

Prevalence of ecological sanitation uptake and associated factors in Kabale Municipality, Kabale District, Uganda

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ABSTRACT

Introduction: Ecological sanitation is a promising novel sanitation approach being promoted in many countries to boost sanitation coverage. Due to inadequate studies and data on uptake levels, we conducted a study to assess the prevalence of ecological sanitation uptake and associated factors in Kabale Municipality, Uganda.

Methods: A cross-sectional study was conducted in Kabale Municipality from January to March 2009. A total of 806 households were interviewed. Data was entered in Epi-data and exported to Stata for analysis. Associations were identified using chi-square and statistical significance determined using 95% Confidence Interval and P-values. Odds Ratios were used as the measure of association.

Results: A total of 163 (20.2%) of 806 households were found to have ecological sanitation toilets. 82% (661) of the respondents were knowledgeable about ecological sanitation. Tertiary education, age groups of the respondents of 40 – 49 and those above 50 years and respondents with income above \$45 were significantly associated with ecological sanitation uptake.

Conclusion: Our study showed a feasible increase in the uptake of ecological sanitation in Kabale Municipality, Uganda. However, there is need for more promotion of low cost ecological sanitation designs, continued massive awareness creations and regular data capture on ecological sanitation communities uptake.

Key words: Ecological sanitation, Uganda, Uptake

Introduction

Poor sanitation and hygiene still remain global challenges to good health, environmental sustainability and poverty eradication especially in developing countries (WHO 2001). Around 2.6 billion people in the world have no access to toilet facilities (WHO 2006), of which 75% live in Asia, 18% in Africa and 5% in Latin America and the Caribbean (SIWI 2005). The MDG 7 on ensuring environmental sustainability aims at halving the proportion of people without access to basic sanitation and safe drinking water by 2015 (WHO and UNICEF 2006). To improve basic sanitation, it was eminent to invent sustainable innovative technological options such as ecological sanitation to achieve the Millennium Development Goal (UNESCO 2006).

Ecological Sanitation is a closed-loop system, which treats human excreta as a resource (Esrey, Gough et al. 1998),(EcoSanRes 2008). Using this approach, faecal materials are separated from urine, and then the excreta are processed locally on site until they are free of pathogens (Drangert 2001). By people taking up this technological option, it not only improves environmental sanitation but also ensures food security by boosting agricultural production from the recycled sanitized human excreta and urine as soil fertilizers (Esrey 2000). Since then, there have been increasing interests in ecological sanitation technologies in most developing countries to scale up sanitation and reduce sanitation related diseases(Windberg 2009).

Though there are increasing interests in ecological sanitation as a remedy to sanitation problems, socio-demographic, individual, service related and geo-demographic factors have affected their uptake. In Uganda, ecological sanitation promotion started in 1997 by the Directorate of Water for Development under the ministry of health. 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). No prior studies have however been conducted to quantify the uptake. This research was therefore conducted to determine the prevalence of ecological sanitation uptake and associated factors in Kabale Municipality, Uganda

Methods

This was a cross-sectional study conducted in Kabale Municipality, Kabale district, Uganda between January to March 2009. Both qualitative and quantitative data collection methods were used. The district has a rocky terrain, high water table in the low laying areas and floods in rainy season which makes construction of conventional sanitation systems like pit latrines difficult.

All household heads or next in-charge and institutions living in Kabale municipality, available during the study period and gave informed consent to participate in the study were included. The sample size was estimated using modified Kish Leslie (1965) formula: $Sample\ size\ N = Z^2 \times p(1-p) \times D/E^2$
Where; Z = Standard normal value at 95% level of significance, D = Design effect. Design effect of 2 used, E = Acceptable error (0.05) used to cater for the variation between the clusters (WHO 2001)., P = proportion of people with ecological sanitation facilities (50%) (WHO 2001). Thus a total of 806 participants were interviewed during this study.

The study employed multi-stage cluster sampling at ward and village levels. Eight (8) wards were selected from the 12 wards in the municipality. Thirty two (32) villages were sampled from 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.

