

Benefits and barriers to safe use of ecological sanitation in El Alto, Bolivia – a need for improved hygiene education?

Introduction

Ecological sanitation (ecosan) refers to sanitation systems that make nutrients and other resources in sanitation waste streams available for safe and productive reuse, usually as agricultural fertilizers and soil conditioners. At the same time they promote human and ecosystem health. Urine-diverting dry toilets (UDDTs) are commonly used as the user interface in an ecosan system.

Potential benefits of ecosan include providing improved sanitation and hygiene access while minimizing the release of pathogen-filled untreated wastewater and excreta; creating marketable agricultural inputs and other business opportunities; and preventing soil degradation, such as loss of organic matter, caused its improper use by humans, thereby boosting agricultural productivity.

However, rural sanitation interventions have had mixed long-term success, and ecosan interventions are no exception. There is an urgent need to better understand what factors influence users' adoption and sustained use of ecosan, and what barriers exist, but to date only a few studies on ecosan interventions exist. This brief summarizes the findings of a mixed methods study on an ecosan project in El Alto, Bolivia.



A District 7 resident using a new household hygiene unit

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The El Alto project

El Alto city was originally a peri-urban settlement on the edge of the Bolivian capital, La Paz. In 1982 it was incorporated as a city in its own right and is now one of the fastest-growing urban centres in Bolivia, largely due to rural-urban migration. According to national statistics, more than half of the population of El Alto lack adequate water and sanitation services and diarrhoea is prevalent in one in four children under the age of five.¹

A pilot project to install household sanitation and hygiene units started in 2008, and was scaled up in 2012. The project sites were all in El Alto's District 7, a peri-urban area with a population of around 27 000, primarily indigenous people making a living through informal commerce.²

The intervention consisted of four components: 1) hygiene education; 2) installation of household sanitation units, including UDDTs and handwashing basins, with a shower and/or separate urinal; 3) waste management, including a collection service and treatment of waste by a local non-governmental organization, Fundación Sumaj Huasi; and 4) introduction of excreta-based fertilizers onto local markets.

Household participation in the project was voluntary. The households were offered project support in installing a household sanitation unit, for which they had to contribute partial funding. Over the whole project, 897 sanitation units

Key findings

- Diarrhoeal disease incidence reported in household surveys fell dramatically in households that installed ecosan units (UDDTs and handwashing stations). The reductions were smaller in poorer households, possibly because they did not use soap for handwashing and used unimproved water supplies.
- In interviews older users reported more challenges with dry toilet use and hygiene practices than younger users.
- Interviewees reported that household excreta collection was irregular, which had negative consequences such as dumping on open ground and unsafe application of untreated human waste on household vegetable gardens.
- Findings suggest that the toilets were widely accepted by the households and hygiene practices were widely perceived to be important, while open defecation was perceived as unsafe and generally disliked. However, respondents lacked knowledge about links between their hygiene practices and health, suggesting that more emphasis should be placed on this topic in hygiene education.

1 El Instituto Nacional de Estadística (INE). Estadísticas Socioeconómicas del Municipio de El Alto. 25 ed. Potosí, Bolivia, 2008.
 2 Suntura, J. C. and Sandoval, B. I. (2012). Case study of sustainable sanitation projects: Ecological Sanitation in peri-urban area of El Alto city, Bolivia. SuSanA case study. Sustainable Sanitation Alliance. <http://www.susana.org/en/resources/case-studies>.



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One of the families who installed a new ecosan system under the project

were installed, benefitting approximately 4489 people. Similar projects have since been implemented in other communities, including Copacabana town and Uyuni city, and more are slated for the future.³

The project was implemented by Sumaj Huasi, with technical support from SEI. It was funded by the Swedish International Development Cooperation Agency (Sida).

The study

To maximize learning from the project, a study was conducted in households that had installed the units, using a mixed-methods approach with both quantitative and qualitative components. A household survey gathered quantitative data from 296 volunteer households on household characteristics and diarrhoea incidence. The first survey round took place before the project intervention, and the same households were then visited several months after installation of the sanitation and hygiene units for a second survey round.⁴ During the second round, households were visited every two weeks, for approximately three months.

In 2016, a qualitative follow-up study was conducted using the photovoice methodology in one community in El Alto to further explore issues around ecosan use.⁵ For this study, eight women from households that had participated in the project were given disposable cameras and asked to take photos related to the sanitation and hygiene situation in the household over a period of two weeks (see opposite for examples). The photos were used to guide subsequent interviews with the women. Both photos and interviews were analysed thematically to identify factors that contributed to the adoption and use of ecosan and the practice of hygiene behaviours in project households.

3 Swedish International Development Cooperation Agency (2016). *Torrtoaletter förbättrar miljön och gör kvinnor tryggare* (dry toilets save water and make women safer). <http://www.sida.se/Svenska/Har-arbetar-vi/Latinamerika/Bolivia/resultatexempel/Torrtoaletter-spar-vatten-och-gor-kvinnor-tryggare/>.

4 For more detail on this survey and its findings see Murad, S. (2016). *Impacts of ecological sanitation on diarrhoeal disease in El Alto, Bolivia*. Master's thesis. Department of Public Health Sciences, Karolinska Institute, Stockholm. Unpublished.

5 For more on photovoice see Wang, C. and Burris, M. A. (1997). *Photovoice: concept, methodology, and use for participatory needs assessment*. *Health Education and Behavior* 24(3). DOI:10.1177/109019819702400309.

Findings

This section synthesizes findings from the mixed-methods study.

