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Research Article

Improved Latrine Coverage and Associated Factors Among Rural Community in Gicumbi Gistrict, Rwanda

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Abstract

This study aimed at determining improved latrine coverage and associated factors among rural community in Gicumbi district. A cross-sectional study was employed using mixed methods with quantitative and qualitative data collection approaches. The quantitative approach of data collection method was conducted and then qualitative approach followed. A structured questionnaire was used to collect quantitative data and Focus Group Discussions (FGDs) were conducted to collect the qualitative data. The study population consists of household heads or their representatives and key informants from the study area of Gicumbi district. For quantitative the total sample size was 236 households while for qualitative data, a total of three FGDs with eight (8) participants were conducted among twenty four (24) rural community members of Gicumbi district. Raw data from the questionnaire were entered into EPI data and transported into SPSS version 22 for analysis. Descriptive statistics was used to tabulate and describe the data. The strengths of the associations were determined with multiple logistic regressions. The results show that 69.1% of respondents were male, 30.1% were farmers, 16.9% had formal employment while 57.2% completed secondary education. The prevalence of improved latrine in Gicumbi District was 65.3%. Tertiary education was also 4.3 times more likely to have improved compared to those who did not have formal education (AOR=4.3CI: 95%: 1.027-7.032. P=0.005). Respondents with average monthly income Between 50,000 and 100,000 Rwfs are 2.7 times more likely to have improved latrine (AOR=2.7 CI at 95%:1.009-4.120, P=0.022).

Keywords:
Latrine Coverage; Gicumbi District; Improved latrine; mixed study

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Introduction

Despite encouraging progress on sanitation, most of Sub-Saharan Africa did not meet the MDG sanitation target. In 2015 it was estimated that 2.4 billion people globally still use unimproved sanitation facilities. Of these, an estimated 1 in 8 (946 million) people still practice open defecation worldwide [1].

Globally, 15% of the world's population do not use improved latrine facilities forcing over 1 billion people to resort to open defecation. Overall, the global latrine coverage as at 2011 was estimated to be 64% implying that the world was set to miss the 75% sanitation MDG target by more than half a billion people if the current trends continued [2] .

Sub-Saharan Africa remained the farthest behind in its progress towards accelerating access to improved latrine facilities (UN, 2013). Regional estimates indicated that only 30% of the population in Sub Saharan Africa used improved latrine facilities and an estimated 26% practiced open defecation due to lack of latrines [3].

In developing countries, 47 % of the population was living in unhygienic environment, while in developed countries the proportion is only 1%. The sanitation coverage of rural and urban was 39% and 71% respectively in developing countries [4]. Nowadays, globally 80% users of unhygienic sanitation facilities and 85.7% who practice open defecation were live in rural areas [5].

Sub-Saharan countries including Rwanda still have the significant numbers of people living in unimproved hygiene and need rapid improvement of sanitation which calls for detailed research [6]. To improve sanitation and hygiene throughout the country, Ministry of Health settled the goal that every household should have access to latrine and large-scale interventions were implemented to increase sanitation coverage [7].

Whereas most studies conducted have focused on establishing the latrine coverage levels, there is a clear gap in the investigation of the underlying factors leading to the low latrine coverage levels especially in marginalized areas like Gicumbi district. Therefore this study sought to determine the improved latrine coverage and associated factors among rural community members of Gicumbi district, Rwanda.

The lack of improved latrine coverage in Rwanda continues to be a widespread health and environmental hazard. The total latrine coverage in Rwanda is 92.2% indicates 73.1% in rural while 82.6 % in urban. Latrine coverage is generally low with 2.12% of the population who defecate in the open [8].