Independent variables such as Socio-demographic factors (such as Age, sex, region, number of household, education level, occupation, income), individual (knowledge, attitude and perceptions about ecological sanitation), service related (availability of trained constructors, cost of construction of the toilet) and Geo-environmental factors such as rocky grounds, high water table and sandy soils were analyzed. Uptake of ecological sanitation was defined as households having and using ecological sanitation toilets. Data was collected by the principal investigator with the help of

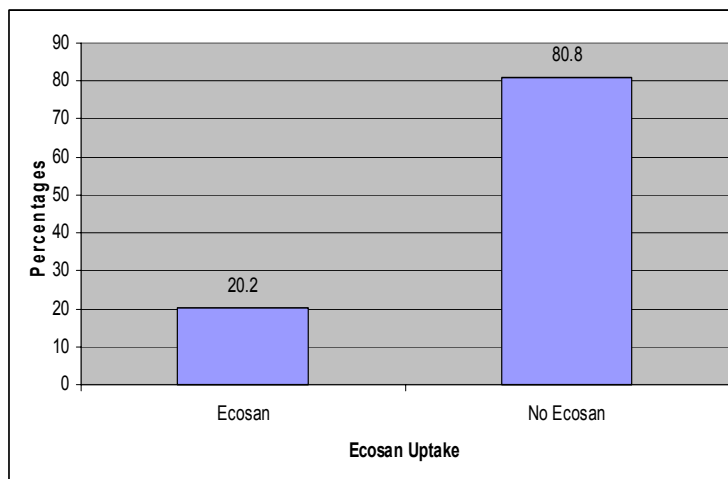
trained research assistants and tools pre-tested prior to data collection. Data was then entered into Epi-Data and exported to stata for analysis.

Continuous variables such as age and income were summarized using medians; range and histogram, while categorical variables were summarized into frequencies, percentages, proportions, pie-charts and bar graphs. Ecosan uptake was obtained by calculating the percentage of households with ecological sanitation toilets over the number of respondents interviewed. Chi-square tests were used as a measure of association between uptake of ecological sanitation and the predictors and odds ratios and confidence intervals (95% CI) reported. A p-value of 0.05 was used for statistical significance. Independent variables with p-values ≤ 0.2 were considered for multivariate analysis to assess for interaction, confounding and identifying significant independent variables associated with uptake of ecological sanitation.

Results and Discussion

A total of 806 household respondents living in Kabale Municipality were sampled and interviewed on the Prevalence of ecological sanitation uptake.

Figure 1: Uptake of ecological sanitation in Kabale Municipality, Kabale District

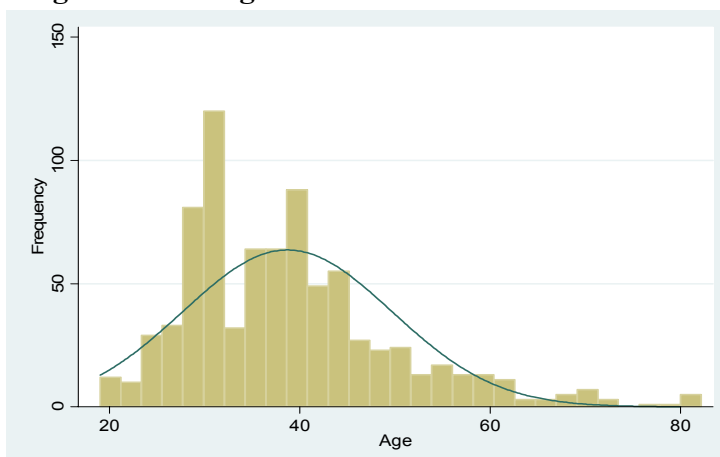


The overall prevalence of ecological prevalence of ecological sanitation uptake was 20.2% (163/806) with the confidence interval of 17.5 to 23.2. This Prevalence was four times lower than for those with other sanitation facilities.

The highest level of education attained by the respondents in the

Municipality was 35.2% (284) for secondary education and 32.1% (259) for Tertiary education. Most of the respondents in this study were married with the highest frequency distribution of 645 (80%) and the majority of the respondents were peasants (262), followed by Business with (254) and Salaried / Civil servants 205 and unemployment accounted for 10.6% (85). There was gender balance in the representation of males and females (Males = 49.7%, Females = 50.3%), 50.4% (406) of the respondents mentioned rocky terrain as the main influencing factor for ecological sanitation, followed by advantages fertilizers 20.8% (168).

Figure 2: Age distribution of 806 households' respondents in Kabale Municipality, Kabale District



The median age of the respondents at 50th percentile was 37 years with the minimum age being 19

years and maximum 80 years. The monthly estimated median income of the respondents was US \$45 with the minimum being \$2 and maximum \$359.

