International Journal of Community Medicine and Public Health
Omufwoko TM et al. Int J Community Med Public Health. 2024 Oct;11(10):3779-3786
http://www.ijcmph.com
pISSN 2394-6032 | eISSN 2394-6040

DOI: https://dx.doi.org/10.18203/2394-6040.ijcmph20242854

Original Research Article

Major factors influencing the effectiveness of community-led total sanitation among communities in Kilifi and Marsabit Counties in Kenya

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Received: 16 July 2024
Revised: 11 September 2024
Accepted: 12 September 2024

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ABSTRACT

Background: Poor sanitation contributes to about 775,000 deaths annually and is one of the world's most significant health and environmental challenges, especially in developing nations. This study examined factors influencing the effectiveness of CLTS as an approach to delivering open defecation-free communities in Kilifi and Marsabit Counties in Kenya.
Methods: The study methodology included a comparative cross-sectional study of the two diverse study populations. The researchers recruited 811 participants after a multistage sampling procedure was used to sample the villages and the households. Quantitative data was analysed using SPSS tool version 26.0. Descriptive and inferential statistics and propensity score matching (PSM) were used to analyse the data. All tests were done at $p \leq 0.05$.
Results: Open defecation dropped from 30% to 13.45% after CLTS interventions. There was a significant statistical association between household heads having a college-level education (A.O.R=10.273, p=0.013), being above 61 years (A.O.R=4.046, p=0.009), having a higher monthly income (A.O.R=6.461, p=0.091), and being female (A.O.R=1.792, p=0.03), and owning a sanitation facility. Also, households with heads with good handwashing and CLTS awareness (A.O.R=2.459, p=0.002) and (A.O.R=4.317, p=0.022) were statistically associated with owning sanitation facilities. PSM analysis found that CLTS programs impacted sanitation status, resulting in a 42% increase in facility ownership.
Conclusions: The study established a statistical significance of CLTS and ownership of sanitation facilities in both counties. The results show that the CLTS program is effective and has positively impacted sanitation status by reducing open defecation levels in Kilifi and Marsabit.

Keywords: Awareness, Intervention, Open defecation-free, Sanitation

INTRODUCTION

Access to water and sanitation is a global challenge. According to the Joint Monitoring Programme (JMP) Report of WHO and UNICEF, about 61% of the world's population (4.5 billion people) lack access to safely supervised sanitation services.[1] This indicates that these individuals use a latrine or toilet, which does not result in the safe treatment or disposal of excreta. Additionally, there were not enough handwashing statistics to create a global estimate. Only 15% of people in sub-Saharan Africa had access to a soap-and-water handwashing station.[1]

Over 5.6 million Kenyans still urinate in the open, with only 31% of the population having access to improved sanitation in urban areas and 30% in rural ones.[2] If

immediate action is not taken, diseases including cholera, typhoid, amoebic, and diarrhoea will continue to be prevalent. Poor sanitation costs Kenya an estimated Kes 27 billion (365 million USD) annually, or 0.9% of the country's GDP.[2] Although open defecation costs Kenya $88 million annually, ending the activity would only necessitate constructing and using 1.2 million latrines.[3] In article 43 of the 2010 Constitution of Kenya, sanitation was deemed necessary enough to be designated a fundamental right. This poor sanitary status can be demonstrated by the current National Cholera crisis, especially in Kibra, Nairobi, that targeted ministers and high-end establishments.

More than half of Kenyans, or 21 million people, use unhygienic or shared latrines, while 5.6 million more have no access to latrines at all and must defecate in the open.[3] The main factor causing Kenya's 3,500 cholera infections per year on average is faecal pollution of the environment. The required WASH response is expected to cost US$ 2.2 million annually. However, a cholera outbreak has economic ramifications beyond the immediate response of the health system.[4] According to the WSP research, 19,500 Kenyans, including 17,100 children under the age of 5, pass away from diarrheal disease each year, with 90% of these deaths being directly related to inadequate access to water, sanitation, and hygiene.[3]

Sanitation is a constitutional right in Kenya, and the responsibility for it rests on the shoulders of the county government.[5] Recently, one form of intervention to reduce open defecation has gained worldwide attention. Community-led total sanitation has been adopted and implemented in many countries as an approach to putting an end to open defecation. Without providing subsidies to buy latrine or toilet construction materials, the CLTS intervention facilitates a process to motivate and empower rural communities to avoid open defecation and construct and utilise latrines.[4]