The promotion of improved latrine use coupled with the requisite knowledge, attitudes and practices has not received significant attention from researchers, the National and program designers, law enforcers and policy-makers. There is limited information on latrine coverage and associated factors that are attributed to the low improved latrine coverage levels among communities like Gicumbi district. This study therefore assessed latrine coverage and associated factors in Gicumbi district, one of the rural

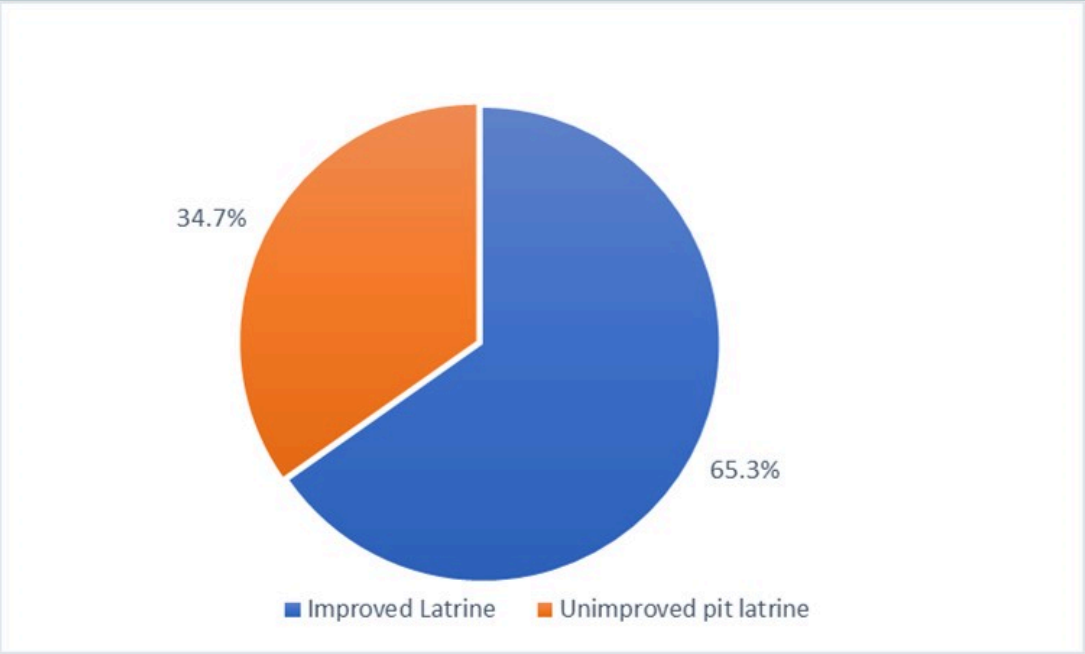


Figure 1. Improved latrine coverage in rural community in Gicumbi district

districts with low level of improved latrine coverage in Rwanda [9], so as to inform public health interventions.

Methods

Research Design

A cross-sectional study employed using mixed methods with quantitative and qualitative approaches. The quantitative approach of data collection method was conducted and then qualitative approach followed in order to get richly information. A structured questionnaire was used to collect quantitative data and Focus group discussions (FGDs) were conducted to collect the qualitative data.

Study Area

The study was undertaken in Gicumbi district, Rwanda. As indicated in the area map in figure 1, the study location has 21 sectors each with one village. The district lies on longitude 30 04'3.00"E and latitude -1 34' 34.68"S. Altitude in the district ranges from 500m to 2,500m above sea level.

Target Population

The study population consists of household heads or their representatives and FGDs from the study area of Gicumbi district. Gicumbi district has a total population of 572,000 and 14,308 households based on the 2009 census results.

Sample Design

Sample Size

Quantitative

The sample size for the study is determined using the sample size calculation designed by Fisher et al. (1998) because the target population is greater than 10,000 as detailed below:

$n=z^2pq/d^2$

Where:

n= Expected sample size

z= Degree of confidence at 95% that corresponds to 1.96

p= Expected prevalence (0.19) of latrine coverage in Rwanda was 19%

d= Acceptance error at 0.05 (5% precision)

$n= (1.96)^2 \times (0.19 \times 0.81) / 0.05^2$

n = 236

The total sample size was 236 households.

