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Original Research Article

Knowledge factors associated with the uptake of improved hygiene and sanitation facilities among households in Kuresoi South Sub-County, Nakuru County, Kenya

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ABSTRACT

Background: Access to improved hygiene and sanitation facilities remains a major public health challenge in many rural communities, contributing to persistent burden of preventable infectious diseases. Knowledge of hygiene and sanitation practices is considered an important determinant of household adoption of improved facilities. This study assessed knowledge-related factors associated with the uptake of improved hygiene and sanitation facilities among households in Kuresoi South Sub-County, Nakuru County, Kenya.
Methods: A descriptive cross-sectional study using a mixed-methods approach was conducted among 346 households selected through stratified and systematic random sampling. Data were collected using structured questionnaires, observation checklists, and focus group discussions. Quantitative data were analyzed using descriptive statistics, chi-square tests, and binary logistic regression at a 95% confidence level. Qualitative data were analyzed thematically.
Results: Overall, 61.3% of households had poor uptake of improved hygiene and sanitation facilities. Chi-square analysis showed significant associations between uptake and knowledge of diseases caused by poor hygiene (χ^2=9.849, p=0.007) and knowledge of critical handwashing times (χ^2=21.877, p<0.001). Logistic regression indicated that households with low knowledge of hygiene-related diseases were 57% less likely to adopt improved hygiene and sanitation facilities (OR=0.43, 95% CI: 0.186-0.980), while those with low knowledge of critical handwashing times were 68% less likely to adopt improved facilities (OR=0.32, 95% CI: 0.177-0.592).
Conclusions: Knowledge significantly influences uptake of improved hygiene and sanitation facilities. Targeted, behavior-specific health education interventions should be strengthened to improve sanitation adoption and sustain appropriate hygiene practices in rural communities.

Keywords: Handwashing, Households, Hygiene, Kenya, Knowledge, Sanitation, Uptake, WASH

INTRODUCTION

Access to improved hygiene and sanitation remains a critical global public health priority, particularly in low- and middle-income countries. Poor sanitation and hygiene practices continue to contribute substantially to preventable diseases, especially diarrheal illnesses that remain a leading cause of morbidity in developing regions.[1] The burden is disproportionately higher in rural and low-income settings where access to safe sanitation

facilities is limited.[2] Despite global progress in improving water, sanitation, and hygiene (WASH) coverage, inequalities remain persistent across regions and populations.[3] These disparities are further exacerbated by rapid population growth and inadequate infrastructure development.[4] Consequently, achieving universal access to improved sanitation remains a key global health challenge, requiring sustained investment, policy commitment, and community-level behavioral change interventions.[5]

The uptake of improved hygiene and sanitation facilities is influenced by a combination of socio-economic, environmental, and infrastructural factors.[6] Household income and education levels significantly determine whether families adopt and consistently use improved sanitation facilities.[7] In many rural communities, limited access to clean water and poor infrastructure constrain the effective use of sanitation systems.[8] Additionally, financial limitations often prevent households from constructing or upgrading sanitation facilities to improved standards. These structural challenges highlight the importance of integrated WASH programming that simultaneously addresses water access, sanitation infrastructure, and affordability.[9] Without addressing these underlying determinants, efforts to improve sanitation uptake may remain ineffective in resource-constrained settings.

Knowledge factors are essential behavioral determinants influencing the adoption of improved hygiene and sanitation practices at household level. Awareness of sanitation-related health risks has been shown to significantly increase the likelihood of adopting proper hygiene behaviors.[10] However, misinformation, cultural norms, and entrenched beliefs often limit the consistent use of available sanitation facilities.[11] In some communities, traditional practices continue to influence sanitation decisions despite awareness of modern health risks. Behavior changes interventions that target attitudes, perceptions, and social norms have been found effective in improving hygiene practices and sanitation uptake.[12] Therefore, addressing both cognitive and cultural dimensions is critical in promoting sustained sanitation behavior change.

