Correlates of latrine utilization among rural community in Marakwet East, Elgeyo Marakwet County

ABSTRACT

Aims: Access to acceptable sanitation is considered a fundamental need and right across the world, large proportions of Kenyans, especially in the rural areas of Elgeyo-Marakwet County still lack access to proper sanitation. The objective of the study was determining factors influencing utilization of latrines among the rural communities in Elgeyo-Marakwet County, Kenya.

Study design:A cross-sectional study was employed a quantitative data collection approach using a structured questionnaire and an observational checklist.
Place and Duration of Study: The sample entailed 423 households. Marakwet East Sub-County, Elgeyo-Marakwet County, Kenya.
Methodology: Purposive sampling and random sampling techniques were integral for this study. Chi square test was used to determine if there was any significant statistical relationship between variables and utilization of latrine. Multiple logistic regression was also done to determine the effects of variables on utilization of latrine among the respondents.
Results: Households that had 1 to 3 members were 1.25 times (AOR: 1.25, 95% CI [1.2–3.2] higher than for households of greater than six members. Higher education (secondary and tertiary education) was 1.6 times more likely to utilize latrines (AOR: 1.6, 95% CI [1.42–3.83]). Cleaning latrine daily increased latrine utilization by 2.19 times (AOR: 2.19, 95% CI [1.12–4.28]). Further, owning a VIP type of toilet were 1.3 times more likely to use (AOR: 1.32, 95% CI [1.15–3.18]. The regression model explained 41.2% of variation on latrine utilization.
Conclusion: The study concluded that latrine utilization is influenced by various variables. The study recommends multi-sectorial approach in designing and implementing community led total sanitation.

Keywords: Improved latrine, Open defecation, Utilization of Latrines, Shared latrine

1. INTRODUCTION

Human access to proper sanitation is considered a basic necessity and a human dignity. Ensuring that all human beings have proper access to sanitation reduces common illnesses, and death which is often prevalent among children [1]. Worldwide it is estimated that 71% of people lacking access to enhanced sanitation are found in the rural localities, the same demographic areas where 91% of open defecation cases in the world are also recorded. And while the essence of attaining good sanitation standards is acknowledged, a report prepared by the WHO/UNICEF show there's a long way to go considering that 3.6 billion in the globe are exposed to unsafe sanitation facilities, with the number entailing 14% still practicing open defecation, and with most of the cases getting recorded from countries that are still developing [2].

The World Health Organization (WHO) and the United Nation Children's Fund (UNICEF) Joint Monitoring Program (JMP) 2021 findings indicated that a population of 494 million still practice open defecation. Out of the number, 92% reside in the rural areas, and about half of the people reside in sub-Saharan Africa [1]. The report further shows Sub-Saharan Africa countries as the ones mostly left behind in terms of the pace toward rising access to enhanced latrine facilities. It is only 30% of people in Sub-Saharan Africa that access enhanced latrine facilities [2]. In a 2017 report by JMP it was established that as of the year 2015, 22.9% of Sub-Saharan Africans lacked basic sanitation and hence were exposed to the dangers of practicing open defecation. A different report still conducted by JMP in 2000 found out that 31.9% of the people in the region defecated in the open rather than into a latrine. The data thus point that only 9% of people had opted out of open defecation practices in those 15 years, and with data still suggesting that around 10% are based on the rural areas [3].

In Ghana some of the factors that positively determined OD were things like number of people in a household, education, income generated, access to a toilet facility, careers and the local norms and beliefs [4]. The presence of latrines and their use is rooted in traditions and misconceptions. Researchers demonstrated various traditions surrounding sanitation in different communities. In India, it was established that it is obligatory for men who wished to marry to have their own latrines. The fact that men could not acquire a bride without first constructing a household latrine led to 21% increase in adoption of latrine facilities. Similarly, traditions that spearheaded construction of sanitation facilities were identified in Ghana [5].

In Kenya, WHO/UNICEF estimated that 47.3% of the people use improper sanitation facilities, while 29% access good sanitation, 26% lack a private sanitation facility, 31% possess unimproved toilets and 14% (5 million) people practice open defecation . In Kenya, improper utilization of latrines often end up in pollution of water source. Based on a study by Njuguna , it was estimated that 7.5 million people (14%) defecate in the open in Kenya [5]. Further, the majority of the population at the range of 35.9-37.9% used pit latrines that were not fitted with slabs [2].

A large proportion of Kenyan communities use ordinary pit latrines. About 85% of the population who reside in these rural areas use simple latrines, however the majority does not conform to the international standards to be labeled as an improved facility for sanitation purposes as stated in the WHO/UNICEF under the Joint Monitoring Program (JMP) specifications [1]. Having a latrine in each household of the Kenyan community will go a long way toward preventing communicable diseases such as diarrhoea and also non-communicable diseases especially when members of the house use it in the right manner and consistently, 31% possess unimproved toilets and 14% (5 million) people practice open defecation [1]. If the sanitation facilities are however not used in the right way and still result in cases of open defecation, the water sources in the community shall be contaminated and hence exposing the population to diseases [6].

According to a recent literature review, incorporating good sanitation practices goes a long way toward reducing the risk of diarrhoeal morbidity by 25%, with the review further pointing out that the results can further reduce by 45% when the sanitation cover is increased by 75%. Further, washing hands using soap was attributed toward lowering the risk of diarrhoea by 30% [7]. The latrine coverage in Elgeyo Marakwet County is at 76%. Close to over 46,181 diarrheal cases have been reported annually for the last three years in the county. Diarrheal disease is among the top three diseases in Marakwet east Sub County [8].