Qualitative

A total of three FGDs with eight participants were conducted among 24 rural community members of Gicumbi district.

Sampling Techniques

Multistage sampling method was used for quantitative part. In the first step one sector was selected randomly and then four sectors neighboring were selected because of its transmissibility. In the second stage, 4 villages from each sector were selected randomly using Statistical Packages of Social Sciences software (SPSS) after the list of villages was entered into the software. In the third stage, households were selected randomly using SPSS as the code and list of households was obtained from the sector administration and then households were distributed according to proportionate to the number of households in each sector.

Data Collection Methods

This explains quantitative and qualitative data collection methods, administration of data collection instruments and validity as well as reliability of data collection tools.

Quantitative

For quantitative, data was collected using a pretested semi-structured questionnaire which was in English and translated to Kinyarwanda. It was administered to the study participants with the help of 2 trained research assistants and the principal investigator. It took approximately 30 minutes to administer the questionnaire. In this study, latrine coverage was determined through the proportion of households having ownership of an improved latrine facility.

Qualitative

For qualitative, data was collected using FGDs (appendix 4 for community member). The FGDs members were interviewed on perception of community members regarding improved latrine use. The discussions were recorded by using telephone recorder and the interviews lasted between 30-40 minutes.

Administration of Data Collection Instruments

For quantitative, questionnaire was administered by trained assistants after receiving consent from each study participants. Participants were recruited after consent is sought and obtained from each individual. At the end of each day the researcher cross checked the questionnaire for completeness. Only completed questionnaires were considered for data entry.

For qualitative, FGDs guide was used in collecting data and moderator was the researcher herself. Qualitative data was done using telephone recorder.

Data Analysis Procedures

Data analysis procedures show how quantitative and qualitative data was analyzed.

Quantitative Data Analysis

Raw data from the questionnaire were entered into EPI data and transported into SPSS version 20 for analysis. Descriptive statistics was used to tabulate and describe the data, score assessment of all variables related to improved latrine use was done in order to find latrine coverage and Bivariate analysis to assess the association between independent and dependent categorical variables was carried out using

Chi square (X^2). The strengths of the associations were determined with multiple logistic regressions. Inference was made using a 95% confidence interval and a p-value < 0.05. The results were presented in frequency, cross tabulation tables, and pie charts.

Qualitative Data Analysis

The qualitative data was analyzed thematically. Each interview transcript was assigned a unique key informant identifier. The transcripts were sent back to the key informants for validation purposes. The key issues in all the transcripts were coded and grouped into similar concepts. The concepts were then categorized into themes and a short report was produced for each discussion topic. The qualitative data was presented in form of quotes.

Ethical Consideration

The consent of the respondents was sought and obtained before the administration of the questionnaire. The participants were informed that their participation is voluntary and they could withdraw from the study at any time without giving any reason. The findings were treated with utmost confidentiality and it is for the purpose of this research only. The objective and result of the study were explained to the subjects of research participants. Then, the participants were informed that the procedure used did not pose any potential risk and their identities and personal particulars were kept strictly confidential. Approval to carry out the study was sought and obtained from Mount Kenya University (MKU).

Results

All 236 households selected as a sample participated in the study; this explains why the response rate was 100%.

Socio Demographic Characteristics of Respondents

This section examines the demographic information of respondents that include Gender of household head, occupation, level of education, Age, Average monthly income and number of household members. Descriptive statistics of each demographic variable are described in the following table 1, this information is useful to comprehensively gain the background information of respondents.