In Kuresoi South Sub-County, Nakuru County, sanitation challenges remain influenced by both structural and behavioral factors at household level.[13] Rural communities in the region often face socio-economic constraints, limited infrastructure, and cultural practices that affect sanitation uptake.[14] Additionally, variations in knowledge levels toward hygiene practices contribute to inconsistent adoption of improved facilities across households.[15] Localized evidence is therefore necessary to better understand these context-specific determinants and guide targeted interventions.[4] National-level data may not fully capture the unique challenges experienced in rural sub-counties. This study therefore sought to assess knowledge level factors associated with the uptake of improved hygiene and sanitation facilities among households in Kuresoi South Sub-County.

METHODS

The study was conducted from 21st September, 2025 to 24th December, 2025. We adopted a descriptive cross-sectional design using a mixed methods approach to examine knowledge factors associated with the uptake of improved hygiene and sanitation facilities among households in Kuresoi South Sub-County, Nakuru County, Kenya. The inclusion criteria were that who resided in the study area for a period of at least one year. Households whose household heads were absent for the entire period of the study were excluded. The dependent variable was uptake of improved hygiene and sanitation facilities, while the independent variables included knowledge levels sanitation practices. A sample size of 350 households was determined using Cochran's formula and adjusted for the finite population. Additionally, four focus group discussions (FGDs) were conducted across the wards to provide in-depth qualitative insights. Households were selected through stratified and systematic random sampling, ensuring proportional representation across the sub-county's wards.

Data were collected using a structured questionnaire, observation checklist, and FGDs. The questionnaire captured data on knowledge variables while the observation checklist assessed the availability, functionality, and condition of sanitation facilities within households. Knowledge was measured using scored questions. FGDs explored perceptions, barriers, and motivations influencing sanitation practices. Data collection was conducted by trained research assistants using ODK (open data kit) to ensure accuracy and efficiency. Pretesting was carried out in Kuresoi North Sub-County using 10% of the sample to refine tools and improve clarity. Reliability was confirmed using test-retest methods, yielding a correlation coefficient of 0.86, while validity was ensured through expert review.

To measure respondents' knowledge of diseases caused by poor hygiene and sanitation, a binary knowledge scale was developed using four hygiene and sanitation-related questions. For each question, responses were coded on a binary scale, where a correct response ("yes") was assigned a score of 1, and an incorrect or unaware response ("no") was assigned a score of 0. The scores from the four items were summed to generate a composite knowledge score ranging from 0 to 5. Higher values reflect greater knowledge of hygiene- and sanitation-related diseases. Based on the total score, respondents' knowledge levels were categorized into three groups: Low knowledge (0-1 points): indicating minimal knowledge of the link between hygiene/sanitation and disease. Moderate knowledge (2-3 points): reflecting partial or average understanding. High knowledge (4-5 points): representing strong knowledge of hygiene- and sanitation-related disease risks. Thus, independent

variable on knowledge level was categorical; hence, inferential statistics (chi-square and binary logistic regression analysis) were used to draw conclusions on its relationship with dependent variable in the study.

Data were analyzed using SPSS version 26 after export from ODK to Excel. Descriptive statistics such as frequencies, percentages, means, and standard deviations were used to summarize data. Inferential analysis was conducted using chi-square tests and binary logistic regression to determine associations between independent variables and uptake of improved sanitation, with significance set at $p \leq 0.05$ and a 95% confidence interval. Qualitative data from FGDs were analyzed thematically to identify patterns related to knowledge levels. Findings were presented using tables, graphs, and charts to facilitate interpretation and comparison of results.

