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**Ecological sanitation uptake, knowledge, beliefs and
practices in Kabale Municipality, Kabale District**

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Ecological sanitation is a promising novel innovation being promoted in many developing countries to boost sanitation coverage. This paper aims to share findings from a cross sectional study to assess ecological sanitation uptake, knowledge, beliefs and practices in Kabale Municipality, Uganda. A total of 806 respondents were interviewed, randomly selected from 32 of 77 (42%) villages in Kabale municipality. We held 6 focus group discussions and 10 key informant interviews. Ecosan coverage was found to be 20% (163/806) and 82% of the respondents knowledgeable. Factors reported for the uptake included education, occupation, religion, age, promotion methods, positive beliefs and the geological formation of the municipality.

Introduction

Ecological sanitation (Ecosan) is a closed-loop system, in which human excreta is considered a resource (Esrey et al., 1991). It has been found to be an alternative innovative approach of boosting sanitation coverage in areas where conventional systems such as ventilated Improved Pit latrines or traditional pit latrines are not possible. Ecosan toilets enhance improved sanitation and living in a clean environment as human excreta which is the most hazardous and pathogenic is sanitized before being released to the environment (Austin and Vuuren, 2001, UNESCO, 2006, Redlinger et al., 2001).

In Uganda, Ecosan innovations have been being piloted in different parts of the country since 1997. The different agencies that are involved in promoting this approach include Ministry of Water and Environment (MoWE), Ministry of Health through the Environmental Health Division (MoH), Ministry of Education and Sports, Directorate of Water and Development (MoES), NGOs, Donor Agencies and through Public-private sector partnerships (PPP), among others. The overall objective of ecological sanitation in Uganda is to improve the living conditions in Uganda by ensuring better sanitation practices, personnel hygiene and food security through better management of human excrements.

The 10 year national strategy on ecological sanitation aims at achieving at least 15 % of the total sanitation coverage to be Ecosan in Uganda by 2018 (WSP 2008). However, though ecosan promotion and implementation has been going on in Uganda since 1997, its uptake, knowledge, beliefs and practices have not been well documented especially in urban growth centres. Some of the previous Ecosan studies in Uganda have concentrated on ecosan as a water and conservation concept (Kakooza, Kyayangayanga et al. 2007), community responses towards ecosan (Nekesa 2007), do's and don'ts in the implementation of ecosan in Uganda (Niwagaba and Asiimwe 2005), as well as technological sanitation designs and factors that influence household choice of sanitation technologies and excreta use (Nuwagaba 2003). The aim of this study was therefore to assess the uptake of Ecosan, knowledge, beliefs and practices in Kabale Municipality which is a town.

Methodology

This research was a cross-sectional study conducted in three divisions of Kabale Municipality. Both quantitative and qualitative data was collected using tools such as questionnaires, topic and interview guides and observations. Kabale district is located in South western part of Uganda. The largest area of the district

and the Municipality inclusive is mountainous with rocky terrain and the low lands having flooding problems which make the construction of conventional systems like pit latrines difficult. All households (inclusive of institutions, public places and markets) or next in-charge living in Kabale municipality available at home, institution, public or market facilities between January 2009 to March 2009 who gave informed consent to participate in the study.

The sample size was calculated using Kish Leslie formulae for the uptake ($N = [Z^2 \times p(1-p) / e^2] \times d$). The proportion of 0.5 was used to estimate the required sample size since was not able to find viable scientific studies on the uptake of Ecosan. Thus, 806 household respondents were sampled. The selection of the study respondents was from the three divisions in the Municipality. Multi-stage sampling was used at wards (Parishes) and village levels. Eight (8) wards were selected from the 12 wards in Kabale Municipality. Thirty two (32) villages out of 77 were sampled from the eight wards and 25 household respondents interviewed from each village. Household respondents enrolled were based on the interval of 10 households starting from the centre of the village with the guidance of the local council chair persons and first household selected randomly.