Specifically, the prevalence of ecological sanitation uptake was high among females (13% / 91), Catholics (11.7% / 94), married (18% / 145), those with tertiary education (12.4% / 100), salaried / civil servants (10.7% / 86) and those earning more than UGX 100,000 (13.4 / 108)

Table 1: Prevalence of ecological sanitation uptake based on socio-demographic variables in Kabale Municipality, Kabale District

Variable	Ecosan prevalence (%), n= no. with ecosan	95% Confidence Interval	Variable	Ecosan prevalence (%), n= no. with ecosan	95% Confidence Interval
Over all	163 (20.2)	17.5 - 23.2			
Sex					
Females	11.3 (91)	9.2 – 13.7			
Males	8.9 (72)	7.1 – 11.1			
Education			Occupation		
None	0.4 (3)	0.0 - 1.0	Peasants / Farmer	4.2 (34)	2.9 – 5.8
Primary	2.2 (18)	1.3 - 3.5	Business	5.0 (40)	3.6 – 6.7
Secondary	5.2 (42)	3.7 - 7.0	Salaried/ civil servants	10.7 (86)	8.6 – 13.0
Tertiary	12.4 (100)	10.2 - 14.9	Unemployed	0.4 (3)	0.0 – 1.0
Religion			Age grouped		
Catholics	11.7 (94)	9.5 – 14.1	19 – 29	2.4 (19)	1.4 – 3.7
Protestants	8.2 (66)	6.4 – 10.3	30 – 39	8.4 (120)	12.5 - 17.5
Moslems	0.1 (1)	0.0 - 0.7	40 – 49	6.5 (20)	1.5 – 3.8
Others	0.2 (2)	0.0 - 0.9	50 and Above	3.0 (4)	0.1 – 1.3
Marital Status			Income grouped		
Married	18.0 (145)	15.4 - 20.8	Less than US \$22	2.9 (23)	1.8 – 4.3
Single	10.0 (8)	0.4 - 1.9	\$22 – 45	3.6 (29)	2.9 – 5.4
Widowed	0.4 (3)	0.0 - 1.0	> \$45	13.4 (108)	11.1 - 15.9
Separated/Divorced	0.9 (7)	0.3 - 1.8			

Significant factors associated with uptake of ecological sanitation toilets at bivariate level of analysis included Tertiary education (OR 0.1, 95% CI 0.03 – 0.32), Employed civil servants or salaried employees (OR 0.05, 95% CI 0.0 – 0.17), income more than US \$45 (OR 0.23, 95% CI 0.12 – 0.38) and respondents with in the age category 40 – 49 years (OR 0.4, 95% CI 0.22 – 0.70), beliefs systems (OR 1.95, 95% CI 1.37 – 2.78), Fair Opinion on ecosan (OR 4.64, 95% CI 2.49 – 8.65), dislikes for ecosan (OR 2.27, 95% CI 1.59 – 3.25) and areas with high water table as a prompting factor to ecological sanitation uptake (OR 0.46, 95% CI 0.29 – 0.72) .

Ecological sanitation promotion in the country is one of the innovative interventions being promoted to scale up sanitation coverage in the country (WSP 2008). In our

study, it showed that there is increasing uptake of ecological sanitation in Kabale Municipality (20.2%) compared to when the technological option had just started in Uganda. This means that two out of every ten (10) households have an ecological sanitation toilet. 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 ecological sanitation systems. At least 15% of all existing sanitation facilities should be ecosan (WSP 2008). The government of Uganda through the Ministry of Water and Environment estimate the number of ecological sanitation facilities in the country to be over 8000 (3000 built by the government and 5000 privately built) (Oketch 2009). The prevalence found in our study is similar to WHO Environmental Update Report on the expanding numbers of ecological sanitation toilets in Siddipur village in Nepal which is over hundred and over thousand toilets in Nepal as a whole (WHO 2009).

The increasing prevalence could be due to the fact that Kabale district was one of the pioneer districts where ecological sanitation toilets started. The difficult geo-physical terrain and high water table areas favor ecological sanitation as opposed to the conventional sanitation systems. Further still, majority of people are knowledgeable about ecological sanitation and its importance as was reported during the focus group discussions. Massive communication channels were used by the Southern Western Water and Sanitation Project to disseminate information on ecological sanitation. Some of the sources mentioned during focus group discussions include; radios, community meetings, churches, use of trained masons and others learning from neighbors and friends. However, the various factors associated with ecological sanitation uptake that were found significant at multivariate level of analysis included education level, age of respondents, income, individual and religious perceptions.