RESULTS

An overall of 350 were nominated to partake in the study. However, six (6) questionnaires were rejected as they were incomplete; hence, findings are reported for 346 participants. As shown in Table 1, for most of the households; 155 (44.8%) the father was the Household Head (HH) as more than average of the households; 203 (58.7%) reported that the gender of the HH was male. A high proportion of the households; 154 (44.5%) were composed of 4-6 household members with the mean composition of households being 5.90±2.84 members. For most of the households; 145 (41.9%), the household head was aged 30-40 years with a third of them; 105 (30.3%) reporting to have completed primary school level of education, and most of them; 126 (36.4%) indicating that they engaged in business as their main socio-economic activity.

Table 1: Profile of the study participants, n=346.

Characteristics	n=346	Percentage
Household head		
Father	155	44.8*
Mother	140	40.5
Other	51	14.7
Household head gender		
Female	143	41.3
Male	203	58.7*
Household composition		
1-3	65	18.8
4-6	154	44.5*
7-9	99	28.6
≥10	28	8.1
Mean HH composition: 5.90±2.84		
Household head age		
19-29	71	20.5
30-40	145	41.9*
41-51	103	29.8
52-62	27	7.8
Household head education		
Completed primary education	105	30.3
No formal education	30	8.7
Secondary education	112	32.4*
Incomplete primary education	51	14.7
Tertiary education	48	13.9
Household income		
Business	126	36.4
Farming	161	46.5*
Salaried employment	59	17.1

Participant's socio- demographic and economic profile generated using descriptive statistics (frequencies and proportions), *: majority of the participants.

As shown in Table 2, it was observed that a high proportion of the households; 212 (61.3%) had poor coverage/uptake of hygiene and sanitation as indicated by the calculated hygiene and sanitation index (HIS). The mean hygiene and sanitation score for the households was 3.49±1.91. Respectively, more than three quarters of the

households; 279 (80.6%) had a hygiene and sanitation facility with the most common facility being a pit latrine with a slab as observed in 95 (27.5%) of the households. In close to three quarters of the households; 246 (71.1%), it was observed that the present hygiene and sanitation facility was not clean (free from fecal matter on the floor, free from garbage, and minimal flies).

In nearly half of the households; 172 (49.7%) it was observed that the available hygiene and sanitation facility was not ventilated. It was further observed that in a high percentage of the households; 150 (43.4%), there were no handwashing material(s) in the hygiene and sanitation facility that was present. Similarly, in most of the households; 208 (60.1%) children's waste disposal facility were not available. Nonetheless, most of the households; 238 (68.8%) had accessible hygiene and sanitation facility. It was further observed that in a high proportion of the households; 132 (38.2%) distance to the available hygiene and sanitation facility was between fifty (50) and one hundred (100) meters.

Table 2: Coverage/uptake of hygiene and sanitation facilities.

Hygiene and sanitation feature	n=346	Percentage
Hygiene and sanitation coverage/uptake		
Poor	212	61.3*
Adequate	134	38.7
Presence of hygiene and sanitation facility		
Yes	279	80.6*
No	67	19.4
Type of hygiene and sanitation facility		
Compost toilet	19	5.5
Flush toilet	33	9.5
Pit latrine with slab	95	27.5*
Ventilated pit latrine	91	26.3
Other	41	11.8
Cleanliness of hygiene and sanitation facility		
Yes	33	9.5
No	246	71.1%
Ventilation of hygiene and sanitation facility		
Yes	107	30.9
No	172	49.7*
Presence of hand-washing material(s)		
Yes	129	37.3
No	150	43.4*
Availability of children's waste disposal facility		
Yes	71	20.5
No	208	60.1*
Accessibility of hygiene and sanitation facility		
Yes	238	68.8*
No	41	11.8
Distance of hygiene and sanitation facility to household		
0-50 meters	111	32.1
50-100 meters	132	38.2
>100 meters	36	10.4

Coverage/uptake of hygiene and sanitation facilities; generated using descriptive statistics (frequencies and proportions), *: majority of the participants.

Information from the focused group discussions complemented quantitative findings on uptake of improved hygiene and sanitation facilities.