Community members use participatory rural appraisal methodologies to examine their sanitation profile, including the level of open defecation and the spread of faecal-oral contamination that adversely impacts every one of them. The CLTS strategy causes the community to feel contemptible and ashamed. They all recognize the horrible effects of open defecation, including the fact that, as long as it persists, they are consuming one another's faeces. This realization inspired them to start a community-wide initiative to address sanitation conditions.[6]

The most extensively used policy intervention for enhancing rural sanitation in low-income countries is CLTS. The SDG of stopping open defecation (OD), which approximately 900 million people currently practise, is the focus of community-led complete sanitation.[6] In many nations around the world, CLTS programming and implementation are being carried out. It is a viable option for governments and donors, as it promises to decrease open defecation and increase sanitation coverage through community mobilisation and shared behaviour change-typically without providing direct financial support for the construction of toilets.[7] Kenya initiated the Open defecation-free rural Kenya in May 2011. The government aimed to have an ODF Kenya by 2013, and an ODF Rural Kenya Roadmap 2011-2013 was developed. It also aimed to accelerate MDG 7, which the country did not achieve.[7] By the end of the period, only 9,126 villages had been triggered. Three thousand nine hundred fifty-six had claimed ODF status, 2,567 had been verified, and a dismal 1,273 had been certified as ODF.[7]

This study aimed to assess the determinants of the effectiveness of CLTS among communities in Kilifi and Marsabit Counties in Kenya. Also, to assess ODF status among communities in Kilifi and Marsabit Counties in Kenya. Additionally, to assess the level of awareness of CLTS among communities in Kilifi and Marsabit Counties in Kenya. Moreover, to evaluate the morbidity of sanitation-related diseases (diarrhoea and dysentery) in children under five years old in communities in Kilifi and Marsabit counties, Kenya. And to determine the major factors influencing the effectiveness of CLTS among communities in Kilifi and Marsabit Counties in Kenya.

METHODS

The study adopted a comparative study design and included an analytical cross-sectional study design to ensure a proper description of the study variables and to bring out the real situation of CLTS among the two communities, properly describing the differences in the effectiveness of CLTS in the two counties.

Study approach

The study design used a quantitative approach. After the intervention phase, quantitative data for key parameters were recorded and compared to quantitative baseline data fetched from secondary sources.

Study location

The study was carried out in Kilifi and Marsabit Counties in Kenya. The purposive method was used as the criteria for choosing the two study locations. CLTS has been implemented in both counties by the government in protocols, yet each one has a social, economic, and geographical difference, which calls for a comparison between the two to ascertain the outcomes of CLTs under these circumstances.

This study represents all such areas with diverse socio-cultural and socio-economic diversity in Kenya, Africa and globally. The study area in (Kilifi) is agricultural, while the other (Marsabit) is nomadic, food-deficient, and semi-arid. Both have different sanitation challenges yet

are expected to achieve Open Defecation Free status in Kenya simultaneously by 2020 (Kenya ODF Roadmap, 2016) – under review.

Target population

The targeted population were adult (18 and above) household heads. The study population was all households in Saku and Rabai Sub counties from Marsabit and Kilifi county reports, totalling 371 villages (Rabai 177 villages and Saku 194 villages).

These two areas were selected purposively. This is because they both had a government CLTS project for one year, from November 2020 to November 2021.

Sampling procedure and technique

Purposive sampling was used to select the study site, which is in Saku and Rabai Sub Counties in Marsabit and Kilifi County.

A multistage sampling technique of the villages within the sub-counties was deployed. This is a form of cluster sampling that involves dividing the population into groups (or clusters). Then, one or more clusters were chosen at random, and everyone within the chosen cluster was sampled. The sampling entailed cluster sampling for villages. The study used a sample frame for HHs and then performed simple random sampling for the HHs.

Data management and analysis

The data analysis plan followed the quantitative aspects of the current study. IBM SPSS version 23 was used to evaluate the data. The prevalence was calculated using descriptive statistics: means, standard deviations, and percentage frequencies. Sections A and B of the questionnaire were examined using the percentage frequency measure to ascertain the adoption of CLTS and ODF in the two chosen locations.

