Knowledge of Open Defecation and Associated Risks among Community Members in, Mathioya Sub County, Murang'a County, Kenya

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Abstract

BACKGROUND

Open Defecation (OD) has contributed to the widespread of faecal-oral diseases throughout communities globally. This practice has detrimental effects on the economy, health, and society, resulting in annual losses of almost 27 billion shillings in Kenya. The study aimed to assess knowledge of OD and associated risks, sources of information and OD practices among community members in Mathioya Sub County, Murang'a County, Kenya.

METHODOLOGY

A mixed methods design with a descriptive cross-sectional survey was used for quantitative data and FGD for qualitative data. A simple random sampling method was used to sample 185 households. Respondents were the household heads, their spouses or any adult member residing in the household. Quantitative data was collected using an interviewer-administered questionnaire and observation checklist and analyzed using SPSS. The Chi-square test measured association with a *P* = <0.05 being significant. A Focus Group Discussion Guide was used to collect qualitative data which was thematically analyzed.

RESULTS

Half (51.9%) of the respondents were aware of open defecation with the main source of information being CHVs as reported by 68.5%. Only a third (33.7%) of the respondents reported more than one risk associated with OD. The study revealed a strong association between OD with marital status *P=0.001* and *level of education P=0.004.* The presence of faeces on the latrine floor being evidence of OD was observed in 65.9% of latrines. Qualitative data was thematically analyzed and further confirmed the presence of OD in the community "*OD is happening in the community and is a major contributor to diarrhoeal diseases, especially in children"*

CONCLUSION

Evidence of OD in the community was attributed to factors such as ignorance, lack or filled-up latrines, lack of anal cleansing materials and hand washing facilities with running water and soap. There is a need to sensitize and mobilize the community to ensure the provision of sanitary facilities with functional handwashing facilities and anal cleansing materials to eliminate OD and associated risks.

Keywords: *Knowledge, Open Defecation, Associated risks*

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Introduction

Open Defecation (OD) remains a global health concern today as it contributes to an estimated 842,000 deaths annually as a result of sanitation-related conditions[1]. Elimination of OD as envisioned by the year 2030 may not be possible if the current trends in OD are not addressed[2].

Sustainable Development Goal (SDG) 6 strives to ensure the availability of water and sanitation for all. Target 6.2 envisages achieving access to adequate and equitable sanitation for all and ending OD by 2030[3]. In Sub-Sahara Africa, OD has shown increasing trends despite governments' efforts to increase latrine coverage over time, especially in rural areas [3].

The 2019 population and housing census report highlighted rural sanitation as a significant challenge in Kenya. Though the report indicated 75% access to sanitation in two-thirds of the Counties, sanitary facilities in most households were of poor quality with limited sustainability, additionally, 10% of the rural population were practising OD[4].

According to the Kenya Environmental Sanitation and Hygiene Policy (KESHP) 2016-2030, the Kenya Vision 2030 and the Sustainable Development Agenda, Kenyans should have access to universal improved sanitation and eliminate OD by 2030. To achieve this, there is a need to ensure the provision and proper use of latrines, sustained handwashing practice and maintenance of environmental cleanliness[5].

Sanitation remains a significant challenge in Kenya with an estimated 70% of the population lacking access to basic sanitation. Open defecation is practised by approximately 5 million persons in Kenya, especially in rural areas[9]. Faecal-oral-related diseases rank among the top 10 causes of morbidity in the Country [4]. There is strong evidence indicating that the communities desire continuous knowledge and guidance to replicate the sanitation technologies. This will save them from financial constraints due to regular maintenance and repairs of sanitary facilities[11]. Kenya Environmental Sanitation and Hygiene Strategy Framework (KESSF) 2021-2020, indicate that 25% of rural Kenyans cannot access basic sanitation. Great variations in coverage exist across the regions with low coverage associated with poverty levels [7].

Open defecation status negatively impacts the well-being of people, especially children and the economy[8.] Improved sanitation contributes to several economic and social benefits including higher productivity, better school and work performance, lower medical expenses, and consequently a better living environment, safety, dignity, and comfort among the citizens [6].

Inaccessibility to safe sanitation may result in mortality of close to 1000 children under five years from diarrhoeal diseases directly or indirectly attributable to faecal oral contamination of drinking water, sanitation and hand hygiene practices[23]. Targeted sanitation interventions are documented to lower the risk of diarrhoea incidences by 25% and possibly further reduce it by 45% with the attainment of 75% coverage in safe excreta disposal [25].

In Murang'a County, 5.8% of households reported missing any form of sanitation facility[16] and this could be a contributing factor to Cholera cases the County has experienced in the recent past. This is evidence of an existing knowledge gap thus there is a need for community sensitization to address the gaps in hygiene and sanitation[17].