In Kenya most diarrhoeal diseases in children are as a result of poor utilization of latrine. According to the WHO, 1.5 million children die each year because of diarrhoea that is caused by poor hygienic practices and inadequate sanitation [1]. Despite government efforts towards enhancing sanitation and increasing latrine coverage, many people in Kenya still do not have accessibility to good sanitation facilities [2]. This is particularly prevalent in rural areas where access to latrines is limited, and cultural and traditional beliefs may discourage their use [9]. This situation has led to poor hygiene, open defecation, and high rates of preventable diseases [2].

Based on records from Kenya Health Information System, an average of 14,418 diarrheal cases have been reported annually for the last three years in Marakwet east Sub County [8]. This number of cases is quite alarming and hence the research sought to uncover the underlying causes that result in lower usage of latrines in the rural parts of the Marakwet East Sub County. This study therefore sought to explore factors influencing utilization of pit latrines among the respondents. The study objective was to determine factors influencing utilization of latrine among rural community in Marakwet East Sub-County, Elgeyo Marakwet County, Kenya.

2. METHODOLOGY

2.1 Study Design

This research study adopted a cross-sectional study and employed a quantitative data collection approach using a structured questionnaire. Quantitative methods are effective for collecting and analyzing data from the TPB model [8].

2.2 Study Area

The study was conducted in Elgeyo Marakwet County in the Kenya's rift valley. Located in the former Rift Valley province, Elgeyo Marakwet County is one of the counties in Kenya that borders Tranzoia County to the North, Baringo County to the South, Uasin-Ngishu County to the West and West Pokot County to the North. The county consist of four sub counties, which is Marakwet West and East, and Keiyo North and South.

2.3 Justification of Study Area

Generally, there are 103,186 households and a population of 503,019 in the county hence translating to 4.5 people in each household and a population density of 150 people in every km square. This study was done in Marakwet East sub-county. The sub county spans over 853.2 km2 and density persons per km2 is 114.There are steep escarpments & flat plateaus ranging from an altitude of 1200m to 3350 over the sea level. Its average temperature ranges at 27°C with the pattern of rainfall annually from 800 to 2300mm. On administration, the county is divided into twenty wards while the study sub county is divided into four wards. The justification for the choice of the study site was the fact that diarrheal cases resulting from poor sanitation is in the list of the ten priority diseases in Elgeyo Marakwet County and its ranked third in Marakwet East Sub County. In comparison to the other three sub counties Marakwet East has the highest number of diarrheal cases averaging 14,418(31%) annually for the previous three years. Purposive sampling was used to select Marakwet East Sub County [6]

2.4 Target Population

The population of Marakwet East is 97,041 with 21,362 households [9]. Households formed the study sample and this study targeted household heads or their designated representatives who are over 18 years as respondents.