Propensity score matching (PSM) was used to estimate the impact of CLTS intervention on the sample population. PSM is a quasi-experimental method in which researchers deploy statistical techniques to form an artificial control group and then match each treated group with a non-treated group having similar characteristics. Using the outcome of the matching process, the researcher can make critical estimates of the impact of the intervention under investigation. PSM assumes that, by using the observable characteristics between the two groups, the treated unit can be compared to the untreated unit as though the treatment has been sufficiently randomised. Using this approach, PSM mimics randomisation and overcomes bias issues that impact other non-experimental approaches.

The steps to analyse data using PSM are as follows:

First, the data is identified, clearly showing the treated and the untreated group. Secondly, the researcher estimates the propensity score through a discrete choice model such as logit or probit. In the second stage, the researcher ensures all relevant covariates are present. The covariates are the baseline characteristics that are not affected by the treatment. After that, the researcher uses values predicted by the logit or probit function to generate the propensity score. The third step is the restriction of the sample to common support. This step ensures that units with the same covariate values have a positive probability of being treated and untreated. After that, a matching algorithm is chosen and implemented. Finally, the impact of the intervention with the matched sample is estimated, and standard errors are calculated. The estimated impact of the intervention is the average difference in outcomes between treated units and their matched untreated control units. This study used the PSMATCH2 command within the IBM SPSS version 23. The command executes all the steps above, thus efficiently estimating the impact of CLTS on sanitation status.

An independent samples t-test was used to compare two groups of cases in one variable. A multivariate logistic analysis was utilised to ascertain if the variables and covariates were related. P 0.05 was used as the criterion of significance for all tests in this study. The study's final findings were displayed in graphs, charts, tables, and figures.

RESULTS

In Kilifi County, 97.07% (n=398) of households had a sanitation facility, while 75.75% (n=303) had one in Marsabit (Figure 1 and 2). In households that reported having sanitation facilities, 64.69% (n=196) of Marsabit County households had an improved sanitation facility (Figure 3). In Kilifi County, 54.52% had an improved sanitation facility (Figure 3). Most household heads (87.67%) were fully aware of CLTS (Figure 4). Only 12.33% were not aware of CLTS (Figure 4). The proportion of household heads unaware of CLTS was higher in Marsabit (23%) than in Kilifi (2%).

Household heads aged 41-50 were twice as likely to own a sanitation facility than those with a household head aged 21-30 (A.O.R=2.41, p=0.03) (Table 1). Also, households with a head above 61 years were four times more likely to own a sanitation facility (A.O.R=4.046, p=0.009) (Table 1). A statistically significant association existed between having a college-level education and owning a sanitation facility. Adjusted odds show that households with college-educated household heads were ten-fold likely to own a sanitation facility at homesteads (A.O.R=10.273, p=0.013) (Table 1). Regarding gender, households with male study participants as the head of the household were 0.5 times more likely to own a sanitation facility (A.O.R=0.558, p=0.03) (Table 1). Further, handwashing awareness was statistically associated with owning a sanitation facility. Household heads having good handwashing awareness were twice as likely to own a homestead sanitation facility (A.O.R=2.459, p=0.002) than those whose household heads had poor handwashing

awareness (Table 1). Concerning CLTS awareness, household heads who were aware of CLTS were statistically associated with owning a sanitation facility (A.O.R=4.317, p=0.022) (Table 1).

Table 1: Logistic regression analysis of factors influencing the CLTS among Kilifi and Marsabit counties communities in Kenya.