Diarrheal diseases contribute to 11.5% of morbidity and rank among the top five diseases in Murang'a county[12]. The 2022 annual report revealed a high burden of faecal-oral diseases in Mathioya Sub County with 10 cases of typhoid fever, 3,490 diarrhoea cases, 7,843 Intestinal worms and 8,262 Amoebiasis cases[13].

Community-Led Total Sanitation (CLTS) initiative was rolled out to generate awareness and help eliminate OD, but, knowledge gaps still exist despite years of CLTS implementation[5]. This is demonstrated through surveys which reveal gaps in knowledge hampering the adoption of the desired state, helping sanitation implementers to identify effective communication strategies for change[8]. Adequately sensitized communities usually adopt and replicate the required health interventions 9, therefore, reinforcement of community awareness is key in CLTS implementation and sustainability for lasting health impact[10].

According to WHO-UNICEF, little or no progress was made in respect to sanitation making hygiene and sanitation a significant challenge in Kenya. Approximately 70% of the Kenyan population (33 million people) lack access to basic sanitation services with one out of ten persons defecating in the open[12]. This is despite the several strategies and interventions put in place towards improving access to hygiene and sanitation in the

country as stated in Vision 2030[13]. Faecal-oral-related diseases continue to rank among the top 10 causes of morbidity in the Country[4].

According to the National ODF implementation framework 2016-2020, only 3% (66) of the villages in Murang'a County had attained ODF status. The plan envisioned to ensure the remaining 1,628 are triggered by the end of the period at a total cost of Ksh 63M[28]. However, there is currently no documented evidence of the ODF status in the County post the implementation period.

Knowledge and adequate awareness of hygiene and sanitation including effects associated with sanitation practices such as OD attitude and practices are critical precursors to improved sanitation standards[5]. Attitudes and practices influence community norms and adoption of desired behaviour[6]. The success of knowledge transfer is determined by several indicators one being the ability of the target group to acquire and implement the desired behaviour change[7].

Materials and methodology

Research design and area

The study employed a mixed-methods approach, combining quantitative and qualitative data collection in a cross-sectional survey. The study was conducted in Mathioya Sub County in Murang'a County one of the seven Sub Counties in Murang'a County. Three administrative Wards were selected for the study namely, Kiru, Gitugi and Kamacharia Wards.

Sample size determination

The study sample size was determined using Fisher's formula (29) with a confidence interval level of 95% and a Standard Deviation (Z) of 1.96. The proportion (p) of the population of interest was set at 14% which is the national prevalence of open defecation. The number of households (N) in the study area at the time of study was 22,406 households.

Study population

The study respondents were household heads or any other adult persons residing in the sampled household at the time of data collection. The household heads were sampled due to the critical role they play in decision-making on infrastructure development in a household. The study area was sampled due to the high incidences of faecal-oral-related conditions in the County. To attain a representative sample in the three Wards, a proportionate sample for the three Wards was calculated from 22,406 households in the study area as per the 2019 Census.

Study sample size

The study sample size was 185 households. The study conducted three FGDs with the household members each comprising 8-12 participants (one FGD per Ward). Household sampling was conducted randomly using a computer-generated table of random numbers. In cases where there was more than one eligible respondent in the household, a simple random sampling method was carried out via lottery. The respondent who picked a paper written Yes was enrolled on the study.

Inclusion and exclusion criteria

Those included were household heads or any other adult member who had lived in the sampled household for more than one year before the study. Visitors, household members with unsound minds and intoxicated adults at the time of the study, were excluded from the study to ensure reliable and accurate responses from the respondents. The criteria aimed at targeting respondents who had adequate and relevant knowledge of the research objective to minimize potential biases in the study.

Data collection instruments and procedures

Data was collected from 3rd August to 29th September 2023 by pre-trained research assistants. Quantitative data was collected using a structured interview schedule and observation checklist, while qualitative data was collected using an FGD guide. Responses and observations made were appropriately recorded in the interview schedules and the checklists. Three FGDs with 8 to 12 participants were conducted to generate qualitative data. Gitugi FGD had 10 (4 males and 6 females) respondents,

Kiru Ward had 12 respondents (5 males and 7 females) while Kamachari Ward had 8 respondents (4 males and 4 females) who had not participated in the quantitative interviews. The sample size for qualitative data was 30 respondents.

