wished to evaluate what has already been done to validate our approach, seek ways to improve, and direct future efforts.
Methods
The population of latrines is spread in over 450 communities around the mountainous department of Colón.
In order to achieve a sample size of 1,000 with a 3% margin of error and 95% confidence level, and keeping logistics feasible, we first used a random number generator to select 75 communities. Then, we used a randomized method to select just under 50% of all beneficiary households in those communities for visits.

75 communities across 10 municipalities

1,019 household visits
Data Collection
March – July 2016

Household Interviews
• Demographic information
• History of function
• Sanitation behaviors
• Affordability
• Perceptions

Latrine Observations
• Presence of parts
• Condition of parts
• Flush test
• Signs of use
• Photos for quality control

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Interview questions were verified and complemented with observational questions to categorize latrine function and household use into ordinal categories.
Nonfunctional

- Does not flush

Basic Function

- Flushes in <15 seconds
- All parts not functioning as they were at installation
  - 1-8 requirements not met

Full Function

- Flushes < 15 seconds
- All parts are functioning as they were at installation
  - 9 requirements
Meets any 1 of 3:
1. Self-reported ‘never’ or ‘rarely’ using latrine
2. No toilet bowl
3. Does not flush

Non-use

Partial Use
- Does not meet any of the three determinants for ‘nonuse’
- Does not meet all of the requirements for Full Use

Full Use
- Self-reported full-time use by all members of household
- Observationally verified signs of use
  - 5 observations
Results
Proportions of Latrine Function

- **85%** of latrines continue to function up to 8 years post-installation

- Age of latrine, home ownership, original ownership, wealth, location found **not** to be significant predictors of function level
Proportions of Latrine Function

- **85%** of latrines continue to function up to 8 years post-installation
- **75%** of latrine’s inability to meet ‘Full Function’ requirements can be explained by door failures
Proportions of Latrine Use

- **82%** of latrines continue to be used up to 8 years post-installation
- Age of latrine, home ownership, original ownership, wealth, location found **not** to be significant predictors of use
- Significant predictors of use:
  - Presence of **door** \( p=0.022 \)
  - **Odor** \( p<0.001 \)
Functionality, Use, and Satisfaction

The size of the square corresponds to the proportion of latrines that fell into the overlapping categories. The saturation of the color corresponds to a question asked during the household interviews in which households were asked to rate their overall satisfaction with their Healthy Latrine.
Likert Scale of User Satisfaction Ratings

Interviewees were asked to use the same scale to rate their satisfaction with 10 features of the latrine.

Overall, Operation, Ease of use, Cleanliness, Odor, Distance to home, Daily Upkeep, Appearance, Affordability, Ease of repair, Pit Management

Scale: 1, 2, 3, 4, 5, N/A
Most features had very similar ratings, however, appearance and affordability received the highest ratings...
Likert Scale of User Satisfaction Ratings

... and households ranked their ability to repair broken parts and their ability to manage full pits the lowest.
Ability to Afford Operating Costs

- 35% reported ability to pay for toilet paper and cleaning materials as ‘difficult’
Ability to Afford Operating Costs

- **35%** reported ability to pay for toilet paper and cleaning materials as ‘difficult’

- **12%** of total supplementing material costs with lower-cost items
  - 5 households not purchasing proper materials at all
Pit Management

Different results were found on affordability of larger, infrequent capital expenses such as pit management.

- **14% of pits had reportedly filled**
  - Household size ($p=0.003$) was significant predictor

Pits were designed to have a lifespan of 7.5 years for a family of 5.5, so it was not surprising to see just 14% of pits filled at the time of the study.
Pit Management

• **14%** of pits had reportedly filled
  • Household size ($p=0.03$) was significant predictor

• Of those that filled, less than a quarter of households reported they had re-routed or re-dug pits

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**Not filled**

- **86%**

**Emptied pit**

- **14%**

**Rerouted pit**

- **3%**

**Did nothing**

- **77%**

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Pit Management

• Of the 77% that reported not doing anything with filled pits, 86% attributed inaction to cost.

• The 23% that reported emptying or re-routing said they spent 8-210 USD (mean and median both falling around 90 USD)
  • The materials needed to dig, line, and re-route to a new pit should be about 30-50 USD.
Pit Management

- The 86% of households that had not had their pit fill at the time of the interview reported that they do not have pit management plans for when it does fill.

- 30-50USD cost of pit management should not be cost prohibitive for these families over the lifespan of the pit. Water Mission believes lack of planning is what causes pit management to be cost prohibitive.

- All Water Mission sanitation projects now involve a great deal more community development and capacity building than they did at the start of Safe Water Colón. This includes planning and training for pit management.
Conclusions

• Sustained **function** and **use** were observed in over 80% of subsidized pour-flush latrines up to 8 years post-installation

• New focus on improving door design due to common failures and significant impact of door presence on latrine use

• Ongoing costs are achievable for most households and deeper community engagement is now employed to increase preparation for capital maintenance
Questions