Purposive sampling method was used for qualitative data to select participants for focus group discussions and Key Informant Interviews. Six (6) focus group discussions (3 meetings consisting only females and three FGD meetings consisting only males) were held in the three divisions of the Municipality (Central, Northern and Southern). Each group consisted of six respondents who had not been sampled for household questionnaires. Two note takers and a moderator (Principal investigator) were used to enlist and capture the required responses from the respondents. Ten (10) key informant interviews were conducted. These consisted of three (3) division sub county chiefs and three (3) community development officers from the Municipality, Public Health Inspector, Former Ecological sanitation project coordinator for Southwestern water and sanitation project, Mid southwestern manager for Umbrella organization for water and sanitation and Municipality Public health specialist. Data was collected by the principal investigator with the help of trained research assistants.

Data collected was regularly checked for completeness, correctness, and cleaned, edited, coded and entered into double entered into Epi-Data and back ups done. The data was later exported it to STATA version 9 for analysis.

Results

There were 806 respondents, with 401 males (49.7%) and 405 (50.3%) females. The median age of the respondents was 37 years (19 to 80 yrs). The respondents with secondary education were 284 (35.2%), while those with tertiary education were 259 (32.1 %). The majority of the respondents were married (n=645, 80%), farmers (n=262, 32.5%), in business (n=254, 31.5%), or salaried/civil servants (n=205, 25.4%). The estimated median income of the respondents was Uganda Shillings 100,000 per month (5000 to 800,000 Uganda Shillings per month).

The overall prevalence of Ecosan uptake was 20 % (n=163, 95% CI 17.5 to 23.2). Ecological sanitation coverage was higher among female respondents (13%, n=91), catholics (11.7%, n=94), married (18%, n=145), those with tertiary education (12.4% n=100), salaried / civil servants (10.7%, n=86) and among respondents earning more than Uganda Shillings 100,000 per month (13.4%, n=108).

The majority of the respondents (n=661, 82%) were knowledgeable about Ecosan and 482 (59.8%) were positive about using Ecosan facilities. Communication channels from where respondents used to get information on ecological sanitation included; radios (n=351, 53.1%), friends and neighbours (n=318, 48.1%), water and sanitation meetings (n=160, 24.2%), South-Western Towns Water and Sanitation Project (n=140, 21.2%), churches (n=82, 12.4%) and masons (n=63, 9.5%). Independent variables significantly associated with uptake and utilization of Ecosan at bi-variate analysis were tertiary education, being employed, incomes more than Uganda Shillings 50,000 per month, respondents aged 30 years and above, respondents knowledgeable on Ecosan, respondents with positive opinion and those in areas with a high water table. Variables that were significant at multivariate level were education (secondary and tertiary), occupation (peasants, business, and salaried/ civil servant), religion (Muslims), and age of the respondents (age categories 30-39, 40-49 and 50 years and above).

Most of the respondents in focus group discussions and key informant interviews reported to have knowledge on Ecosan toilets. Sources of information mentioned were from friends and people having Ecosan toilets, water and sanitation meetings and through the radio. Most of the respondents had no beliefs affecting construction and use of Ecosan. One of the key informant respondents, the former coordinator of

South-Western Towns Water and Sanitation Project (SWTWS) mentioned that initially, some people had fears over the use of ash to cover faeces that it would make their anus swell, and the other that faeces left near the surface could be used for witchcraft. She added that since urine was already known as a remedy for sore eyes, banana weevil and drunkenness, it was quite easy to dispel the fears with increased sensitization promotion. Some respondents reported to use the sanitized faeces as soil conditioner and urine as fertilizer and for their plants. Some of the respondents who were aware of Ecosan toilets reported not having them because they were expensive to build. However, some responded that they were much cheaper if built with local materials as opposed to using bricks and cement. Ecological sanitation toilets were also reported not to be preferred by Muslims because their designs had no provision for cleansing.