2.5 Sampling Procedures and Techniques

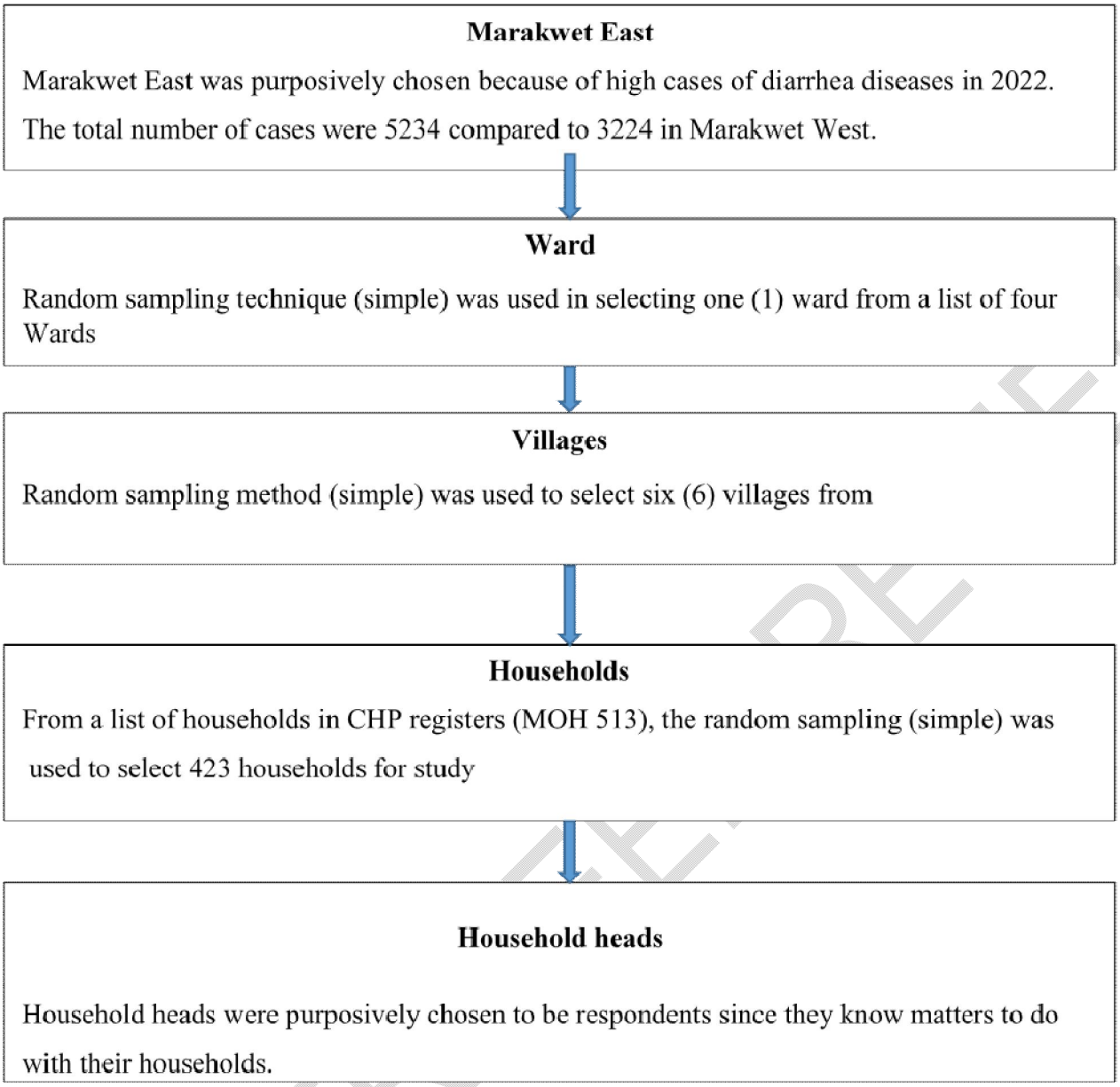

Figure 1: Sampling techniques

The population of study was over 10,000 people; the sample size is determined by the Andrew Fishers exact formula of 1998 [10]. A sample size of 384 was statistically calculated bare minimum sample size for the study. 10% was added to cater for non-response, hence the study interviewed 423 respondents. The name of the ward, population distribution per sub location and the sample size per village is as tabulated in table 1 below;

Table 1 Sample size distribution

Ward	Sub-locations	HHs	Population	Villages	HHs	Sample size
Sambirir	Chukor	224	1066	Chukor	106	78
	Maina	423	1786	Komolwo	83	61
	Nyirar	517	2478	Kapsara	99	73
	Metipso	322	1455	Kipsacha	77	56

	Tuturung	451	2003	Katuturung	100	73
	Chesiyo	489	2432	Chesiyo	112	82
Total	6	2426	423	6	577	423

2.6 Data Collection Instruments

Structured questionnaire was utilized in collecting quantitative data from household heads in the month of December 2023. The structured questionnaires addressed three parts relevant to the study objectives which were based on cultural factors, socio-demographic factors and latrine design. The questionnaire had specific questions for households with latrine and those without latrines. The structured questionnaire was translated into the local language for consistent questioning and answering. This ensured the respondents understood the question well.

2.7 Observational Methods

Further, Observational method was used during the study by the researcher to document all relevant observations noted on utilization of latrine practices in the households. A five (5) point Linkert scale was used. The observational checklist was constructed based on research questions during the study.

2.8 Pilot Study and Pretesting

The researcher organized with the local administration one day to pretest the structured questionnaire at Korkitony (kapngoriom) village from the bordering county of Uasingishu. This area has the same topography and characteristics similar to HHs in the area of study and hence suitable when it comes to pretesting so that the respondents were not interviewed twice. The issues that needed modification were addressed before the actual data collection.

2.9 Test for Validity and Reliability

2.9.1 Validity

The researcher designed a tool after various reviews on relevant studies and literature that concerns the study topic to ensure validity on the research instruments. To make structured questionnaire understandable to the local community, it was translated into the local language for consistent questioning and answering. Research assistants underwent a 5 days training to comprehend objectives of the study and how to administer the tools. To enhance validity the pretest of the tools was conducted in the neighboring county of Uasingishu.

2.9.2 Reliability of instruments

A sample of forty three (43) questionnaires which represented 10% was used to test the reliability of research instruments. Test and retest reliability technique was integral to assess how reliable the research instruments were. Same questionnaires were administered twice to the same participants at different point in time and then the correlation between the two sets of results was calculated to see if the scores are similar. A reliability test using Cronbach's alpha was carried out to ascertain whether the dataset was fit for analysis. The scores at both time periods were highly correlated >0.7. The instruments were regarded dependable since the results produced a Cronbach's alpha per variable as shown in table 2. During the data collection exercise review meetings was held daily with the research assistance. The researcher collected the filled questionnaires daily for data quality assurance to recheck for completeness, correct errors and tackling any challenges experienced.

Table 2 Cronbach alpha

Independent variable	Type of data	Alpha score

1	Cultural factors	Quantitative	0.8218
2	Socio demographic factors	Quantitative	0.9180
3	Latrine design	Quantitative	0.8252

3. RESULTS

3.1 Sample Size and Response Rate

A sample of 384 was statistically determined as the bare minimum sample size for the study was used. Additionally, to provide for non-response at 10% (38 questionnaires) were added. In total, the total sample was 423. All the 423 questionnaires were administered to the respondents leading to a response rate of 100%. Some questionnaire however, had some items that were not responded.

3.2 Socio Demographic Characteristics of Respondents

In regard to respondent's sociodemographic characteristics, respondents were requested to indicate their age, gender. Occupation, education attainment, marital status and their religion. Table 3 below indicates distribution of the respondents.

