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**DELIVERING WATER, SANITATION AND HYGIENE SERVICES
IN AN UNCERTAIN ENVIRONMENT**

**Identifying challenges in the use of urine-diverting toilets:
a case study from Rukungiri Municipality (S.W. Uganda)**

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In Rukungiri Municipality, the installation of pit latrines is hindered by limited space, rocky soils, and a high water table. A limited water supply eliminates flush toilets as a feasible option. Through surveys of users of Urine-Diverting Dry Toilets (UDDTs), the authors discovered that, although residents have been strongly encouraged by the Municipality to install these facilities, they have received limited education and training regarding their construction and operation. Other challenges identified include a lack of desiccating materials and the need to establish a safe, effective system for emptying and disposing of fecal material. To address these issues, the possibility of desiccant delivery and toilet emptying services should be explored, and further sensitization should occur, perhaps through public gatherings and the distribution of low-cost signs describing proper operation. The authors hope that, through these recommendations, UDDTs will become a safer, better understood, and more widespread sanitation option within Rukungiri Municipality.

Introduction

In much of Uganda, pit latrines are considered to be the standard for managing human excreta. While pit latrines are a significant improvement over alternatives such as open defecation, they often provide a smelly, fly-infested environment that is uncomfortable, potentially unsafe, and possibly harmful to the environment. In fact, according to the most recent Demographic and Health Survey, only 18.7% of the population use improved facilities, while another 13.4% use shared facilities that would otherwise be classified as improved. The remaining two-thirds of the population do not have access to improved facilities (Uganda Bureau of Statistics and ICF International, Inc., 2012).

In a properly functioning Ecological Sanitation (Eco-San) system, odors and flies are minimized and groundwater is protected from pollution that could be caused by a deep pit (Esrey et al., 1998). Most of the systems currently being installed in Uganda utilize urine-diverting dry toilets (UDDTs), which create dry, high pH conditions through the addition of materials, such as wood ash or sawdust, that have desiccating and/or basic properties. The Ugandan government has stated, through the Ministry of Water and Environment, that its goal is to have Eco-San systems account for at least 15% of the country's total sanitation coverage by 2018 (Tumwebaze et al., 2011). However, the most recent estimates suggest that Eco-San systems are being used by less than 1% of Uganda's population (Uganda Bureau of Statistics and ICF International, Inc., 2012).

The sanitation situation in Rukungiri

Rukungiri Municipal Council is a quickly modernizing, yet haphazardly planned town of about 29,000 residents in the hills of Southwestern Uganda. The area is characterized in some places by high water tables and rocky soils, which make pit latrine construction less feasible. Moreover, the Municipal water system has been unable to provide a consistent supply, reportedly due to unproductive aquifers, making flush toilets undesirable. The town's residential areas are comprised mostly of brick and mortar houses. The fronts of these houses usually face a road, while the backs face one another, with an alley between them called a "Sanitary Lane" – what would likely be called a utility easement elsewhere. These alleys contain weeds, raw

sewage, and piles of garbage, including plastic bottles, which are often burned, releasing dangerous compounds into the air. There is little evidence of any official effort to maintain them.

Beginning in 2007, Municipal officials took note of the fact that developers had been building structures, mostly latrines, on these sanitary lanes. Having concluded that this practice presented a problem for future infrastructure development and emergency services, the Municipal Council started a campaign encouraging residents to dismantle the parts of their properties that infringed on public land, though many residents claim to have been completely unaware of this effort. In 2009, after two years of campaigning with few residents taking heed, the Municipal Council took action, demolishing any structure in the sanitary lane, beginning with those of the Mayor and a prominent MP to show that favoritism was not a factor in this venture. This move was not supported by the district health inspector, due to its haphazard and unplanned nature. His main concern was that residents were not sincerely engaged or thoroughly involved in the process.

Due primarily to space limitations and some knowledge of their benefits, many residents chose to have UDDTs built in place of their pit latrines. During discussions with the authors, these residents noted that public health officials provided little to no training regarding the correct construction or use of these facilities. In some cases, residents learned about proper use from outside institutions, but in others, they remained in the dark about the values of separating urine and feces in a UDDT.