Table 2: Multivariate Analysis of factors associated with ecological sanitation uptake in Kabale Municipality, Kabale District

Variables	Odds Ratio	95% CI	P-Value
Education			
None	1		
Primary	0.5	0.93 - 2.70	0.42
Secondary	0.34	0.07 - 1.80	0.21
Tertiary	0.2	0.04 - 1.06	0.05
Age grouped			
19 – 29	1		
30 – 39	0.6	0.30 - 2.71	0.15
40 – 49	0.36	0.18 - 0.76	0.01
50 and Above	0.37	0.16 - 0.88	0.03
Income			
Less than US \$22	1		
\$22 – 45	0.67	0.33 - 1.33	0.25
> \$45	0.42	0.22 - 0.79	0.01
Religious leaders view of Ecosan			
Do not Know	1		
Recommend them	3.97	1.37 - 11.56	0.01
Not concerned	13.09	1.90 - 90.23	0.01
Used Ecological sanitation			

No			
Yes	223.8	31.14-1608.29	<0.001

- Education

From the study findings, there is a protective association between ecological sanitation uptake and education level. At tertiary level of education (OR = 1) households were more likely to take up ecological sanitation facilities when compared to households with no education (OR = 0.5, 95% CI = 0.93 – 2.70). This trend shows that the higher the level of education, the greater likelihood households are to take up ecological sanitation toilets. This could be that with increased level of education, the cultural bond of negative attitudes towards urine and excreta is loosened. This is evidently explained too by the high prevalence of ecological sanitation uptake from this study (12.4%, 95% confidence interval of 0.10 – 0.02) among the households with tertiary education level. In a study that was conducted by Nuwagaba (2003), looking at the assessment of factors that influence household's choice of sanitation technologies and excreta, it was found that ecosan prevalence was high among people with tertiary education (13%) and less with primary education level (0.4%) (Nuwagaba 2003).

- Age of respondents

The household respondents in the age groups of 40 to 49 years and 50 years and above were more likely to take up ecological sanitation than those in the age category 30 to 39 years (Odds ratios are 0.36 and 0.37 respectively). This is probably because most household heads in these age groups are engaged in farming and realize the need for use of urine and sanitized excreta for their gardens as fertilizers to boost their harvests. The youth age group probably more engaged in seeking for greener pastures. The trend in change of attitude is also more growing among the young than in the adults.

- Income of the respondents

From the study findings, income of the respondents is directly associated with ecological sanitation uptake in Kabale Municipality. Households with members with incomes more than US \$45 were less likely not to have ecological sanitation (OR = 0.42, CI = 0.22 – 0.79) than those with incomes less than \$45. This explains why ecological sanitation toilets were mentioned by respondents interviewed. Most said the cost of construction ranges from \$224 to \$673. To them, “ecological sanitation toilets are known to be for the rich who can afford to build them”. Thus the higher the disposable income one has, the more likely this person is to build an ecological sanitation toilet.

- Religious leaders' perceptions on ecological sanitation

Household participants who mentioned that religious leaders were not concerned about ecological sanitation were thirteen times (OR = 13.09, CI= 1.90 – 90.23) more likely to have ecological sanitation facilities. Those who mentioned that ecological sanitation was recommended by religious leaders were three times more likely to have ecological sanitation facilities too than those who never knew their view. During promotion of ecological sanitation promotion in Kabale, some churches and religious leaders were used in its marketing. Thus some people were motivated to construct them because they were being backed by religious leaders and some churches were ahead to build them too.

- Ever Used Ecosan

Household respondents who had ever used ecological sanitation facilities were more likely to have them than those who had never heard, seen or even used them. This could be that they get to know about them and how to use them compared to those

who have not yet been exposed to them. In addition, the more they get to use them, the more the diminishing bad attitudes towards them.

- **Opinion on ecological sanitation**

Household respondents who viewed ecological sanitation facilities as fair were four times more likely to have ecological sanitation than those who mentioned they did not know. This was because they had never heard about them, seen or used them.

Study limitations

There are no previous studies both nationally and internationally that have specifically looked at ecosan uptake in different countries where it is being promoted. These would have been good for comparison purposes on the trend of uptake.

Secondly, some of the research assistants used had never seen or used ecological sanitation toilets which were likely to bias the respondents if the study was not well described to them. However, these were overcome by training the research assistants prior to data collection and even take them for an onsite visit to an ecosan toilet facility under use.

Conclusion

In conclusion, our study showed that there is a feasible increase in the uptake of ecological sanitation in Kabale municipality, Uganda. However, governments and development partners should promote low cost effective ecological sanitation designs suitable to target populations, continue massive sensitizations and awareness campaigns, disaggregating toilet coverage data including that of ecological sanitation toilets to inform the ecological sanitation strategy on the performance and contribution to the general sanitation coverage in the country and need for wider research studies to address issues of uptake and low cost construction designs suitable to the settings of local communities.

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