Table 3. Socio demographic characteristics of the respondents

	frequency	**Percentage**
Income levels		
1000-12000	365	86.3
more 12000	58	13.7
Total	**423**	**100.0**
Gender of the respondents		
Male	281	66.4
Female	142	33.6
Total	423	100
Occupation of the respondents		
Farming	332	78.5
Civil servant	49	11.6
Businessman	42	9.9
Total	423	100
Age of the respondents		
18 – 27	81	19.1
28 – 37	55	13.0
38 – 47	221	52.2
⩾48	66	15.6
Total	423	100.0
Marital status		
Single	80	18.9
Married	326	77.1
Widowed	17	4.0
Total	423	100.0
Education status	**frequency**	**Percentage**
Primary	245	57.9
secondary school	90	21.3

College	65	15.4
None	23	5.4
Total	**423**	**100.0**

Moreover, Majority of the respondents (391(92.4%) were Christians. 32 (6.6%) Muslims, and 42(1%) were from other religions including African traditional religion and Hindu.

In regard to household size the mean house hold size was with 5.2 members per household with 1.61 Standard deviation. The following pie chart shows the distribution of the household membership among the respondents in the study area sizes.

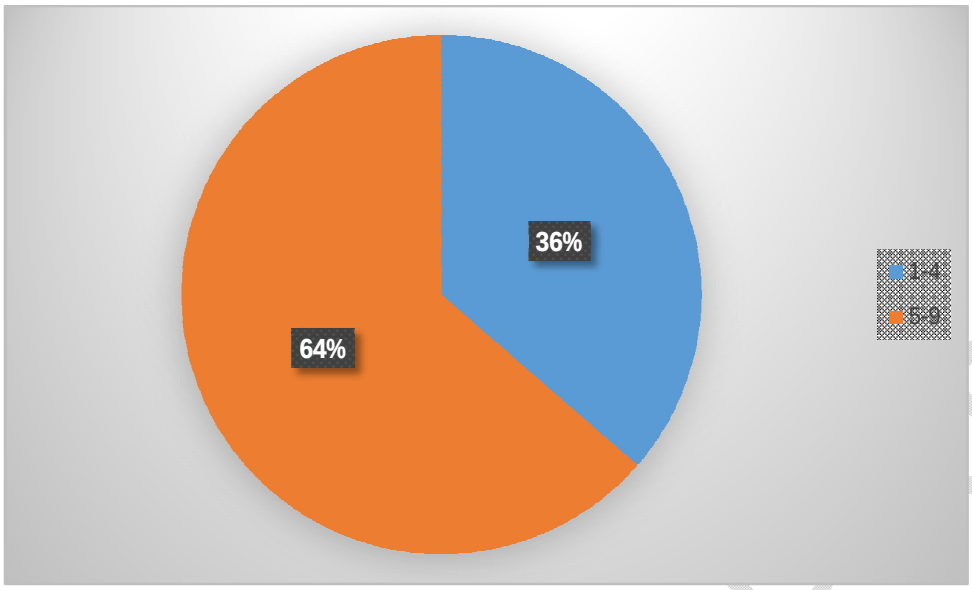

Figure 2 Distribution of household membership size

3.3 Toilet Accessibility and Usage

The respondents were asked to state whether they owned (were accessible) to toilets. In this regard 297(70%) indicated that they owned or were able to access a toilet. 105(25%) of the respondents indicated that they did not own or were able to access a toilet. 21(5%) of the respondents did not respond to this question. Majority of the respondents who indicated that they owned a toilet, 225(76%) used ordinary pit latrine while 72(24%) owned VIP type of a toilet.

Moreover, respondents were asked to state whether all the members of their household used latrines (or its equivalent) every time they needed to relieve themselves. The chart below shows the distribution of the responses.