Variables			[95% Co	Interval]	Sig
	A.O.R	P value	Lower	Upper	
Age groups (years)					
21-30	Base				
31-40	1.631	0.148	0.841	3.162	
41-50	2.41	0.03	1.091	5.326	**
51-60	1.70	0.277	0.654	4.419	
61>	4.046	0.009	1.417	11.553	***
Marital status					
Divorced	1				
Married	0.982	0.98	0.244	3.957	
Single	0.906	0.901	0.193	4.265	
Widowed	0.445	0.321	0.09	2.202	
Level of education					
Primary incomplete	1				
Primary complete	2.013	0.305	0.529	7.663	
Secondary incomplete	0.649	0.489	0.19	2.209	
Secondary complete	1.919	0.340	0.503	7.328	
College	10.273	0.013	1.637	64.478	**
University	0.49	0.545	0.049	4.947	
Monthly income					
5000-10000	1				
10,001-15,000	6.461	0.091	0.742	56.262	*
15,001-20,000	1.609	0.578	0.301	8.607	
20,001-25,000	0.416	0.052	0.172	1.007	*
>30,000	0.458	0.060	0.203	1.033	*
Duration lived in the homestead	1.008	0.234	0.995	1.022	
Gender					
Female	1				
Male	0.558	0.034	0.326	0.956	**
Handwashing awareness					
Poor	1				
Good	2.459	0.002	1.381	4.378	***
CLTS awareness					
Not aware	1				
Fully aware	4.317	0.022	1.24	15.028	**
Climatic conditions					
Extreme hot and dry	1				
Moderately rainy	5.785	0.038	2.821	11.864	***
Constant	1.889	0.531	0.259	13.791	
Mean dependent var	0.858			SD dependent var	0.349
Pseudo r-squared	0.2552			Number of obs	760
Chi-square	158.544			Prob > chi2	0
Akaike crit. (AIC)	506.781			Bayesian crit. (B.I.C.)	608.714

Notes: *** p<0.01, ** p<0.05, * p<0.1.

Post-hoc propensity scores analysis shows that sanitation facility ownership was influenced by CLTS awareness (t=-2.51, p=0.012), education level (t= 4.16, p=0.0001), and monthly household income (t=-10.76, p=0.0001). The results confirm that these covariates (education, CLTS awareness, handwashing awareness, and income) impacted sanitation facility ownership and thus influenced the efficiency of interventional programs.

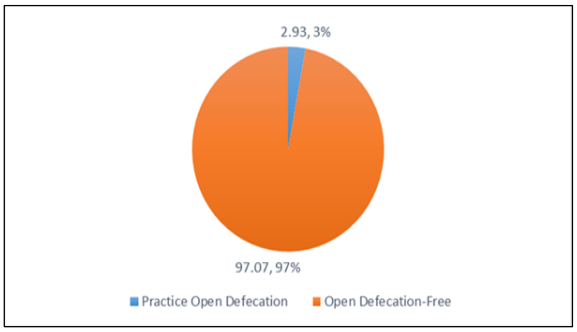

Figure 1: Sanitation usage in Kilifi.

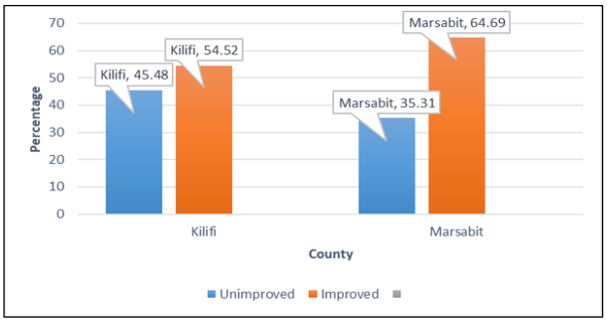

Figure 3: Types of sanitation facilities.

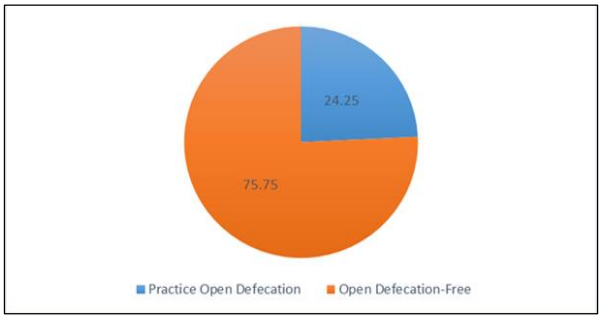

Figure 2: Sanitation usage in Marsabit.

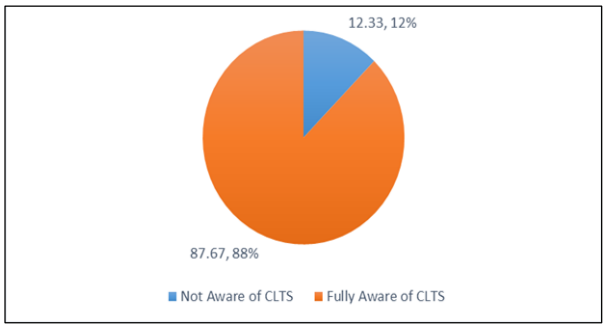

Figure 4: Level of CLTS awareness in Kilifi and Marsabit.