Validity and reliability of the tools

A pilot study involving 20% (37 respondents) was conducted in Othaya Sub County before data collection. The data collection tools were re-evaluated to clear any inconsistencies and ambiguities realized after the pilot study. Further, Cronbach's alpha (α) was performed for items under the study variable to measure the internal consistency of the data tool[18]. The Cronbach's-alpha score for the study variable was $\alpha = 0.809$. This was achieved by subjecting all the items of the study variable to a reliability analysis using SPSS software.

Data analysis

Coding of quantitative data was done and entry was made in Statistical Package for Social Science computer software (SPSS) version 23.1. and the data was cleaned before analysis. Ordinal and categorical data was presented in proportions, frequencies and measures of central tendency, in tables, figures and charts. Findings were presented in tables, figures and charts. Inferential was performed to draw conclusions and generalize the study findings with a significant level *(P)* set at <0.05. A qualitative technique was used to assess the opinions and individual actions of the respondents on open defecation. A voice recorder was used to capture the responses of the FGD participants. This was then retrieved, transcribed and thematically analyzed.

Ethical considerations and approval

Research approval was granted by Mount Kenya University Ethics and Research Committee License Number 2012 dated 27th July 2023, and National Commission for Science Technology and Innovation (NACOSTI), License Number NACOSTI/P/23/28369 dated 3rd August 2023. Data collection authority was sought from the County government and the Department of Health Services Muran'ga County then the community entry process was followed and CHVs engaged to guide the research assistants in identifying the sampled households. Informed consent of the respondent was sought after explaining the purpose of the study and only those who consented by signing the consent form participated in the study. Confidentiality and anonymity were maintained throughout the study.

Results

Response rate

The study recorded a 100% response rate which was achieved by replacing any household where the interview was declined. Such a household was replaced by the next sampled household until the desired sample was achieved.

Social demographic characteristics

Two-thirds of respondents were female 123 (66.5%). The largest proportion of the respondents aged between 31 to 50 years (46.4%); with M=34, SD = 2.29. Over a quarter 53 (28.6%) of the respondents were aged over sixty years. This could be attributed to the fact that elderly persons stay at home and may not be employed. Most of the respondents were household heads or their spouses at 69.2%. Most of the respondents 101 (54.6%) had attained primary level education with 10.3% having attained tertiary level and above while 11 (5.9%) had no formal education.

The majority 132 (71.4%) of the respondents were married while 17.9% were single or separated. The majority 142 (76.8%) were farmers with a small proportion of 6 (3.2%) being employed. A third 123 (66.5%) earned up to Ksh 15,000 with 5 (2.7%) earning between Ksh 75.000 to Ksh 90,000. Half 93 (50.3%) of the housed holds had four to six household members. The study findings revealed a strong association between OD with marital status $P = 0.001$ and level of education $P = 0.004$.

Knowledge of open defecation and associated risks

Less than half 48.1% of the respondents had ever been sensitization on OD with 57 (64.2%) of those sensitized, getting information from the CHVs, and 23.5% sensitized by the Public Health Officers. A significant proportion of the respondents (93.5%) were aware of at least one risk associated with OD.

Only 28 (15.3%) knew of more than two risks. However tangible evidence to prove sensitization was not explored and was identified as a gap for future studies.

Diarrhoeal diseases were the most reported risk by 147 (85.2%) while cholera/ typhoid and insect/ rodent breeding were the least, reported by 44 (25.9%). Half (50.2%) were aware of two risks.

Qualitative findings

Analysis of qualitative data was done in themes identified about OD and thematically analyzed. The findings confirmed the existence of OD in the community, which was attributed to several reasons as follows:

Theme 1: Lack of latrines in public places

The provision of sanitary facilities is a requirement at all public places for safe disposal of human excreta. However, a respondent from Kiru FGD said:

"Open defecation is practised in market centres since latrines are either not provided or they are ever closed and difficult to get the keys. Bushy areas near the centres serve as the OD sites. Furthermore, provided sanitary facilities are mostly soiled, unsightly and are a source of smell and fly nuisances thus encouraging OD".

Table 2:
Social demographic characteristics of the respondents

Variable	Category	Frequency	Percentage	P value
Gender of the respondent	Male	62	33.5	0.07
	Female	123	66.5	
Age	18 to 30 years	12	6.4	
	31 to 40 years	43	23.2	
	41 to 50 years	43	23.2	
	51 to 60 years	34	18.6	
	61 years and above	53	28.6	
	No response	5	2.7	
Level of education	No formal education	11	5.9	0.004
	Primary	101	54.6	
	Secondary	54	29.2	
	Tertiary level and above	19	10.3	
Marital status	Widowed	20	10.8	0.001
	Single/ Separated/Divorced	33	17.9	
	Married	132	71.4	
Occupation	Salaried/ employed	6	3.2	0.021
	Casual worker	13	7.0	
	Self-employed	24	13.0	
	Farmer	142	76.8	
Average monthly income	Up to Ksh 15,0000	123	66.5	0.32
	Ksh 15,001 - 30,000	28	15.1	
	Ksh 30,001 - 45,000	11	5.9	
	Ksh 45,001 - 60,000	13	7.0	
	Ksh 60,001 - 75.0000	2	1.1	
	Ksh 75,001 - 90,0000	5	2.7	
Family size	Up to 3 members	75	40.5	0.20
	4 to 6 members	93	50.3	
	7 members and above	17	9.2	