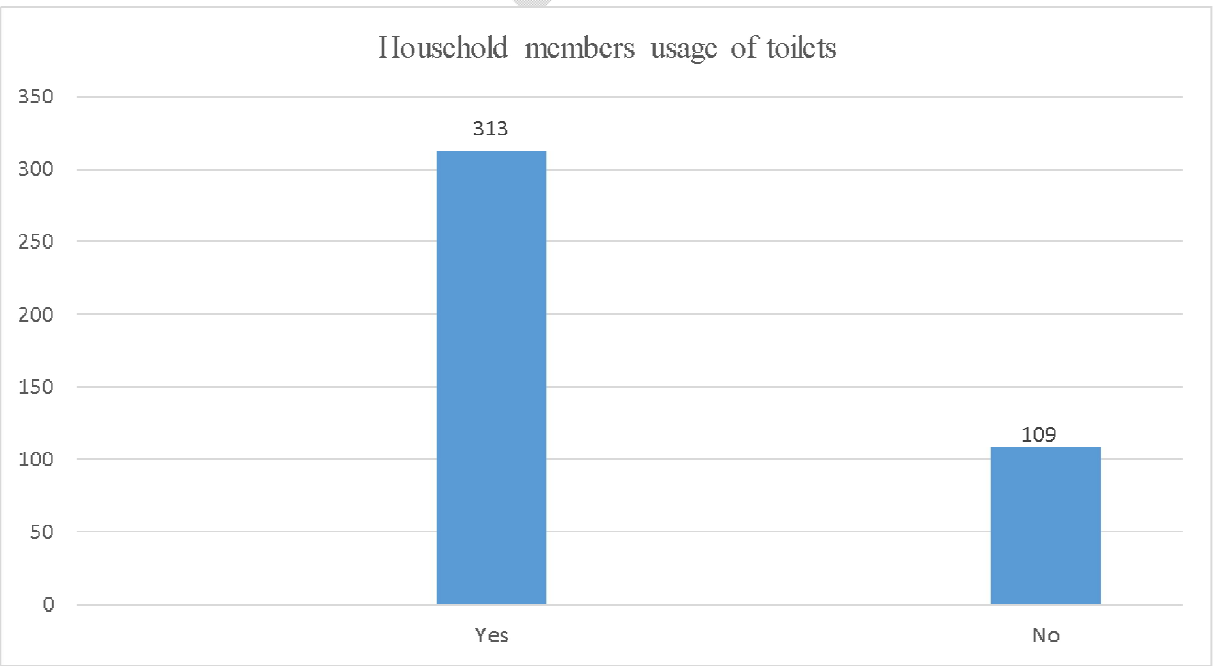

Figure 3 Household member utilization of Toilets

In regard to usage of latrine 313(76%) of the respondents said they used latrine always for defecation. 109(24 %) of the respondents indicated that they did not always use toilet every time they needed to relieve themselves.

3.4 How Socio-Demographic Factors affect Latrine Utilization

On Social demographic factors, Chi square test was used to determine if there was any significant statistical relationship between sociodemographic factors and utilization of latrine at 95% confidence level. The results are tabulated in table 4. below

Table 4: Social demographic factors influencing utilization on latrine

		Household members use of latrine			
	Frequency	**Percentage**	χ2	df	P-Value
Income levels					
1000-12000	365	86.3	93.7	1	<0.001
more 12000	58	13.7			
Total	**423**	**100.0**			
Gender of the respondents	χ2	df	P-Value		
Male	281	66.4	14.6	324	<0.001
Female	142	33.6			
Total	423	100			
Occupation of the respondents		χ2	df	P-Value	
Farming	332	78.5	37.4	2	< 0.001
Civil servant	49	11.6			
Businessman	42	9.9			
Total	423	100			
Age of the respondents		χ2	df	P-Value	
18 – 27	81	19.1	50.65	3	<0.001
28 – 37	55	13.0			
38 – 47	221	52.2			
⩾48	66	15.6			
Total	423	100.0			
Marital status			χ2	df	P-Value
Single	80	18.9	37.4	3	<0.001
Married	326	77.1			
Widowed	17	4.0			
Total	423	100.0			
Education status	**Frequency**	**Percentage**	χ2	df	P-Value
Primary	245	57.9	74.4	3	<0.001
secondary school	90	21.3			
College	65	15.4			
None	23	5.4			
Total	**423**	**100.0**			

All the social demographic characteristics of the respondents significant at 0.05 p values implying that they had a role in the determining whether household members utilized latrines or not. The multivariable analysis revealed that household size of 1 to 4 persons, education level of the respondent, number of years since construction of the latrine greater than three years and as to whether the respondents cleaned the toilet were significantly associated with latrine utilization. The

odds of latrine utilization on households that had 1 to 3 members were 1.25 times (AOR: 1.25, 95% CI [1.2–3.2]) higher than of households of greater than six members.

The study also revealed that the odds of latrine utilization for households where individual were highly educated (secondary and tertiary education) was 1.6 times (AOR: 1.6, 95% CI [1.42–3.83]) higher than for those that did not complete a primary or secondary school student.

Furthermore, the odds of latrine utilization in households in which it had been three years or more years since the latrine had been constructed were 1.82 times (AOR: 1.82, 95% CI [1.12–2.95]) higher than for households in which it had been constructed more recently. The odds of latrine utilization for households that cleaned the latrine daily were 2.19 times (AOR: 2.19, 95% CI [1.12–4.28]) higher than for households that rarely cleaned their latrine moreover, household that owned VIP type of toilet were 1.3 times more likely to use toilet than those who owned ordinary toilets (AOR: 1.32, 95% CI [1.15–3.18]).

3.5 Multivariable Analysis

To see the contribution of the social demographic characteristic to the outcome (toilet usage) a hierarchical multiple logistic regression model was run with toilet use as the dependent variable and all the 8 social demographic characteristics entered at different levels. Table 5 below show the logistic regression model results

Table 5 Effects of the social demographic characteristic to toilet usage

Model Summary

					Change Statistics				
Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	R Square Change	F Change	df1	df2	Sig. F Change
1	.290[a]	.084	.082	.40325	.084	38.725	1	421	.000
2	.334[b]	.111	.107	.39768	.027	12.872	1	420	.000
3	.340[c]	.115	.109	.39727	.004	1.870	1	419	.172
4	.438[d]	.192	.184	.38012	.077	39.675	1	418	.000
5	.627[e]	.393	.386	.32990	.201	137.94	1	417	.000
6	.633[f]	.401	.393	.32803	.008	5.759	1	416	.017
7	.636[g]	.404	.394	.32765	.003	1.956	1	415	.163
8	.642[h]	.412	.400	.32595	.008	5.345	1	414	.021

a. Predictors: (Constant), age

b. Predictors: (Constant), age, sex

c. Predictors: (Constant), age, sex, marital status

d. Predictors: (Constant), age, sex, marital status, education

e. Predictors: (Constant), age, sex, marital status, education, occupation

f. Predictors: (Constant), age, sex, marital status, education, occupation, religion

g. Predictors: (Constant), age, sex, marital status, education, occupation, religion, income

h. Predictors: (Constant), age, sex, marital status, education, occupation, religion, income, household membership size

From the logistic regression model above, all the social demographic factors except for marital status and religion, influenced the decision to utilization of toilet while relieving themselves. Cumulatively, the model explained 41.2% of variation on latrine utilization.