Table 2: Propensity score matching.

Variable	Sample	Treated	Controls	Difference	S.E.	T-stat	P value
Type of sanitation	Matched	0.4496	0.5242	-0.0746	0.0362	2.06	p=0.0835
	ATT	0.4699	0.4355	0.0344	0.0813	0.42	

Table 3: Effect of covariates on sanitation facility ownership.

Variables	Means			t-test	
	Treated	**Control**	**% Bias**	**t-value**	**p>t**
Monthly household income	4.6447	6.2808	-72.1	-10.76	0.0001
CLTS awareness	0.79083	0.86246	-22.7	-2.51	0.012
Hand wash awareness	0.09456	0.09456	0	0	1.000
Education level	4.2464	3.9542	28.6	4.16	0.0001

DISCUSSION

Open defecation-free status

The current study answered the question about OD and ODF status in the counties under study by reporting 2.93 per cent and 24.45 per cent OD rates for Kilifi and Marsabit, respectively. On average, the two counties reported a 13.5 per cent open defecation rate, slightly lower than the 14 per cent country average reported by the Water and Sanitation Program in 2012.[2,7] Despite the high rates, the current study established that open defecation in the two counties reduced significantly from 64 to 24.45 per cent for Marsabit and 34 per cent to 2.93 per cent for Kilifi.

Level of awareness of CLTS in Kilifi and Marsabit

CLTS awareness levels varied significantly between the two counties. In Marsabit, the unawareness level was recorded at about 23 per cent, higher than the 2 per cent rate recorded in Kilifi. On average, the two counties reported 87.6 per cent awareness and 12.3 per cent unawareness levels. Considering that OD rates in Marsabit and Kilifi were about 24 per cent and 2.9 per cent, respectively, it shows that a lack of CLTS awareness is associated with open defection practices in the two counties. In Kilifi, a 2 per cent unawareness rate resulted in a 2.9 per cent OD rate, while in Marsabit, a 23 per cent unawareness resulted in a 24 per cent open defection rate. In both countries, the unawareness rate was almost equal but slightly lower than the open defection rate,

confirming that persons unaware of the CLTS programs were highly likely to practice OD. Only about 1 per cent of the population practised open defection with total awareness of CLTS programs. The findings confirm that CLTS awareness is an effective approach to achieving ODF status in rural communities. The MoH and interested stakeholders must invest in CLTS awareness when rolling out such programs to increase efficiency and achieve program goals. Targeting to increase awareness levels to achieve ODF communities has shown to be effective in different communities, as reported in the review. For example, a study was conducted in Mali to establish the impact of CLTS awareness on access and use of latrines. In villages where access and use of latrines were at 33 per cent before CLTS awareness, the rate increased to 65 per cent post-intervention phase. Besides access and use, full ownership of latrines increased significantly by about 39 per cent, thus reducing open defection practices in the region.[8] In a similar study, Garn found that CLTS awareness increases latrine coverage by 6-12 per cent, and the increase reaches 30 per cent if proper awareness campaigns are performed.[9] These results show that for Kenya to achieve its ODF targets and increase ownership, access, and use of sanitary facilities, the interested stakeholders must target increased CLTS awareness levels for improved outcomes.

Factors influencing the effectiveness of community-led total sanitation

Age

An increase in age was associated with increased awareness and practice of CLTS program measures. The study found that participants aged 41-50 were twice as likely to own a sanitation facility and practice CLTS measures as those aged 21-30. Comparing the 21-30 age group and the above-61 age group showed that the elder group was four times more likely to own sanitation facilities and practice proper sanitation practices than the younger participants. The correlation between the age of a household head and sanitation practices was also confirmed in Ethiopia.[10] According to Belay et al., Ethiopia's OD rate dropped significantly from 81.96% in 2000 to 32.23% in 2016. After a study to determine covariates factors that contributed to the drop, the researchers found that OD was substantially correlated with individual and community-level characteristics, including age.[10]

