

FACTORS ASSOCIATED WITH SANITATION PRACTICES AND USE OF SANITATION
TECHNOLOGIES IN KYARUMBA SUB COUNTY, KASESE DISTRICT

Harriet Masika*, Dr. Adalbert Aine-Omucunguzi
The Directorate of Graduate Studies and Research, Mountains of the Moon University

Abstract

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Access to improved sanitation is fundamental to health and the prevention of many diseases worldwide. The study aims to assess the factors influencing the adopting of sanitation practices and technologies.

Methodology

The study was a descriptive survey in which quantitative data was collected. Data was coded, entered, and analyzed using Statistical Package for Social Scientists (SPSS) and Stata computer software.

Results

The level of education attained by most respondents was primary education (51.2%), and most households (48.3%) had 5- 7 persons. Sex had a negative coefficient (0.547) and was significant at a 1 percent probability level. This implies that one's sex influences one to adopt sanitation innovations. Household size also had a negative coefficient (-0.367) and was significant at a 1% probability level. The occupation had a negative coefficient (-0.367) and was significant at a 1% probability level. Results of logit regression showed that factors such as age (0.069), marital status (0.026), level of education (0.531), and access to information (0.681) had positive coefficients and were significant at a 1% level of probability.

Conclusion

The combined influence of variables such as age, marital status, level of education, and access to information has made positive and significant contributions to the adoption of sanitation practices and technologies, Sex of household members, household size and occupation had negatively and significantly constrained uptake of sanitation technologies and practices at 1% level of probability.

Recommendations

Kasese District Local Government and Kyarumba Sub County Council should establish bylaws to enforce compulsory adoption of sanitation technologies and practices by households.

Keywords: Adoption, Sanitation, Practices, Technologies

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Corresponding Author: Harriet Masika*

Email: harrietmasika47@gmail.com

The Directorate of Graduate Studies and Research, Mountains of the Moon University.

Background

Access to improved sanitation is fundamental to health and the prevention of many diseases worldwide. A lack of clean water and sanitation leads to diarrheal illness and other infectious diseases through the fecal-oral pathway. Diarrheal illness is the second leading cause of death among children under the age of five, especially in developing countries (WHO, 2009). Uptake of appropriate sanitation practices is essential to the prevention of communicable diseases such as diseases like cholera, and dysentery that lead to death in communities with low sanitation standards (DWAF, 2001). Kasese district local government and non-governmental organizations have been promoting proper sanitation practices in the district and Kyarumba Sub County in particular. However, the rate of uptake of sanitation practices and technologies was still low. Since no studies had been carried out in this area to determine factors influencing the uptake and sustained use of sanitation practices and technologies, this study was undertaken to do so to generate appropriate strategies for promoting sanitation in the area.

Worldwide, an estimated 2.5 billion people lack access to basic improved sanitation, and 780 million lack access to improved drinking water (WHO, 2012). This means only approximately 66% of the global population has access to improved sanitation far below the Sustainable Development Target of 75% by the year 2015 (UN Women, 2015). In Asia and Latin America, the average access to sanitation facilities is 50% while sub-Saharan Africa has the lowest coverage of sanitation facilities at

37% (WHO, 2006). This shows how most of the countries in Sub-Saharan Africa are not on track to meet the Sustainable Development Goal (SDG) targets on sanitation. Owing to the persistence of poor access to improved Sanitation, it remains central in the post-2015 development agenda. An estimated 72 million disability-adjusted life years (DALYs) were lost globally diarrheal illness in 2004, far more than malaria and HIV/AIDS (WHO, 2004). Currently, 2.5 billion people lack access to improved sanitation, and 780 million people lack access to "improved water supplies" (WHO, 2012). There has been a significant focus of international non-governmental organizations (NGOs) and governments to increase access to safe drinking water, but much less overall attention given to adequate sanitation.