4. DISCUSSION

From the findings70% of the respondents owned a latrine while 25% did not. Moreover, in regard to usage of latrine for defecation 109(26%) of the respondents indicated that they did not always use the toilet every time they needed to defecate. This concurs with Osumanu et al., that although efforts to increase toilet coverage have been made, there still exist people who practice open defecation even with access to toilets [4]. This is consistent with Garn et al. who stated that latrine coverage, or rather ownership, does not necessarily translate to latrine usage since even households that already have latrines still practice open defecation [13]. For example, in a sanitation assessment that covered the squatter areas of Mumbai, while there was a presence of latrine, 71-99% of them were not in good conditions often leading to open defecation on the available filthy latrines[14]. While there may be presence of latrines, people may still opt to openly defecate due to different circumstances such as environment and overtime behavior. In a study conducted by Njuguna, &Muruka in 2015, the Mean open defecation rate across Kenya's 47 counties was 23.5% and the median rate 6.9%. The lowest rate was 0.1% and the highest 88.4%. Fifteen counties had open defecation rates of 40% and above [12]. This study finding therefore indicates that Marakwet East performance in terms of fighting the open defecation vice is below Kenya's average.

Majority of the respondents 365 (86.1%) from the study findings indicated that they earned less than 12000 per year and are farmers in occupation. Status is a person's ability to meet needs in accordance with existing income and become one of the factors in facilitating behavior change [16]. Economic conditions affect the ability of individuals to provide sanitation facilities including the availability of latrines [17]. This is supported with research conducted in Raipur India, where employment status has a significant effect on OD behavior with the unemployed having a high prevalence for failing to utilize the latrines [18]. According to results of 17 reviewed articles (54.84%) examined the relationship between economic status and OD behavior, and 14 articles (82.35%) of them stated that there was a relationship between economic status and OD behavior [19]. The studies point to the underlying cause for the low levels of latrine utilization as a result of low-income. Specifically in the study area, and similar communities, economic interventions are important to be included with sanitation interventions so as the low-income manage to construct the sanitation facilities and end up enhancing latrine utilization.

Further, the odds of latrine utilization of households that had 1 to 3 members were 1.25 times (AOR: 1.25, 95% CI [1.2 -- 3.2]) higher than of households of greater than six members. Hence, the chances for smaller households to embrace latrine utilization was huge. This can be explained due to their ability to manage and maintain the latrines, and as well since it has less cost demands for maintenance. The findings support earlier findings from the field that pointed to household size as having an effect on the utilization and sanitation of latrines [20]. Specifically tailored effort for latrine utilizations and toward large households should be incorporated during the latrine design and implementation processes to cater for the specific issues like finances and maintenance that is often an issue for larger households and which end up affecting latrine utilization.

The study also revealed that the odds of latrine utilization for households where individuals were highly educated (secondary and tertiary education) was 1.6 times (AOR: 1.6, 95% CI [1.42 -- 3.83]) higher than for those that did not complete a primary or secondary school. Studies conducted in Nigeria [21], Ghana [22]and Ethiopia [16]also stated that education level had a significant effect on OD behavior. However, education is not always the main factor in shaping behavior. Based on the results of the review, 5 articles explained that low education did not affect OD behavior. The other factors influence the occurrence of behavior such as knowledge, attitudes, and non-formal education [23]. When OD behavior has become a habit, it will be difficult to change. Education here shows a high likelihood to affect latrine utilization because of having the ability to provide exposure on the necessities of latrine utilization and therefore there's need for education endeavors by the policy makers.

Furthermore, the odds of latrine utilization in households in which it had been three years or more years since the latrine had been constructed were 1.82 times (AOR: 1.82, 95% CI [1.12–2.95]) higher than for households in which it had been constructed more recently. The findings correlate with the existing literature in the field. The findings here imply that long-term use of latrines have corresponding higher levels of latrine utilization. This may be because of different reasons such as the users getting accustomed to using them and incorporating its use in their daily routine even overcoming the initial logistical factors or resistance [24]. They may have also upgraded its look to enhance its appeal. Studies have pointed out that the usage rate is attributed to familiarity and the development of a habitat [25]. Thus, this can further form a basis to continue enhancing the existing latrine facilities, while still developing new ones.

The odds of latrine utilization for households that cleaned the latrine daily were 2.19 times (AOR: 2.19, 95% CI [1.12–4.28]) higher than for households that rarely cleaned their latrine moreover, household that owned VIP type of toilet were 1.3 times more likely to use toilet than those who owned ordinary toilets (AOR: 1.32, 95% CI [1.15–3.18]). The condition of good facilities affects a person's willingness to use these facilities, where poor latrine conditions have an impact on the low use of latrines [4]. Supported with the research conducted in Ethiopia where households that do not clean their latrines regularly are 5.5% more likely to have OD than households that clean their latrines regularly [26]. Based on the results of the review, it was found that people with poor latrine conditions tended to do OD. These conditions include

clogged drains, have never been cleaned, cause unpleasant odors and unsafe seating conditions, so they cannot provide comfort in the morning to the wearer and prefer to do open defecation. Therefore, the necessity for well-maintained latrines is further pinpointed, as it's crucial for enabling higher rates of latrine utilization.