Positive health impacts

Comparing data from the “before” and “after” household surveys revealed a statistically significant reduction in diarrhoeal disease overall following the project intervention. Over 95% of households visited reported that they had consistently used their new toilets and 89% reported that they consistently washed their hands with soap. These findings together seem to confirm that the project intervention had a positive impact on their household health.

Socioeconomic status a factor in health outcomes

Although reported diarrhoeal disease fell in all households after the intervention, the decline was significantly smaller in households with lower socioeconomic status, according to the survey. There was, however, no significant difference in reported toilet usage rates between households of different socioeconomic status. As no such association was found in the pre-intervention survey, it seems that the positive health impacts of the intervention were smaller for lower-status households.

This phenomenon may be partly explained by the fact that higher diarrhoeal disease incidence is also associated with not using soap for handwashing and with the use of unimproved water sources. Both of these may be characteristic of lower-status or lower-income households, and might lead to additional exposure to pathogens.

Together these trends suggest that sanitation interventions should pay special attention to the obstacles faced by lower-status households, and be implemented in tandem with improvements in water supply.

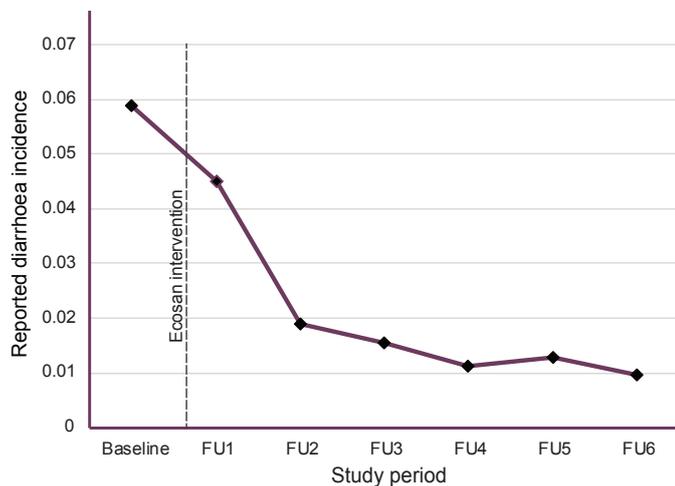
Barriers to toilet use

Several factors were identified by the photovoice participants as barriers to toilet use and good hygiene practices in their communities. One barrier that emerged was age differences, as some younger respondents reported using toilets and practising handwashing, while some older respondents reported that they still practised open defecation, even with toilets at home. The reasons the older respondents gave for this were the inconvenience of cleaning the toilet and taking out the waste, as well as the perceived ease of open defecation, which may be a more accepted practice among older residents. Sanitation programmes should consider exploring age-related sociocultural influences, and their impacts on adoption rates, and whether interventions need to be tailored for different age groups.

Another barrier given for not using the toilets was inconsistency in the waste collection: when uncollected waste built up, households were forced to resort to open defecation, or disposed of the waste in other unsafe ways (see below). Operation and maintenance services are key elements in any sanitation intervention aiming for long-term sustainability. Strategies should be explored to ensure there is consistent and reliable service provision.



Photos taken by El Alto residents to visualize their household and sanitation situations, as part of the photovoice research



Falling diarrhoea incidence following ecosan intervention

The y-axis shows average household diarrhoea incidence in the previous two weeks reported at baseline and in follow-up (FU) surveys.

Need to emphasize risks of exposure to pathogens

While some ecosan systems – especially in rural areas – are designed for households to treat and reuse their own waste products, this was not the case in the El Alto project. As a result, little attention was given in the hygiene education to the proper treatment and handling of excreta or to the risks of improper treatment and handling. This may partly explain why respondents in the photovoice study reported that when waste was not regularly collected, it was dumped in the open (e.g. vacant lots, drainage ditches), or used, untreated, as fertilizer for household crops. The latter strategy suggests that



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Separate urinals were offered as an optional feature of the sanitation and hygiene units under the project

This policy brief was written by Sofia Murad and Sarah Dickin. It is based on Sofia Murad's Master's thesis for Karolinska Institute entitled *Impacts of ecological sanitation on diarrhoeal disease in El Alto, Bolivia (June 2016)* and the SEI Working Paper *Understanding the Adoption of Ecological Sanitation and Hygiene Practices: Using Photovoice to Capture Local Perspectives in El Alto, Bolivia (2016)*. These studies were made possible by a Minor Field Studies scholarship from the Swedish International Development Cooperation Agency, with support from SEI.

the benefits of reclaiming resource from excreta for agriculture were well understood and accepted, but not the pathogen exposure risks and the importance of treatment and proper waste handling. This underlines the importance of educating users about the risks of pathogen exposure in ecosan projects, even when they are not expected to treat or handle excreta themselves.

Hygiene for cleanliness and health

The sanitation units were widely accepted and proper hygiene practices were perceived as important, while open defecation was generally perceived as unsafe and disliked. However, a limitation of this study was that survey participants were not randomly selected, and observations were not made of ecosan and handwashing facilities. This could lead to selection bias and exaggerated reports of acceptable and use. In discussing hygiene, respondents emphasized cleanliness in the kitchen as the main benefit. However, respondents did not indicate knowledge of linkages between hygiene and the prevention of diarrhoea or other health benefits. This suggests that hygiene education programmes should explain specific health benefits and risks, including various exposure routes, and more closely link them to hygiene practices that are important to participants.

Conclusions

The study provides new evidence of the benefits of ecological sanitation use as well as suggesting areas where interventions can be strengthened. However, the results reported here must be seen as reflecting the particular context of District 7 and the intervention strategies used there. Thus, they are most relevant to future ecosan projects in El Alto, but they also provide lessons for improving ecosan (and other approaches to sanitation) implementation in other similar settings.

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