One stride in this area was the inclusion of sanitation coverage in the Millennium Development Goals. Goal 7C states that between the years of 1990 and 2015, the percentage of people globally who lack access to improved sanitation and improved drinking water sources will be cut in half. There is debate regarding what is defined as "improved sanitation" as well as how to measure sanitation access and reach those without sanitation. The world met the MDG for water at the end of 2011 but is expected to miss the sanitation goal by more than a billion people (WHO, 2012). There are many different types of sanitation used throughout the world, including both wet and dry systems. There are also various models of ecological sanitation (eco sanitation) that recycle human waste back into the environment. An example is urine-

diverting toilets, which separate urine from feces. The urine can be used for fertilizer, and the feces can be used for composting, dried, or burned for fuel (Tilley, 2008). Another example is an arbor loo, where a tree is planted in a pit latrine after it is full. Not all facilities are hygienic, and there is debate about which types are the best for different areas. The World Health Organization defines “improved sanitation” as access to personal sanitation facilities that can hygienically separate human waste from human contact (WHO, 2008). These include flush and pour-flush toilets that empty into a sewer, septic tank, or soak-away pit, as well as pit latrines with slabs, ventilated improved pit latrines (VIPs), and composting toilets. Unimproved sanitation includes no sanitation facilities at all, known as “open defecation”, pit latrines without slabs, hanging toilets, buckets, and shared or public facilities of any type. The concept of a “sanitation ladder” has been introduced by WHO to show differing levels of sanitation access which gives more information than the dichotomous. “improved”/“unimproved” labels (WHO, 2008). The lowest rung of the sanitation ladder is open defecation. The next rung is some sort of unimproved sanitation facility, such as pit latrines with no slabs, trenches, and buckets. Next is an improved facility that is somehow shared in this case the facility itself is adequate, but it is not considered improved access because it is shared between households or is a public facility. The top rung on the sanitation ladder is the aforementioned improved sanitation facilities of personal flush toilets, pit latrines with slabs, and VIP facilities (WHO, 2008). High water table resulting in shallow pit latrines coupled with high basement rock resulting in shallow pits (Majorin *et al*, 2013). Nomadic pastoralism also affects the adoption of sanitation technologies. This way of life creates little demand for excreta disposal facilities because people are always moving with their animals in search of new pastures (WSP, 2004). The study aims to assess the factors influencing the adoption of sanitation practices and technologies

Methodology
Study setting

The study was carried out in Kyarumba Sub County, Kasese District. The Sub County was selected because it had the least coverage of sanitation facilities in the district. Kasese district is located in the Western region of Uganda and is bordered by the districts of Bushenyi to the South, Kamwenge to the East, Kabarole to the North East, Bundibugyo to the North, and the Democratic Republic of Congo to the Western border. The total land area is 2, 724sq.kms of which 1,647sq.kms is available for human settlement activities. The population is estimated at 702,029 people giving an average density of 426 persons per square kilometer of settled areas. About 85 % of the people live in rural areas. Kasese district comprises 25 Sub Countries, 3 Town Councils, and Municipality.

Research design

The study was a descriptive survey in which quantitative data was collected. Data was collected from respondents who had adopted sanitation practices and technologies and those who had not.

The study population

The study population included households of Kyarumba Sub County both with good and poor sanitation practices and technologies. The respondents interviewed were household heads or their spouses who were willing to consent before participating in the study or any other adult member of the household aged 18 and above.

Inclusion Criteria

Household heads or their representatives, Adults above 18 years, mentally sound participants

Exclusion Criteria

Children below 18 years, Mentally deranged, Visitors/ Household members who have been away from home for long

Sampling

A simple random sampling technique was adopted to select two (2) out of the five (5) parishes found in Kyarumba Sub County from which one village was randomly selected per parish. Lists of households were made by the researcher with the assistance of the chairpersons of Local Council One (LC1s) and village health teams to obtain the study population. The study sample was obtained using Israel and Glenn's (1992) formula for sample size determination stated;
$$n = \frac{N}{1 + N(e)^2}$$
Where n is the sample size, N is the population size and e is the level of precision
The study sample was determined from a total of 169 households for Kaghema and Kitabona villages
$$n = \frac{169}{1 + 169(0.05)^2} = 120 \text{ households}$$
From each household, the head or his or her representative who was at least 18 years of age was selected for the interview. This translated into 120 respondents.