5. CONCLUSION

This study looked at how latrine utilization in rural communities is affected by factors like the latrine design, cultural factors and social demographics specifically in Marakwet East. The study concluded that latrine utilization is influenced by various variables. Further, socio-demographic factors such as education, occupation, and household size further impact the level of priority that individuals have towards utilizing latrines. The logistic regression model on social demographic factors influenced the decision to utilize latrine with exception of marital status and religion. Cumulatively, the model explained 41.2% of variation on latrine utilization. Bearing in mind these factors that affects latrine utilization, the study recommends developing campaigns that aim to change the myths and misconceptions as one of the vital ways that could enhance sanitation. The study recommends multi-sectorial approach in designing and implementing community led total sanitation. It's important as well to involve the community to come up with a cost-effective latrine design and culture-abiding ways that nurture ownership and sustainability in the long-term.

7. ETHICAL APPROVAL

Ethical issues were vital to ensure quality of research is maintained and the data collection process respected the rights and privacy of individual and its proper use.The research study was approved by Mount Kenya University Ethics Review Committee REF: MKU/ISERC/3272. This was followed by seeking a Research Permit (License) from the National Commission of Science, Technology and Innovation (NACOSTI) Ref No: 961791. Finally a research authorization letter was obtained from the ministry of Interior and National Administration, Elgeyo Marakwet County Ref PUB.CC.24/2VOL.III/187 that allowed collection of data in households of Marakwet East. Prior to the interview participants were informed about the study that it was voluntary hence one had the option to opt out from the interview at any given time without giving reasons. Before the questionnaire was administered a written consent was sought from the respondent. With informed consent the questionnaire was administered. Research assistant had been trained on the need to maintain confidentiality. The completed questionnaires were only accessible to the researcher who kept them safely in a lockable box. In addition there was no use of names in the questionnaire for assurance of anonymity and confidentiality to the respondent..

8. REFERENCES

1. W. H. Organization and U. N. C. Fund, Progress on household drinking water, sanitation and hygiene 2000-2020: five years into the SDGs. World Health Organization, 2021.
2. "Progress on household drinking water, sanitation and hygiene, 2000-2020: Five years into the SDGs - UNICEF DATA." Accessed: Jun. 05, 2024. [Online]. Available: https://data.unicef.org/resources/progress-on-household-drinking-water-sanitation-and-hygiene-2000-2020/
3. "Progress on drinking water, sanitation and hygiene 2000–2017 | UNICEF." Accessed: Jun. 05, 2024. [Online]. Available: https://www.unicef.org/reports/progress-on-drinking-water-sanitation-and-hygiene-2019
4. "Determinants of Open Defecation in the Wa Municipality of Ghana: Empirical Findings Highlighting Sociocultural and Economic Dynamics among Households - Osumanu - 2019 - Journal of Environmental and Public Health - Wiley Online Library." Accessed: Jun. 05, 2024. [Online]. Available: https://onlinelibrary.wiley.com/doi/10.1155/2019/3075840
5. "No toilet no bride? Intrahousehold bargaining in male-skewed marriage markets in India - ScienceDirect." Accessed: Jun. 05, 2024. [Online]. Available: https://www.sciencedirect.com/science/article/abs/pii/S0304387817300342
6. [6] "(PDF) Understanding empowerment in water, sanitation, and hygiene (WASH): a scoping review." Accessed: Jun. 05, 2024. [Online]. Available: https://www.researchgate.net/publication/337737443_Understanding_empowerment_in_water_sanitation_and_hygiene_WASH_a_scoping_review