Discussion

Ecological sanitation is one of the innovative interventions being promoted to scale up sanitation coverage in Uganda. Our study showed that there is a relatively high Ecosan coverage of 20.2% in Kabale Municipality although it is a relatively new sanitation concept in Uganda. The findings correspond with those from a study in Nepal that reported large numbers of Ecosan toilets in use (UNICEF and WHO 2009). This is a positive trend and an impetus to the government that is focusing on having Ecosan promotion scaled up in the whole country to coverage by Ecosan of 15% by 2018.

The relatively high Ecosan coverage in Kabale municipality is due to the difficult geo-physical terrain for example rocky and the high water table, which do not favour other conventional toilet systems like the traditional and VIP latrines. In addition, most of the respondents mentioned being unable to afford having flushing toilets in their homes as they live in semi-permanent houses and have inadequate incomes. Our findings are consistent with those of a study that was conducted looking at norms and attitudes towards Ecosan and other sanitation systems in six peri-urban settlements, that is, Kabale (Uganda), Manyatta (Kenya), Majumba Sita (Tanzania), Addis Ababa (Ethiopia), Cuernavaca (Mexico) and Stockholm (Sweden) (Drangert 2004).

In addition, the majority of the respondents (82%) were having some knowledge about Ecosan through the massive communication channels that were used to promote and disseminate information during promotion. The organization responsible for the promotion was the South-Western Towns Water and Sanitation project. The communication channels used to promote Ecosan were radios, community meetings, churches, use of trained masons, community learning and exchange visits to the households that had constructed Ecosan facilities. Other respondents reported that they had learnt about Ecosan from neighbours and friends. Radios were the most effective channel of communication followed by learning about Ecosan facilities from friends and neighbours.

In our study, some of the respondents who were knowledgeable about Ecosan toilets did not have them because they were considered expensive to build, ranging between Uganda Shillings 500,000 (US \$244) to 1,500,000 (US \$731). However, some members in the focus group discussions reported using local materials like mud and wattle to construct Ecosan toilets which cost them about Uganda Shillings 200,000 only, compared to using bricks and cement that are too expensive. Our findings echo those of a study in Kasange sub-county in Wakiso district in Uganda, where cheaper designs of Ecosan facilities were used and were viewed by low income households as being affordable and comfortable due to the absence of smell and flies (Nekesa 2007). This is in agreement with a study carried out on households' choice for sanitation technologies and excreta re-use that found that poverty was the main barrier to Ecosan adoption (Nuwagaba 2003). A study in Honduras also found a close linkage between poverty and access to basic sanitation (WSP 2008). However, this contrasts with a study conducted in Pakistan on cultural preferences in designing ecological sanitation systems in North West Frontier Province, and found out that Ecosan toilets were preferred by the local residents felt that open defecation was a sign of poverty, underdevelopment and low social status (Nawab, Nyborg et al. 2006).

The implications of the findings are the need for Government of Uganda (GOU) to explore low-cost Ecosan toilet designs that use locally available and affordable materials. The Government of Uganda through the Ministry of Water and Environment estimates the number of Ecosan facilities in the country to be over 8000 (3000 built by GOU and 5000 privately built) (Oketch 2009). By 2018, the Government of Uganda targets to have the quality of life in Uganda improved as water resources and human health are protected by safe excreta management through sustainable Ecosan systems. At least 15% of all existing sanitation facilities in Uganda should be Ecosan by 2018 (WSP 2008). Uganda, like other countries committed to the United Nations decade aims to achieve sanitation targets of the Millennium Development

Goals of halving the proportion of people without basic sanitation by 2015 (UN 2008). However, there a number of barriers to scaling up Ecosan facilities in Uganda as demonstrated in our study.

The study findings show that respondents with tertiary and secondary education were 2 to 5 times more likely to have Ecosan facilities than respondents with primary education. This finding corresponds with the findings of Nuwagaba (2003) looking at the assessment of factors that influence household's choice of sanitation technologies and excreta use where it was found that Ecosan coverage was high among people with tertiary education (13%) and less with primary education level (0.4%) (Nuwagaba 2003).