Methodology

This study, conducted by the advisor of the North Kigezi and Kinkiizi Diocese Water and Sanitation Programme (NKKD WATSAN) with assistance from US Peace Corps Volunteers, sought to assess the quality and operation of UDDTs in Rukungiri Municipality, while also capturing the thoughts and perspectives of users. These objectives were achieved through a combination of home/institution visits, semi-structured interviews, and eyes-on assessment of the facilities. Three forms were created to assist with data collection: a toilet assessment datasheet, a semi-structured interview guide for users, and a second interview guide for municipal authorities.

Field visits began in January, 2013, on the edge of the “urbanized” higher-density central area of Rukungiri Municipality. The authors identified UDDTs as they moved behind buildings looking for access panels. Others were identified by neighbors with knowledge of facilities in the area. A total of eighteen UDDT sites (some with multiple units) were visited prior to the writing of this paper, though the study will be continued, so that a more complete picture of the situation in the municipality can be gained.

All field visits were conducted in person and took place with at least two of the authors present. After an explanation of the study, each field visit began with a semi-structured interview and general discussion of the UDDT, the users’ knowledge of it, and its operation. Each user then granted the authors permission to visit and photograph the UDDT. Upon visiting the facility, the authors would complete the datasheet, recording vital information about construction, operation, maintenance, and hygienic condition.

Interviews with municipal authorities were also conducted to better understand official policies that have affected the sanitation situation within the Municipality. These interviews were intended to gauge the level of involvement with respect to sanitation, as well as officials’ specific perspectives on UDDTs, their use, and their appropriateness. The hope was that this assessment of official engagement would provide a more complete picture of the larger situation and identify ways in which the Municipality might be able to more effectively promote safe sanitation practices.

Results and findings

Perhaps the most important finding thus far involves user knowledge. Most users reported that, when UDDTs were installed, they, their landlords, or the previous owners had been trained by builders, friends, family members, or, in rare cases, government officials. As shown in Table 1, while 78% of respondents confirmed that they had received initial instruction, only 28% reported that any follow-up visits had occurred. It seems that, while the Municipality was strongly encouraging the installation of UDDTs, the operational training that took place was limited. Any training that did occur appears to have been incomplete and usually did not include subsequent monitoring visits to provide further information. Many users are not fully aware of principles that impact the success of UDDTs, including the amount of desiccant to add and what to do with feces after emptying. Perhaps this finding is best illustrated by users’ uncertainty when asked to estimate the filling time of a collection chamber. In a double-vault toilet, where vaults are used in an alternating fashion, filling time should be roughly equal to storage time after closing a chamber. While the number of users affects filling time, it is important for these users to know that at least six months

of storage in dry, high pH conditions are needed to significantly reduce pathogen levels (Niwagaba and Asimwe, 2005). Other, more general issues were also observed, including an absence of hand-washing facilities near latrines and an apparent lack of child training on the proper use of UDDTs.

It is also important to note that a number of the identified UDDTs are used by renters. When the landlord constructed the toilet, it is likely that he or she may have received some training, but the future tenants would not have been included. As a result, several landlords remarked that tenants improperly use the facilities, while tenants noted that they had never received training. Perhaps, since the landlords chose and purchased the system, they feel a stronger sense of ownership, leading them to be proactive in learning about the technology and its effective operation.

Another significant challenge related to UDDT operation in Rukungiri involves the availability of wood ash. Many users understand that adding ash regularly is necessary to control odors and flies, and all respondents identified wood ash as their desiccant. However, it was observed that ash was present, either inside or near the toilet, in only half of the toilets, and users reported that it is often difficult to obtain an adequate supply. This issue has also been seen in other areas of Uganda (Kaggwa et al., 2003). As an alternative, wood ash could be mixed with other absorbent materials, such as sawdust or dry soil (Esrey et al., 1998), reducing the required amount of ash.