Education

The study found a statistically significant association between education and owning a sanitary facility in Kilifi and Marsabit. According to this study, households with a college education were ten times more likely to own a sanitation facility than those with household heads who dropped out at the primary school level. However, the statistics were insignificant when college graduates were compared with university graduates, implying that college-level education was the peak at which literacy levels influenced ownership of sanitation facilities and the practice of CLTS measures. Njuguna found a correlation between higher education and proper disposal of faecal waste.[11] The researcher conducted three nationwide household surveys in 2003, 2008, and 2014 to investigate the link between several variables and the presence of OD. They employed descriptive analysis and bivariate logistic regression. OD was the dependent variable, and the independent factors were gender, the household head's educational degree, place of residence, region, and lack of farm animals. According to the study, the most important predictor of OD was the household head's educational degree.[11]

Gender

Regarding gender, households with male heads were 0.5 times more likely to own a sanitation facility. The difference in gender conformities is due to the assigned gender roles in the studied communities. In the two counties, women take up the bulk of sanitation-related roles. They are responsible for fetching water, washing, and sourcing for sanitation facilities in homes. Despite women not making the majority of household heads, they make most decisions related to sanitation and hygiene. Women's critical roles in sanitation measures make them more likely to own and practice proper sanitation because they have first-hand experience with the adverse effects of sanitation. Also, women have a bigger role in caring for under-fives than men. Since under-fives are disproportionally affected by sanitation-related diseases, women are at the forefront of ensuring that they practice proper sanitation measures to protect their children from contracting sanitation-related diseases. The probability that female household heads in Kilifi and Marsabit were more likely to implement sanitation measures in a household than male household heads contradicted results reported by Wamera in her study conducted in the Western region of Kenya.[12] According to Wamera, men in the Western region were mostly the decision-makers in matters related to the construction and funding of sanitation facilities.[12]

Income

Similar to education, the study found a statistically significant association between income and owning sanitation facilities. Participants who earned between 10,000-15,000 Kenya Shillings were six times more likely to own a sanitary facility than those who earned between 5,000-10,000 Kenya Shillings. However, comparing higher income earners, from 15,000 to above 30,000, showed no significant statistical difference. Belay et al. investigated the spatiotemporal distribution and factors influencing OD among Ethiopian households.[13] The authors examined the prevalence, spatial distribution, and causes of OD among Ethiopian households. According to Belay et al, OD in Ethiopia was substantially correlated with individual and community-level characteristics, including poverty/economic status.

The study found that households with low incomes are disproportionately affected by OD, demonstrating wealth-related inequities.[13]

This study has few limitations. The study was conducted in only two representative counties in Kenya; thus, the results may not be generalized to the entire 47 counties in Kenya. Secondly, the study was carried out just before the general election. Since the government implemented CLTS programs, political affiliations may have impacted responses. Those who supported the government may have provided skewed responses showing the effectiveness of CLTS, while those who did not support the government gave biased negative feedback. Despite identifying that, the study did not investigate the impact of culture and religion on sanitation practices.

CONCLUSION

The findings of this study confirm that while CLTS effectively reduces open defecation and mitigates health risks linked with poor sanitation, there are disparities in its implementation., in its current form. Therefore, there is an urgent need to review the CLTS standard protocols to address different geographic/ climatic zones innovatively. In addition, these findings will guide the formulation and implementation of CLTS programs by identifying factors that require a customised approach. For example, future CLTS programs must be gender and age-specific, targeting males and the younger generation who were found to be lagging in sanitation practices. Lastly, the findings will guide curriculum developers, especially in primary and secondary education, towards increasing CLTS awareness at low education levels. Such shift the peak and which education level impacts proper sanitation practices from college to primary education. This will ensure primary school leavers and dropouts know and practice proper sanitation measures to mitigate critical public health challenges.

Recommendations

Recommendations for policymakers

Enhance policies that provide access to sustainable health services for sanitation-related diseases such as diarrhoea. Provide access to health education regarding prevention, treatment, and management of sanitation-related diseases through media and public posters. Formulate policies to establish funding and construction of shared-sanitation facilities in areas with low facility ownership rates. Advocate for more funding to establish sanitation facilities in the highly affected areas.

Recommendations for CLTS program developers and implementers

Target men as a more vulnerable gender. Target the young household heads aged 18-30 as the most vulnerable age group. Use vernacular and local dialects to communicate program objectives to the less literate. Roll out CLTS in areas with high open defecation rate. Emphasise CLTS awareness before and after roll out to increase adherence levels.