Them 2: Ignorance/ inadequate knowledge

Open defecation is associated with ignorance and inadequate knowledge. A respondent at Kiru FGD said:

"The issue of OD mostly happens along the roadside at night mostly by drunkards and ignorant members of the community. I witnessed a case where fresh faeces on a roadside had live worms".

Theme 3: Disease transmission

Open defecation is a major cause of diarrheal disease transmission. At Kamacharia FGD, one respondent reported that:

"diarrheal disease transmission is very common in the community through ingestion of contaminated food and water".

Another participant said:

"*Open defecation expose children to diseases when they play in such contaminated areas. Children are known to eat with dirty hands thus transmitting faecal-related diseases from one person to another".*

Similarly, the FGDs concurred that diarrheal diseases were the main risk associated with OD. Another respondent at Kamacharia reported that*:*

"most people eat without washing their hands despite the preventive role it plays in faecal disease transmission".

Table 3:

Knowledge of Open Defecation and Associated Risks

Variable	Category	Frequency	Percentage
Ever sensitized on OD	Yes	89	48.1
	No	96	51.9
The main source of information	CHVs	57	64.2
	Public health staff	21	23.5
	Friends/ family members	11	12.3
Known risk to OD	Yes	173	93.5
	No	12	6.5
Risks associated with OD	Diarrheal diseases	147	85.0
	Intestinal worms	78	45.1
	Unsightliness	63	36.4
	Insect/ rodent breeding	44	25.9
	Cholera/ typhoid	43	25.4
Number of mentioned risks	1 risk mentioned	64	34.5.
	2 risks mentioned	93	50.2
	3 risks mentioned	15	8.1
	4 risks mentioned	13	7.2

Table 4:

Open defecation risk prevention

Variable	Category	Frequency	Percentage
Open defecation risk prevention	Provision & effective latrine use	147	79.8
	Community sensitization	78	37.6
	Hand washing	63	28.1
	Sanitation dialogue	44	26.4
	Provide latrines at market centres	43	9.6
Ways of OD elimination	Health Education	140	79.1
	Community involvement	59	33.3
	Law enforcement	54	30.5
	Household visit	47	26.6
	Support latrine for construction	21	11.9

Knowledge of OD risk prevention and elimination

Provision and effective use of latrine was reported by the majority 147 (79.8%) of the respondents as a means to prevent risks associated with OD. Community sensitization on OD accounted for 37.6%, while the provision of public latrines in market centres was reported by 43 (9.6%). Regarding OD elimination strategies, health education was the most 140 (79.1%) suggested, while government support to construct latrines was the least 21 (11.9%) suggested.

Types of latrine and evidence of OD practices

Observation revealed majority 155 (83.8%) of the households had provided ordinary pit latrines which are common in rural areas. Observations further revealed the presence of OD in and around latrines as evidenced in most 122 (65.9%) of the latrines.

The FGDs further concurred with evidence of OD in the community as a respondent from Kamacharia FGD reported that:

"OD is a common practice especially along the roadside and in household sharing latrines. This is mostly noted in latrines with earthen and wooden floors where cleaning is difficult. Open Defecation is usually practised by young children who usually defecate behind the latrine for fear of the pit latrine".

Discussion

This study revealed two-thirds of the respondents were female, which compares satisfactorily to Orienje's 2018 study which revealed

The FGD similarly supported knowledge creation as the most important way to eliminate OD. At Kamacharia FGD a respondent said:

"*provision of latrine without effective use is not enough thus knowledge creation is paramount to eliminate OD and improper use of latrine".*

The three FGDs were in concurrence on how to prevent OD whereby they suggested that the provision of latrines in public places such as market centres, assisting the vulnerable households to provide latrines, is required to eliminate OD in the study area.

similar findings, further emphasised by the rural sanitation guide MOH, 2022 that females in most rural setups lack decision-making authority despite the fact that they face higher burden in sanitation and hygiene practices[20].