Survey Question	Count	Percentage
Initial User Training		
Yes	14	78%
No	1	6%
Unsure	3	17%
Follow Up Visits		
Yes	5	28%
No	11	61%
Unsure	2	11%
Time for Collection Chamber to Fill		
Six months	2	11%
One year	1	6%
Two years	2	11%
Less than one week	2	11%
Unsure	11	61%
Urine Disposal Method		
Diverted to soak pit	13	72%
Used as fertilizer	2	11%
Unsure	3	17%
Feces Disposal Method		
Buried	11	61%
Used as fertilizer	1	6%
Buried, then used as fertilizer	1	6%
Unsure	5	28%
Initial User Training		
Yes	14	78%
No	1	6%

A final issue that has been identified through these surveys involves emptying of stored feces and the use or disposal of urine and fecal products. Especially in the context of Rukungiri Municipality's increasingly limited space, simply digging holes and burying the products is not an appropriate, long-term solution. However, burying feces in a nearby location is the most common method of use or disposal among respondents, and a similar trend was found for the use or disposal of urine, which is usually diverted into a soak pit. As already discussed, it seems that education regarding these topics has been minimal, and, unfortunately, a number of users commented that they simply do not know what they are supposed to do with the feces. In fact, one respondent explicitly stated that the Municipality did not educate Eco-San users

on how or where to dispose of the products. Of course, this situation has the potential to create a significant health hazard as chambers fill up and users are unsure of what to do with the products.

Recommendations

Educating stakeholders

More sensitization, utilizing places of worship, schools, and community groups to advertise educational programs that target existing UDDT users, is necessary. Programs could be conducted at the North Kigezi and Kinkiizi Diocese Water and Sanitation Programme office, which contains a well-maintained demonstration unit. It would be advantageous for the Municipality and District to be involved and to organize other outreach efforts. At least at local businesses and institutions, the Municipality should conduct annual or biannual inspections of UDDTs, which would include opportunities for personalized education and instruction. An incentive system that encourages landlords to maintain their toilets and sensitize their tenants could also be beneficial.

Managing guests

To address the problem of careless guests, especially men, misusing the facilities, urinals can be installed, especially in those toilets connected to bars, hotels, or similar establishments. A rock-filled soak pit next to the toilet could serve as a urinal, or a separate, standing unit could be installed inside the facility. The Municipality should also distribute low-cost signs containing the basic information needed to properly use a UDDT, written in the local language and shown pictorially. With these signs displayed in each facility, guests could understand the necessary operational points in a few seconds, and landlords could use them as visual tools when sensitizing their tenants.

Addressing construction issues

The Municipality should sensitize builders on the importance of installing durable metal panels that are painted black, since these effectively absorb heat from the sun and raise the temperature of the feces, thereby contributing to the dehydration process (Esrey et al., 1998). To encourage standardization and provide a measure of quality control, the Municipality should create a written set of specifications and guidelines for the construction of UDDTs. Considering that construction cost is often an important factor in implementation (Tumwebaze et al., 2011), perhaps builders could be shown a few different designs, some of which would incorporate inexpensive, local materials, such as timber, grass thatch, or plastic bottles, as part of the superstructure or as a replacement for the relatively expensive, yet commonly used, pre-fabricated urine diversion pans.

Prospects for future private enterprise

The town should look into the possibility of desiccant sales to address the issue of wood ash availability. Anecdotal evidence suggests that local bakeries, which use large amounts of firewood, are willing to sell ash to institutions. Carpenters and lumber yards around Rukungiri Town, with their abundance of sawdust, might also profit from such a demand for desiccant. The Municipal Council should consider awareness campaigns to connect users with these businesses. If the scale of the demand is realized, potential markets may exist for desiccant delivery services and vault emptying services, which could transport products out of town for burial or further processing. It seems that, by providing builders with better marketing strategies to reflect users' perceived benefits, which include space maximization, odor and fly reduction, and child safety, due to the reduced chance of falling into the hole, demand for UDDTs could increase. This rise in demand would correspond to a higher need for desiccants and emptying services, which would help to provide a firm foundation for these related businesses.

Conclusions

Despite the issues that have been identified, many residents believe that UDDTs are a good option for Rukungiri Municipality. Due to limited space, rocky soils, and a high water table, pit latrines are not appropriate in many locations within the Municipality, and, given the area's limited water supply, flush toilets are also unsuitable. UDDTs do not face these problems, and, when well-maintained, they provide users with a pleasant, odorless environment that is not infested with flies. Of course, to realize these benefits, users must understand the principles behind the technology and recognize the connections between

proper operation and conditions within the facility. Even with limited sensitization and training, many users are attempting to operate these toilets to the best of their ability, and some residents have been quite successful. Future efforts to provide more complete knowledge of UDDT systems, to ensure quality of construction, and to work with users to address operational issues could lead to increased safety, better understanding, and more widespread implementation of this technology, both within Rukungiri Municipality and throughout Uganda.

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Notes

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