7. J. Wolf et al., “Impact of Drinking Water, Sanitation and Hand Washing with Soap on Childhood Diarrhoeal Disease: Updated Meta-Analysis and –Regression,” Trop. Med. Int. Health, vol. 23, Mar. 2018, doi: 10.1111/tmi.13051.
8. PR143.pdf.” Accessed: Jun. 05, 2024. [Online]. Available: https://dhsprogram.com/pubs/pdf/PR143/PR143.pdf
9. “ken179039.pdf.” Accessed: Jun. 05, 2024. [Online]. Available: https://faolex.fao.org/docs/pdf/ken179039.pdf
10. Stratified Fisher’s exact test and its sample size calculation - PubMed.” Accessed: Jun. 05, 2024. [Online]. Available: https://pubmed.ncbi.nlm.nih.gov/24395208/
11. K. N. B. of S. n/a K. N. B. of Statistics, “2019 Kenya Population and Housing Census Reports,” CAHF | Centre for Affordable Housing Finance Africa. Accessed: Jun. 05, 2024. [Online]. Available: https://housingfinanceafrica.org/documents/2019-kenya-population-and-housing-census-reports/
12. [12] J. Njuguna and C. Muruka, “Open Defecation in Newly Created Kenyan Counties: A Situational Analysis,” J. Health Care Poor Underserved, vol. 28, no. 1, pp. 71–78, 2017, doi: 10.1353/hpu.2017.0009.
13. J. V. Garn et al., “The impact of sanitation interventions on latrine coverage and latrine use: A systematic review and meta-analysis,” Int. J. Hyg. Environ. Health, vol. 220, no. 2, Part B, pp. 329–340, Apr. 2017, doi: 10.1016/j.ijheh.2016.10.001.
14. [14] R. Biswas, K. Arya, and S. Deshpande, “More toilet infrastructures do not nullify open defecation: a perspective from squatter settlements in megacity Mumbai,” Appl. Water Sci., vol. 10, Apr. 2020, doi: 10.1007/s13201-020-1169-4.
15. “What motivates open defecation? A qualitative study from a rural setting in Nepal | PLOS ONE.” Accessed: Jun. 05, 2024. [Online]. Available: https://journals.plos.org/plosone/article?id=10.1371/journal.pone.0219246
16. [16] “Household latrine utilization and its association with educational status of household heads in Ethiopia: a systematic review and meta-analysis | BMC Public Health | Full Text.” Accessed: Jun. 05, 2024. [Online]. Available: https://bmcpublichealth.biomedcentral.com/articles/10.1186/s12889-018-5798-6
“Open defecation practice and its determinants among households in sub-Saharan Africa: pooled prevalence and multilevel analysis of 33 sub-Saharan Africa countries demographic and health survey | Tropical Medicine and Health | Full Text.” Accessed: Jun. 05, 2024. [Online]. Available: https://tropmedhealth.biomedcentral.com/articles/10.1186/s41182-022-00416-5
17. P. Panda, A. Chandrakar, and G. Soni, “Prevalence of open air defecation and awareness and practices of sanitary latrine usage in a rural village of Raipur district,” Int. J. Community Med. Public Health, vol. 4, p. 3279, Aug. 2017, doi: 10.18203/2394-6040.ijcmph20173828.
18. Logistic regressions: Effect of financial inclusion on open defecation.,” ResearchGate. Accessed: Jun. 05, 2024. [Online]. Available: https://www.researchgate.net/figure/Logistic-regressions-Effect-of-financial-inclusion-on-open-defecation_tbl2_359034446
19. E. T. Woyessa, T. Ashenafi, Z. Ashuro, and A. Ejeso, “Latrine Utilization and Associated Factors Among Community-Led Total Sanitation and Hygiene (CLTSH) Implemented Kebeles in Gurage Zone, Southern Ethiopia: A Cross-Sectional Study,” Environ. Health Insights, vol. 16, p. 11786302221114819, Jul. 2022, doi: 10.1177/11786302221114819.
20. I. Rimi Abubakar, “Exploring the determinants of open defecation in Nigeria using demographic and health survey data,” Sci. Total Environ., vol. 637–638, pp. 1455–1465, May 2018, doi: 10.1016/j.scitotenv.2018.05.104.
21. “Determinants of Open Defecation in the Wa Municipality of Ghana: Empirical Findings Highlighting Sociocultural and Economic Dynamics among Households - Osumanu - 2019 - Journal of Environmental and Public Health - Wiley Online Library.” Accessed: Jun. 05, 2024. [Online]. Available: https://onlinelibrary.wiley.com/doi/10.1155/2019/3075840
22. “The influence of culture on open defaecation in some basic schools in selected districts in Ghana: A preliminary study - PMC.” Accessed: Jun. 05, 2024. [Online]. Available: https://www.ncbi.nlm.nih.gov/pmc/articles/PMC7537866/
23. A. Nunbogu, M. Harter, and H.-J. Mosler, “Factors Associated with Levels of Latrine Completion and Consequent Latrine Use in Northern Ghana,” Int. J. Environ. Res. Public. Health, vol. 16, p. 920, Mar. 2019, doi: 10.3390/ijerph16060920.
24. “Latrine Utilization and Associated Factors Among Community-Led Total Sanitation and Hygiene (CLTSH) Implemented Kebeles in Gurage Zone, Southern Ethiopia: A Cross-Sectional Study - PMC.” Accessed: Jun. 05, 2024. [Online]. Available: https://www.ncbi.nlm.nih.gov/pmc/articles/PMC9310215/

[26] “Latrine Structure, Design, and Conditions, and the Practice of Open Defecation in Lodwar Town, Turkana County, Kenya: A Quantitative Methods Research - PJ Busienei, GM Ogendi, MA Mokua, 2019.” Accessed: Jun. 05, 2024. [Online]. Available: https://journals.sagepub.com/doi/10.1177/1178630219887960

9. DEFINITION & ABBREVIATIONS

DEFINITIONS.

Improved latrine: a facility that eliminates contact between human excrements and humans hygienically.

Open defecation: the practice of disposing human excrements in an open locality that include water bodies like beaches, rivers and lakes, fields, bushes, among more.

Utilization of Latrines: this is when members of a household use latrines in the course of their lifetime and keep it clean while also using a hand-washing facility that's close to the latrine.
Shared latrine: this is a facility for containing human excreta and used by more than one household but excludes public latrines.

ABBREVIATIONS

CLTS Community Led Total Sanitation
HHs Households
JMP Joint Monitoring Programme
KHIS Kenya Health Information System
MOH Ministry of Health
OD Open Defecation
TPB Theory of Planned Behavior
UNICEF United Nations Children's Fund