Data collection instrument

A structured questionnaire containing closed-ended questions was used for data collection. This was developed by the researcher with the assistance of the supervisor in line with the objectives of the study. The questionnaire was preferred to other types of instruments because a higher completion rate was expected given that the researcher looked for respondents and interviewed them face to face. The questions in the questionnaire were written in English but the interviewer would translate them into Lhukonzö (area local language) while interviewing and record the response in English.
The questionnaire was pre-tested on 20 respondents in Karusandara sub-county Kasese district. This sub-county was selected for pretesting the research instrument because it was among the sub-counties with poor sanitation in the district. Pre-testing the interview schedule in a different area enabled the researcher to fine-tune the instrument before applying the tool to the target population. It also prevented the monotony of interviewing the same respondents if they happened to be in the study sample. The researcher and supervisor reviewed the questionnaire for content validity. Their views were sought on the clarity of the questions, the general layout of the instrument, and whether the questions adequately covered the objectives of the study. The supervisors gave their opinions and subsequent revisions were made by deleting the irrelevant questions and adding some on relevant areas of study.
The questionnaire was tested for its reliability during the pre-testing exercise. Twenty respondents selected from Karusandara Sub County were interviewed twice by the researcher using the same questionnaire. The interval between the interviews was two weeks. Two weeks were appropriate because the respondent would have forgotten the previous response. This was done to check for the consistency of the responses given by the same respondents during the two interviews. The results were correlated to generate reliability coefficients ranging from 0.58 to 0.63 hence the questionnaire was considered reliable for data collection since reliability coefficients were reasonably high (Amin, 2005).

Data collection methods

Data was collected in April and May 2016 by the researcher. Both primary and secondary data were collected. Primary data were collected through face-to-face interviews in addition to observations made on the adoption and use of sanitation practices and technologies. The popular language in the area (Lhukonzo) was used during interviews while the responses were recorded in English. This was done because the researcher was well versed in both languages and hence it would save time during interviews. Respondents interviewed were either the household heads/their spouses or their representatives because they were considered to have a bigger stake in the adoption of sanitation practices and technologies than anybody else in their households. Respondents were interviewed to generate information about the socio-demographic characteristics of the respondents, the existing sanitation conditions, and associated health, environmental, and socio-economic problems in the area. In addition, respondents were asked to provide information on factors influencing the adoption of sanitation practices and technologies as well as motivating factors for sustained use of sanitation practices, and technologies.

Data analysis

After collection, data was coded, entered, and analyzed using Statistical Package for Social Scientists (SPSS) and Stata computer software. Statistical Package for Social Scientists and Stata were used because of their ability to handle diverse numbers of variables and test them simultaneously. Statistical Package for Social Scientists was used to generate frequencies and percentages of the socio-demographic characteristics of the respondents, the existing sanitation conditions, associated health, environmental, and socio-economic problems in the area, and motivating factors for sustained use of sanitation practices and technologies. Stata was used to compute the factors affecting the uptake of sanitation practices and technologies using a logit regression model that is described below.

Logit Model specification

Uptake of sanitation practice/ technology was the dependent variable and represented in the model by binary variable taking the value of one (1) if the respondent had adopted the practice/technology and zero (0) if otherwise. The cumulative logistic probability function is specified as:

$$P_i = F(Z_i) = \frac{e^{a + \beta x_i}}{1 + e^{a + \beta x_i}}$$

Where, P_i represents that i th respondent adopting a sanitation practice/technology given x_i and x_i represents the i th explanatory variables $i=1, 2, 3, \dots, n$; Z_i a linear function of n explanatory variables (x_i), e represents the base of natural logarithms; a and β are regression parameters to be estimated in the model where a is the intercept, are slope coefficients of the equation. The model can be written in terms of the log of odds ratio (the probability that the respondent has adopted a sanitation practice/technology or has not adopted ($1 - P_i$)) defined by:

$$\ln\left(\frac{P_i}{1 - P_i}\right) = \dots \dots \dots (2)$$

Using equation 1 and 2, the odds ratio becomes;

$$OR = \dots \dots \dots (3)$$

Alternatively

$$OR = \dots \dots \dots (4)$$

Taking the natural logarithms of the odds ratio of equation (4) it results,

$$Z_i = \dots$$

If the disturbance term (U_i) is introduced to the model, the model becomes

$$Z_i = \dots$$

The logit model is specified as:

$$\ln\left(\frac{P_i}{1 - P_i}\right) =$$

$$\text{Linear}$$

$$Y_i = \dots$$

Where;

$$Y_i =$$

$$X_1 = \text{Sex}$$

$$X_2 = \text{Age}$$

$$X_3 = \text{Marital status}$$

$$X_4 = \text{Level of education}$$

$$X_5 = \text{Family size}$$

$$X_7 = \text{Occupation}$$

Ethical considerations

The proposal was reviewed by the ethical committee and approved by the ethical board of Mountains of the Moon University before the research was conducted. Approval and introductory letters were obtained from the Directorate of Post-Graduate Studies and Research which the researcher presented to the DHO of Kasese to be granted permission to undertake the research and introduced to Kyarumba Sub County. The researcher would explain the purpose of the study to respondents and obtain their informed consent before conducting the interviews.

Results

Table: Characteristics of respondents in Kyarumba Sub County, Kasese District

Characteristic	Freq. (N=120)	(%)
Sex		
Males	58	48.3
Females	62	51.7
Age (years)		
18-30	40	33.3
31-48	50	41.7
49-58	23	19.2
59+	07	05.8
Marital status		
Married	93	77.5
Single	19	15.8
Divorced	08	06.7
Level of education		
No formal education	38	31.7
Primary education	62	51.6
Secondary education	15	12.5
Post-secondary education	05	04.2

Family size		
2-4	32	26.7
5-7	58	48.3
8-10	19	15.8
>10	11	09.2
Source of sanitation information		
Radio	98	81.7
Governmental official	47	39.2
NGO official	39	32.5
Neighbors	52	43.3
Public posters	08	06.7
Occupation		
Farmer	98	81.7
Trader	31	25.8
Laborer	43	35.8
Civil servant	04	03.3

Source: Field survey, 2016. Some percentages add up to more than 100 due to multiple responses

Table 1, indicates that both females and males participated in the interviews with a bigger proportion of females (51.7%) than males (48.3%). The majority of respondents (41.7%) were aged 31-48, followed by 33.3% aged 18-30, 19.2% aged 49-58, and those aged 59 and above were 5.8%. Most respondents (77.5%) were married with only 15.8% and 6.7% single and divorced respectively. The level of education attained by most respondents was primary education (51.2%) followed by those with no

formal education (31.7%). Respondents who had acquired secondary education and post-secondary education were few at (12.5%) and (4.2%) respectively. Most households (48.3%) had 5- 7 persons. The main source of sanitation information in the area was the radio which provided information to 81.7% of the respondents. Factors influencing the adoption of sanitation practices and technologies

Table 2: Logit regression of factors influencing uptake of sanitation practices and technologies

Variables	Coefficient	Standard error	P value
Sex	-0.547*	0.179	0.001*
Age	0.069*	0.047	0.000*
Marital status	0.026*	0.053	0.001*
Level of Education	0. 531*	0. 150	0.001*
Family size	-0.367*	0.123	0.000*
Access to information	0.681*	0.120	0.001*
Occupation	-0.801*	0.253	0.001*

P is significant at 0.01 level (2 tailed)

Table 2, sex had a negative coefficient (0.547) and was significant at a 1 percent level of probability. This implies that one’s sex influences one to adopt sanitation innovations. Household size also had a negative coefficient (-0.367) and was significant at a 1% probability level. The occupation had a negative coefficient (-0.367) and was significant at a 1% probability level. Results of logit regression showed that factors such as age (0.069), marital status (0.026), level of education (0. 531), and access to information (0.681) had positive coefficients and were significant at a 1% level of probability.