Recommendations for curriculum developers

Introduce CLTS concepts in primary education to increase awareness among primary school leavers and dropouts. Introduce basic health education regarding sanitation and sanitation-related diseases at the primary level.

Recommendations for further research

Investigate the impact of religion on the implementation and adoption of CLTS. Investigate variables critical for behaviour change that promotes proper sanitation measures. Carry out a similar study by recruiting participants from every county in Kenya to achieve generalisable results. Carry out a study investigating the impact of marital status on sanitation status.

ACKNOWLEDGEMENTS

We would like to thank the School of Public Health for its assistance in creating a favourable and encouraging atmosphere for learning. We would like to thank Dr. Alfred Owino Odongo (Ph.D.) and Professor Mohamed Karama, for their valuable critiques, feedback, and encouragement.

Funding: No funding sources
Conflict of interest: None declared
Ethical approval: The study was approved by the MKU Institutional Research Ethics and Review Committee

REFERENCES

1. WHO/UNICEF. Progress on Drinking Water, Sanitation and Hygiene Update and SDG Baselines, 2017. Available at: https://washdata.org/sites/default/files/documents/reports/2018-01/JMP-2017-report-final.pdf. Accessed 01 July 2024.
2. IRC. Economic Impacts of Poor Sanitation in Africa: Kenya, 2024. Available at: https://www.ircwash.org/resources/economic-impacts-poor-sanitation-africa-kenya. Accessed 01 July 2024.
3. World Vision. Press Release - World Toilet Day. World Vision International, 2015. Available at: https://test.wvi.org/kenya/pressrelease/press-release-world-toilet-day. Accessed 01 July 2024.
4. World health Organization. WHO Global Water, Sanitation and Hygiene: Annual Report 2021, 2022. Available at: https://www.who.int/publications/i/item/9789240057258. Accessed 01 July 2024.
5. Kenya National Commission on Human Rights. Framework for Monitoring Realisation of the Rights to Water and Sanitation in Kenya, 2017. Available at: https://www.knchr.org/Portals/0/EcosocReports/PHE-Framework.pdf. Accessed 01 July 2024.

6. Kasiva E, Mworia L, Mburugu K, Kiogora D. In the cultural mirror: influence of cultural factors on adoption of sanitation practices in rural areas: a case of Nzaui Sub-County, Makueni County, Kenya. Afr J Sci Technol Soci Sci. 2022;1(1).
7. MOH. Protocol for Implementing CLTS in Kenya, 2021. Available at: http://guidelines.health.go.ke :8000/media/Community_Led_Total_Sanitation_MoH_Guideline_2014.pdf. Accessed 07 September 2024.
8. Pickering AJ, Djebbari H, Lopez C, Coulibaly M, Alzua ML. Effect of a community-led sanitation intervention on child diarrhoea and child growth in Rural Mali: a cluster-randomised Controlled Trial. Lancet Global Health. 2015;3(11):e701-11.
9. Garn JV, Sclar GD, Freeman MC, Penakalapati G, Alexander KT, Brooks P, et al. The impact of sanitation interventions on latrine coverage and latrine use: a systematic review and meta-analysis. Int J Hyg Environm Heal. 2017;220(2, Part B):329-40.
10. Belay DG, Asratie MH, Aragaw FM, Tsega NT, Endalew M, Gashaw M. 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. Tropi Medi Heal. 2022;50(1).
11. Njuguna J. Progress in sanitation among poor households in Kenya: evidence from demographic and health surveys. BMC Publ Health. 2019;19(1).
12. Wamera E. Gender Outcomes of the Community-Led Total Sanitation Approach in Selected Counties in Kenya, 2012. Available at: https://ir-library.ku.ac.ke/server/api/core/bitstreams/fa702e9b-9288-4a7b-b8d4-6415a0cc8605/content. Accessed 7 September 2024.
13. Belay DG, Chilot D, Asratie MH. Spatiotemporal distribution and determinants of open defecation among households in Ethiopia: a mixed effect and spatial analysis. PLOS ONE. 2022;17(5):e0268342.

Cite this article as: Omufwoko TM, Odongo AO, Karama M. Major factors influencing the effectiveness of community-led total sanitation among communities in Kilifi and Marsabit Counties in Kenya. Int J Community Med Public Health 2024;11:3779-86.