"... Most of us have a latrine, but having it does not mean everything is okay. Some are old and not well taken care of, so hygiene is still a problem. We constructed the latrine mainly so that we are not blamed by health officers, but improving it is another issue ..." (Male FGD, 2025)

"...Cleaning the latrine every day is difficult, especially when many people are using it. Sometimes it stays dirty for long. When children use the latrine, they soil the floor,

and it is not easy to clean immediately. On ventilation, we do not see the importance of ventilation pipes; as long as the latrine is there, it can be used ..." (Female FGD, 2025)

Table 3: Knowledge level factors associated with uptake/coverage of improved hygiene and sanitation facilities.

Knowledge level variables	Uptake/coverage of improved hygiene and sanitation		χ^2	P value
	Poor	Adequate		
Knowledge level on disease caused by poor hygiene				
Low	52 (15.0)	37 (10.7)	9.849	0.007*
Medium	148 (42.8)	77 (22.3)		
High	12 (3.5)	20 (5.8)		
Knowledge on transmission of disease related to poor hygiene				
Low	101 (29.2)	49 (14.2)	4.740	0.093
Medium	90 (26.0)	65 (18.8)		
High	21 (6.1)	20 (5.8)		
Knowledge on critical hand-washing times				
Low	115 (33.2)	66 (19.1)	21.877	<0.001*
Medium	75 (21.7)	29 (8.4)		
High	22 (6.4)	39 (11.3)		
Knowledge on reasons for handwashing				
Low	54 (15.6)	29 (8.4)	9.161	0.010
Medium	137 (39.6)	76 (22.0)		
High	21 (6.1)	29 (8.4)		

Pearson Chi-Square ($\chi 2$) test for associations. *Statistically significant χ^2 association at $\alpha \leq 0.05$.

Table 4: Binary logistic regression analysis on knowledge level factors associated with uptake/coverage of improved hygiene and sanitation facilities.

Variables	Odds Ratio	95% confidence interval	P value
Knowledge level on diseases caused by poor hygiene and sanitation			
Low	0.427	0.186-0.980	0.045*
Medium			
High			
Knowledge level on critical hand-washing times			
Low	0.324	0.177-0.592	<0.001*
Medium			
High			

Binary logistic regression analysis; *Statistically significant χ^2 association at 95% confidence interval (CI).

As shown by Table 3, the study found out that there was a significant association between knowledge level on diseases caused by poor hygiene and uptake/coverage of improved hygiene and sanitation facilities (χ^2=9.849, df=2, p=0.007, CI=95%). Similarly, there was a significant association between knowledge level on critical handwashing times uptake/coverage of improved hygiene and sanitation facilities (χ^2=21.877, df=1, p<0.001, CI=95%). However, the study did not find a significant association between knowledge level on transmission of diseases related to poor hygiene and sanitation (χ^2=4.740, df=3, p=0.093, CI=95%) and knowledge level on reasons for handwashing performance (χ^2=9.161, df=2, p=0.010, CI=95%), and uptake/coverage of improved hygiene and sanitation facilities.

FGD participants provided further narrations on the level of knowledge on different attributes related to uptake of improved hygiene and sanitation facilities. These narrations indicated that members of households sampled for the study possessed basic and uneven knowledge levels on different aspects aligned with uptake of improved hygiene and sanitation facilities.

"... I only know about diarrhea; other diseases I am not very sure about. In addition, "We know the disease comes, but how exactly it enters the body is not very clear to us ..." (Female FGD, 2025)

"... People wash hands mostly so that they look clean, not necessarily thinking about disease. You wash hands before eating, but sometimes we forget other times ..." (Male FGD, 2025)

Knowledge level factors that demonstrated significant association with chi-square (knowledge level on diseases caused by poor hygiene and sanitation and knowledge level on critical handwashing times) were introduced to binary logistic regression model to assess the level of association. As shown in Table 4, having low level of knowledge level on diseases caused by poor hygiene and sanitation reduced the odds of predicting uptake/coverage of improved hygiene and sanitation by 57% (OR=0.43, 95% CI: 0.186-0.980; p=0.045). Similarly, having low level of knowledge on critical handwashing times reduced the odds of uptake of improved hygiene and sanitation facilities by 68% (OR=0.32, 95% CI: 0.177-0.592; p<0.001).