According to the study findings, employed respondents were 2 to 5 times more likely to have Ecosan facilities than the unemployed. People who are employed are able to raise the money to build Ecosan toilets than people who are not employed. In addition, farmers may prefer to build Ecosan toilets because of its value in promoting agricultural production. Participants in the Focus Group Discussions (FGDs) were divided with some reporting that Ecosan toilets were expensive to build and were for the rich, while others reported that Ecosan toilets could be affordable if one used locally available materials like mud and wattle for building. It is difficult to separate occupation and income since the type of job one holds influences the level of income the household has and therefore the capacity to build Ecosan toilets.

The study found that respondents with higher incomes were more likely to have Ecosan toilets. These findings correspond to the findings by Nuwagaba (2003) on the factors that influenced household's choice of sanitation technologies and excreta re-use where he found that respondents with incomes of more than 100,000 Uganda Shillings had high Ecosan coverage (20%) compared to respondents with lower incomes (Nuwagaba 2003).

Study findings showed that muslims were ten times less likely to build Ecosan toilets compared to respondents of other religious dominations. During household and focus group interviews, respondents reported that Ecosan toilets do not favour Muslims because they use water to cleanse themselves yet Ecosan toilets require no mixing of faeces with water. Our findings are agreement with the findings from a study conducted in Pakistan on cultural preferences in designing Ecosan systems where it was found that in most Muslim cultures, sanitation without water was not easily welcomed. Water based sanitation was preferred to minimize contact with faeces and urine which were taken to be impure in the Muslim culture (Nawab, Nyborg et al. 2006). The implication of our findings is the need to explore alternative designs that would suit the Muslim communities.

Majority of the respondents (90%) reported that being in a modern world; they had no beliefs that would affect the use of Ecosan toilets. One key informant who is the former project coordination of SWTWS project in Kabale mentioned that some members of the community had fears in the early stages of Ecosan promotion, where it was believed that when ash is applied to the faeces as a cover material it would make the anus swell, and that faeces left near the surface could be used for witchcraft. The key informant further pointed out that urine was already known as a remedy to cure sore eyes and drunkenness and to kill banana weevils, concluding that it was easy to dispel the fears with increased sensitization. In most societies, the negative attitudes of individuals and cultures have been barriers to the use of Ecosan toilets (Nawab, Nyborg et al. 2006).

The high water table and rocky grounds in Kabale Municipality were found significantly associated with uptake of Ecosan. Ecosan toilets are economical on space because they are long lasting and produce sanitised faeces as soil conditioner and urine as fertilizers respectively. Similar factors as those pointed out above have been found to influence Ecosan uptake in other studies (Nuwagaba 2003; Drangert 2004; Niwagaba and Asiimwe 2005). The availability of trained masons to construct Ecosan toilets for the community members and the cost of construction of Ecosan were other factors mentioned that influence Ecosan coverage in Kabale Municipality. Furthermore respondents mentioned that during the start of Ecosan promotion in Kabale, some masons were trained on how to build them and some learnt from their friends.

The sample size was representative of the population in the three divisions that constitute the Municipality. Thus the findings represent the true coverage of ecological sanitation in the Municipality.

Secondly, results from our study provide important baseline data of ecological sanitation coverage especially as the government is increasing promotion of ecological sanitation in Kabale district and the country as a whole. During the research study, we were not able to find updated records of ecological sanitation coverage. Thus, findings from our study could be used to develop tailored Ecosan promotion programs for other districts and country as a whole. A country wide study to establish the national ecological sanitation coverage is necessary to govern and guide the implementation of ecological sanitation strategy.

Conclusions

The study showed a relatively high prevalence of Ecosan uptake in Kabale Municipality when compared to the projected national target of Ecosan access (15 %) to be achieved by 2018. Ecosan contributed about a quarter of the total sanitation coverage and more than a half of the sanitation facilities were traditional pit latrines. Ecosan coverage was associated with education, occupation, religion, age of the respondents and income, awareness, positive beliefs and geographical terrain of the Municipality.

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