Table 1. Socio-demographic characteristics of respondents

Characteristics	Frequency (N=236)	Percent (%)
Gender of household head		
Male	163	69.1
Female	73	30.9
Occupation		
Formal employment (Salaried)	40	16.9
Informal employment (Casual)	46	19.5
Business/Trading	49	20.8
Livestock keeping	28	11.9
Agriculture	71	30.1
Others (Specify)	2	0.8
Level of Education		
No formal education	1	0.4

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Table 1 (continued)

Characteristics	Frequency (N=236)	Percent (%)
Primary	18	7.6
Secondary	135	57.2
Tertiary	82	34.7
Age		
Below 30yrs	18	7.6
30-40	101	42.8
40-50	85	36
Above 50	32	13.5
Average Monthly Income		
Less than 50,000 Rwfs	14	5.9
Between 50,000 and 100,000 Rwfs	35	14.8
Between 100,001 and 200,000 Rwfs	107	45.3
Above 200,000 Rwfs	80	33.9
Number of Household members		
Six or more	32	13.6
Four or five	100	42.4
Three	71	30.1
Two	29	12.3
One	4	1.7

Source: Primary Data

The table above (Table 1) displays the information on demographic characteristics of respondents. The results show that 69.1% of respondents who reported that they were household heads were male while 30.9% were females.

The research furthermore sought to find out the occupation status of respondents and categorized into Formal employment (16.9%) , Informal employment (19.5%) , Business/Trading 20.8% , Livestock keeping (11.9%) ,Agriculture (30.1%) ,and others (0.8%) who cited the hand-to-mouth work for surviving.

To get the information on school-learnt skills, education of respondent was asked and 0.4% of respondents did not have chance to go to chool whereas 7.6% completed Primary education and , 57.2% completed Secondary education and 34.7% completed tertiary education.

The Age of respondents was reviewed and the results showed that only 7.6% were below 30 years old, most of the respondents equivalent to 42.8% were between 30-40 years and 36% were aged between 40-50 years whereas 13.5% are above 50 years old.

To understand the earnings of respondents, the average monthly income of respondents was asked and most of respondents (45.3%) said that their monthly income ranges between 100,001 and 200,000 Rwfs, only 5.9% of respondents earn less than 50,000Rwfs, 14.8% earn between 50,000 and 100,000 Rwfs and only 33.9% of respondents had income which is above 200,000 Rwfs monthly.

And lastly, the research wanted to know the size of household in terms of number of people living in, asked the respondents about the number of household members and 42.4% responded that there were four or five household members, 13.6% said that there were six or more members in their household, 12.3% responded that there were two household members whereas only 1.7% who was alone in the household.

The Improved Latrine Coverage Among Rural Community in Gicumbi District

The study further established the prevalence of latrine use in rural community of Gicumbi district, having improved latrine was to facilitate for the safe disposal of human faeces and urine without slab and to also know the proportion of households having ownership of an improved latrine facility among community under the study.

As shown by the figure 1 above, the results from the study revealed that more households (65.3%) responded that they had improved latrine whereas 34.7% responded that they did not have improved latrine. From this discrepancy in the ownership of improved latrine, the researcher sought to know the related factors that may hinder or influence the possession of improved latrine in the household under studies.

To sort out the factors associated with improved latrine coverage among the respondents in Gicumbi district, Bivariate analysis was conducted through a chi-square test in SPSS to find out the interdependence among independent variables and the outcome variable of interest which is the possession of improved latrine.

Chi-square test statistic was observed and P-Value was viewed to compare it to significance level (0.05) so as to take the decision against the null hypothesis (there is no association between any independent variable and the possession of improved latrine).

The table above (Table 2) shows the results from a bivariate analysis between socio-economic characteristics of respondents and the improved latrine coverage, chi-square test of independence was used to test the relationship, P-Value ($p<0.05$) was considered significant.