On income, the study compares favourably with Orienje's, 2018 study which revealed that over half of the respondents earned less than Ksh 10,000 [17]. The average income of Ksh 15,000 earned by most of the respondents is categorized as low-income status which could consequently lead to low prioritization of sanitation infrastructure in households. According to Buseinei J., low economic status is a critical contributor to open defecation[18].

Over half 54.6% of the respondents had attained a primary level of education with 76.8% being farmers. The finding concurred with Njuguna, 2019 report, which indicated that income, level of education and place of residence were strong predictors of OD[19.] Moreover, the Kenya National Bureau of Statistics (KNBS 2019) census report revealed that 7.3% of the population had never been to school[16].

Table 5:
Types of latrine and evidence of OD practices

Variable	Category	Frequency	Percentage
Types of latrines provided	Ordinary latrine	155	83.8
	VIP latrine	30	16.2
Evidence of OD	Presence of faecal matter	122	65.9
	Absence of faecal matter	63	34.1

The study provided evidence aligning with the 2019 JMP report, which identified Kenya among the 17 countries lagging in the progress toward eradicating open defecation by 2030 [20]. The FGD findings concurred with the 2019 report which indicated that roadsides were the main sites for OD[19]. Additionally, from the qualitative findings, the community Health Promoters were the main source of information in the community, concurring with WHO-UNICEF 2021 JMP report which revealed that, CHVs have played a critical role in community sensitization in Kenya since 2000 [20].

Diarrhoeal diseases were key risks associated with OD, this finding corresponds with Acholi's 2018 report which revealed similar risk factors associated with OD. Diarrhoeal diseases accounted for 244.2 Years Lost to Disability (YLD) and 5689.9 Years of Life Lost (YLL) per 100,000 [25].

The study revealed suggested awareness creation as the major factor for OD elimination. This finding concurs with the KESH Policy (2016/27 which indicates that the provision of sanitation infrastructure alone is insufficient to ensure improved environmental sanitation and hygiene practices unless it is coupled with explanation and persuasion[24]. Similarly, a meta-analysis report on the impact of sanitation interventions on latrine coverage and use indicated that sanitation interventions that incorporated an educational component attained higher scores in the elimination of open defecation [26].

Knowledge of risks associated with OD may not translate to the provision and proper use of latrines and contribute to the downstream reduction in morbidity if OD practices are not eliminated. Thus, the Kenya Environmental Sanitation and Hygiene Policy 2016-2030 recommends sensitization and raising public knowledge of individuals, households and communities on behaviour change, the negative impact of poor environmental sanitation and the benefits of improved environmental sanitation and hygiene practices[24].

The proposal by the majority of the respondents for health education to stop open defecation is in concurrence with the Kenya 2020 OD campaign framework (2016/17-2019/20) which lays emphasis on increasing knowledge on the sanitation status of the communities and the risks associated with poor sanitation. This sanitation knowledge is intended to create a sense of disgust with OD resulting in a self-motivated community to improve their sanitation situation and end OD [24]. This is further in line with the revised Kenya Vision 2030 which recommends community health education promotion on sanitation since Behavior Change Communication (BCC) is critical in ensuring the adoption of sustainable hygienic practices by individuals and the community at large[27].

Study limitation

The respondents could have inclined their responses to what they thought was a socially acceptable state of OD or what was satisfactory to the researcher. This would affect the way they respond thus distorting their true knowledge of OD and its associated risks. Honesty and unbiased responses were emphasized during data collection to address the limitation. When such biases were realized, the researcher explored further for precision. The Research assistants were adequately trained to be unprejudiced and non-judgmental. Consequently, participants may have forgotten some risks associated with OD especially if they are unaware of the faecal-oral disease transmission route. This could result in incomplete information from the participants. To address the limitation, the interviewers employed prompts probing to provoke the respondents' ability to give their responses to the best of their knowledge.

Conclusion

The study revealed a high level of knowledge of risks associated with open defecation among the household members, despite less than half of the respondents having ever been sensitized to OD. Despite this, evidence of open defecation was observed in most of the households. Additionally, the CHVs were the major source of information among household members. The provision and effective use of latrines, community sensitization and handwashing were the main strategies to prevent

risks associated with OD. Conversely, gaps in knowledge and practices related to OD may contribute to increased morbidity in the community especially among children.

Recommendations

We recommend targeted community awareness, health promotion and education sessions to induce behavioural change and eliminate open defecation in the area. There is a need to adequately train the CHVs on hygiene and sanitation to enable them to effectively sensitize the household members on open defecation. There is a need for public health officers to follow up on latrine provision, awareness creation and installation of handwashing facilities at the household level to prevent risks associated with OD, as well as rendering the villages open defecation free.

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