Discussion

Sex had a negative coefficient (0.547) and was significant at a 1 percent probability level. This implies that one’s sex influences one to adopt sanitation innovations. For example, pregnant women culturally are barred from using latrines in the area. In addition, the decision to construct sanitation facilities solely was made by men and the actual construction. This implies that in most homes males were reluctant to construct sanitation facilities, and so they remained absent. This study's findings were both in agreement and disagreement with findings made by other scholars on the uptake of technologies. Gender issues in technology adoption have been investigated for a long time and most studies have reported mixed evidence regarding the different roles men and women play in technology adoption (Bonabana- Wabbi 2002). Gender may have a significant influence on some technologies. Gender affects technology adoption since the head of the

household is the primary decision maker and men have more access to and control over vital production resources than women due to socio-cultural values and norms. For instance, a study by Eder *et al.*, (2012) on the adoption of technology found that gender had a significant and positive influence on the adoption of improved sanitation facilities in Bolivia. His result compared with that of Diallo *et al.*, (2007) which indicated males were more likely to adopt sanitation technologies, unlike their female counterparts. Household size also had a negative coefficient (-0.367) and was significant at a 1% probability level. This implies that the bigger the household size the lesser the probability of having sanitation facilities and also the lesser the chances of adopting good sanitation practices. This was because sanitation facilities like pit latrines constructed in mountainous places like Kyarumba Sub County were usually shallow due to the existence of impermeable rocks a few meters from the ground surface which made it difficult to construct deep latrines. Shallow latrines would easily be filled up by household members and eventually would resort to open defecation. The occupation had a negative coefficient (-0.367) and was significant at a 1% probability level. This implies that the kind of work that one does determines whether he would adopt or not adopt sanitation facilities and practices. The majority of respondents are farmers at the peasantry level, small-scale retail traders, and laborers on people's farms of which all activities are labor-intensive, leaving them with little time to furnish their households with sanitation facilities. However, results of logit

regression showed that factors such as age (0.069), marital status (0.026), level of education (0.531), and access to information (0.681) had positive coefficients and significance at a 1% level of probability. This implies that the older the respondent the higher the chances of adopting sanitation innovations and practices. Married people also have higher chances of adopting sanitation practices like bathing than non-married people because in most cases household heads would easily access water from their wives compared to singles. Education increases access to information and therefore educated people were more likely to adopt sanitation practices than un-educated people. Access to information about sanitation made respondents compliant with to uptake of sanitation practices and facilities because they were able to appreciate the pros and cons associated with good and poor sanitation. Age has been found to have a negative relationship with the adoption of technology. Younger people are typically less risk-averse and are more willing to try new technologies. A respondent with increased education and/or age may have increased income and the ability to spend it on building and maintaining a personal toilet or latrine. Also, increased age and education could contribute to a better understanding of hygiene and disease transmission and therefore increase the desire for a personal toilet or latrine. (Jenkins & Curtis, 2005). Finally, increased education and age may contribute to increased prestige, which may motivate a respondent to maintain a personal sanitation facility because it is expected of someone of their rank in society (Cairn Cross, 1992). However a study in Peru showed without adequate water, hygiene would not improve even with education (Gilman et al., 1993).

Conclusion

The combined influence of variables such as age, marital status, level of education, and access to information has made positive and significant contributions to the adoption of sanitation practices and technologies, Sex of household members, household size and occupation had negatively and significantly constrained uptake of sanitation technologies and practices at 1% level of probability.

Recommendations

Kasese District Local Government and Kyarumba Sub County Council should put in place bylaws aimed at enforcing compulsory adoption of sanitation technologies and practices by households.

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Acronyms

WHO: World Health Organization
WSP: Water and Sanitation Programme
UN: United Nations

DHO: District Health Office

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The study was not funded

Conflict of interest

The Author did not declare any conflict of interest

Author Biography

Harriet Masika is a student of a Master of science degree in public health at Mountains of The Moon University. Dr. Adalbert Aine-Omucunguzi is a lecturer at the Directorate of Graduate Studies and Research at Mountains of The Moon University.

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