Table 2. Bivariate Analysis: Factors associated with Improved Latrine

Variables	Have Improved Latrine		P-Value
	Yes n(%)	No n(%)	
Gender of household head			0.06
Male	100(42.4)	63(26.7)	
Female	54(22.9)	19(8.1)	
Occupation			0.262
Formal employment (Salaried)	31(13.1)	9(3.8)	
Informal employment (Casual)	32(13.6)	14(5.9)	
Business/Trading	21(8.9)	28(11.9)	
Farming	70(29.7)	31(13.1)	
Level of Education			0.017
No formal education	0(0.0)	1(0.4)	
Primary	9(3.8)	9(3.8)	
Secondary	113(47.8)	22(9.3)	

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Table 2 (continued)

Variables	Have Improved Latrine		P-Value
	Yes n(%)	No n(%)	
Tertiary	74(31.4)	8(3.4)	
Age			0.041
Below 30yrs	13(5.5)	5(2.1)	
30-40	76(32.2)	25(10.6)	
40-50	46(19.5)	39(16.5)	
Above 50	19(8.1)	13(5.5)	
Average Monthly Income			0.002
Less than 50,000 Rwfs	9(3.8)	5(2.1)	
Between 50,000 and 100,000 Rwfs	25(10.6)	10(4.2)	
Between 100,001 and 200,000 Rwfs	98(41.5)	9(3.8)	
Above 200,000 Rwfs	76(32.2)	4(1.7)	
Number of Household members			0.138
Six or more	22(9.3)	10(4.2)	
Four or five	57(24.2)	43(18.2)	
Three	50(21.2)	21(8.9)	
Two	23(9.7)	6(2.5)	
One	2(0.8)	2(0.8)	
Having necessary skills for constructing latrine			0.038
Yes	153(64.8)	79(33.5)	
No	1(0.4)	3(1.3)	
Who is responsible for constructing latrine			0.073
Men	103(43.6)	64(27.1)	
Women	51(21.6)	18(7.6)	

Source: Primary Data

Gender of the household head was not significantly associated with improved latrine coverage (p=0.06), although households with males as the household heads 100(42.4%) tend to have improved latrine. There is no significant association between occupation of respondents and improved latrine coverage, although more respondents with farming activities 70(29.7%) have improved. A significant association was also found between education level of the respondents and improved latrine coverage (P-Value = 0.017).

The Age of respondent was found significantly associated with improved latrine coverage in Gicumbi district (P-Value = 0.019), respondents aged between 30 and 50, 76(32.2%) tend to have improved latrine compared to older and younger respondents. There is a significant relationship between

average monthly income and improved latrine coverage (p=0.002), respondents who earn more than 100,000Rwf per month 174(73.7%) have improved latrine.

No significant relationship between number of household members and latrine coverage (P=0.138), having necessary skills for constructing latrine does not influence the ownership of improved latrine (p= 0.088) which shows that the relationship is insignificant, the research also found no significant relationship between whoever is responsible for latrine construction and improved latrine with (p=0.073).

Results from bivariate analysis showed that only Age and occupation of respondents were found statistically, significantly associated with improved latrine with the P-Values 0.041, 0.008 respectively.

Multivariate analysis estimates the logistic model with independent variables significantly associated (Age and Occupation) with outcome variable and the outcome variable (Improved, Unimproved latrine), the results from Binary logistic regression are shown in the table 3 below.

Results from multivariate analysis Table 3 revealed that being having completed secondary and tertiary education 2.5 times more likely to have improved latrine compared to those who did not have formal education (AOR=2.5, CI at 95%:1.002-4.362, P=0.018) and those who completed tertiary education were also 4.3 times more likely to have improved compared to those who did not have formal education (AOR=4.3 CI at 95%: 1.027-7.032. P=0.005).

Respondents with average monthly income Between 50,000 and 100,000 Rwfs are 2.7 times more likely to have improved latrine compared to those who earn on average less than 50,000 Rwf (AOR=2.7

Table 3. Multivariate analysis of Factors associated with the improved latrine coverage in Gicumbi district