DISCUSSION

The results from the logistic regression analysis reinforce the critical role of knowledge in shaping hygiene and sanitation behaviors. Individuals with low knowledge of diseases associated with poor hygiene and sanitation were significantly less likely to adopt improved facilities, with a 57% reduction in odds. This suggests that knowledge enhances risk perception and motivates preventive behavior, as individuals who understand the health consequences of poor hygiene are more likely to engage in protective practices.[16] Recent evidence supports this relationship, with studies demonstrating that higher levels of hygiene-related knowledge are significantly associated with improved WASH practices and increased uptake of sanitation facilities.[17,18]

Similarly, the strong association between knowledge of critical handwashing times and uptake of improved hygiene and sanitation facilities where low knowledge reduced the odds by 68% highlights the importance of practical, action-oriented knowledge.[19] Understanding key moments for handwashing helps translate awareness into routine behavior, reinforcing the use of sanitation infrastructure.[20] Empirical studies have shown that targeted hygiene education focusing on specific practices, such as handwashing at critical times, significantly improves both behavioral compliance and sanitation outcomes.[21,22] These findings underscore the need for interventions that strengthen both general and specific hygiene knowledge to enhance the adoption and sustained use of improved sanitation facilities.

These findings also suggest that knowledge functions as an enabling factor that supports the translation of awareness into actual practice.[23] Individuals with adequate knowledge are more likely to recognize the benefits of improved hygiene and sanitation facilities and to overcome barriers related to cost, accessibility, or cultural norms.[24] Conversely, limited knowledge may reduce perceived importance and hinder behavioral change, even when facilities are available. Recent empirical studies have emphasized that knowledge not only influences individual behavior but also shapes household decision-making regarding sanitation investments and sustained use of facilities.[7,25] This highlights the importance of integrating hygiene education with infrastructure development to ensure optimal utilization.

Furthermore, the stronger association observed with knowledge of critical handwashing times suggests that specific, behavior-focused knowledge may be more impactful than general awareness alone.[26] Practical knowledge provides clear guidance on when and how to act, thereby increasing consistency in hygiene practices and reinforcing the use of sanitation facilities.[10] Evidence indicates that interventions targeting specific hygiene behaviors yield greater improvements compared to general health education approaches.[3] Therefore, public health strategies should prioritize context-specific and behavior-centered education alongside broader awareness campaigns to maximize the uptake and sustained use of improved hygiene and sanitation facilities.

The cross-sectional design adopted by the study limited causal inference between knowledge and uptake of improved hygiene and sanitation facilities. Additionally, reliance on self-reported data may have introduced recall and social desirability bias, and the findings may not be generalizable beyond Kuresoi South Sub-County due to contextual differences.

CONCLUSION

The study demonstrates that knowledge is a significant predictor of the uptake of improved hygiene and sanitation facilities. Specifically, knowledge of diseases caused by poor hygiene and sanitation, as well as knowledge of critical handwashing times, were both independently associated with higher likelihood of adoption. Individuals with low levels of knowledge in these areas were significantly less likely to utilize improved facilities, highlighting the importance of awareness in influencing health-related behaviors. These findings suggest that improving knowledge can enhance risk perception and motivate individuals to adopt preventive hygiene and sanitation practices.

The results highlight the need for targeted health education interventions that go beyond general awareness to include practical, behavior-specific information. Programs focusing on educating communities about disease risks and critical hygiene practices, such as handwashing at key times, are likely to yield substantial improvements in sanitation uptake. Therefore, policymakers and public health practitioners should prioritize integrated approaches that combine infrastructure development with effective hygiene education to promote sustained utilization of improved hygiene and sanitation facilities.

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