Variables	Description	AOR	(CI at 95%)	P-Value
	No formal education	Ref		
	Primary	0.6	(0.168 - 2.442)	0.069
	Secondary	2.5	(1.002 - 4.362)	0.018
	Tertiary	4.3	(1.027 - 7.032)	0.005
Age				
	Below 30yrs	Ref		
	30-40	1.6	(1.001 - 3.061)	0.019
	40-50	2.5	(1.211 - 4.238)	0.012
	Above 50	0.4	(0.525 - 1.061)	0.075
Average Monthly Income				
	Less than 50,000 Rwfs	Ref		
	Between 50,000 and 100,000 Rwfs	2.7	(1.009 - 4.120)	0.022
	Between 100,001 and 200,000 Rwfs	6.5	(1.092 - 12.294)	<0.001
	Above 200,000 Rwfs	4.7	(1.012 - 6.720)	0.005
Having necessary skills for constructing latrine				
	Yes	Ref		
	No	0.3	(0.09 - 0.71)	0.006

Source: Primary Data

CI at 95%:1.009-4.120, P=0.022). Earning on average between 100,001 and 200,000 Rwfs per month increases by 6.5 times the likelihood of having improved latrine (AOR=6.5, CI at 95%: 1.092-12.294, P<0.001) and respondents who on average earn above 200,000 Rwfs per month are 4.7 times more likely to have improved latrine compared with those who earn less than 50,000Rwf per month (AOR=4.7, CI at 95%:1.012-6.720, P=0.005).

Respondents who did not have skills for constructing latrine were 0.3 times less likely to have improved latrine as compared to those who had skills for constructing the latrine (AOR=0.3, CI at 95%: 0.09-0.71, P=0.006).

Discussion

The study showed that 154 (65.3%) had improved latrine in rural community of Gicumbi district; this proportion is lower than the national coverage (81.3%) in rural areas according to integrated household and living condition survey (EICV, 2016-2017).

100% of the households participated in this study share their own improved latrine in Gicumbi district, according to EICV5 only 66.9% do not share their own improved latrine,

In this study, findings from bivariate analysis showed that Education level, Age and skills for constructing improved latrine and average monthly income of household per month are significantly related to improved latrine coverage. The increase in average income earned by household increases the likelihood of the household to own improved latrine, this was also found in the study conducted by [10], in rural communities of Bahir Dar Zuria district in Ethiopia on 608 households found that availability of latrines was twice higher in households with an income of 5000 or more Ethiopian Birr (1USD = 17.5 Ethiopian Birr) than those who had an income less than 5000 Birr.

Households with an educated household member tend to have improved latrine, this was also highlighted by [11], in a study conducted in rural areas of denbia district, northwest Ethiopia on 801 households found that educated mothers are 2.4 times more likely to have improved latrine than those without formal education.

Having skills for constructing improved latrine was found associated with improved latrine coverage since it increases the positive attitude towards latrine use, this is in line with what [12], found that attitude towards improved latrine, education level and upper wealth quintile are associated with improved latrine coverage.

In multivariate analysis, respondents with both secondary and tertiary education were more likely to have improved latrine compared to those with primary and no formal education, this is because they are skilled of the benefits of having improved latrine as a sanitation tool. Respondents with more than 50,000Rfw income per month tend to have improved latrine when compared to those who earn less, this is because they can afford to pay the related cost of establishing the sanitation tools like improved latrine.

Conclusion

The improved latrine coverage among rural areas in Gicumbi district is low compared to the national level. Households with a member with secondary or tertiary education are respectively 2.5 or 4.3 times more likely to have improved latrine compared to those with no formal education. Respondent aged 40-50 was 2.5 times more likely to own improved latrine compared to others aged below 30 years. Households with average monthly income of between 100,000Frw and 200,000Frw are 6.5 times more likely to have improved latrine compared to those earning less than 50,000Frw per month and having no skills for constructing latrine is 0.3 times less likely to influence the availability of improved latrine. Since the improved latrine coverage in rural areas was found to be less than the national level's prevalence of improved latrine, there is a need of mobilization among communities of Gicumbi district to improve awareness, knowledge and benefits of availability of improved latrines in the households.

Competing Interests

The authors have declared that no competing interests exist.

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