Exploring the Interplay of Socio-demographic Enablers in Sustaining Open Defecation-Free Status among Households in Kakamega County, Kenya

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ABSTRACT

This study aimed to explore the interplay between socio-demographic enablers and the sustainability of post-open-defecation-free status among households in Butere Sub-County, Kakamega County, Kenya. The research adopted a cross-sectional survey to assess the sustainability of the open defecation-free status at the household level, surveying 6286 certified Open Defecation Free (ODF) households through stratified random sampling. A sample size of 376 households across three wards was selected for the study. Both quantitative and qualitative data were employed; quantitative data was analysed using SPSS Version 28.1, summarized using descriptive statistics, and presented in tables, pie charts, and frequency tables, whereas qualitative data was analysed thematically. Data analysis involved three stages; univariate, bivariate and multivariate analyses. Chi-square tests analysed the statistically significant association between dependent and independent variables. Binary logistic regression predicted the probability of post-ODF status (whether the ODF status was sustainable or not), and 2x2 contingency tables were used to compute the odd ratio. Results revealed that only 9% of households sustained post-ODF status. The chi-square tests revealed a significant association between respondents' gender ($\chi^2 = 0.124$, $p = 0.009$), age distribution ($\chi^2 = 6.471$, $p < 0.05$), presence of children under 5 years old in the household ($\chi^2 = 1.884$, $p = 0.004$*), level of education ($\chi^2 = 5.726$, $p = 0.006$*), employment status ($\chi^2 = 9.602$, $p = 0.006$*), and monthly earning brackets ($\chi^2 = 11.783$, $p<0.001$*). However, there was no statistically significant association between marital status ($\chi^2 = 10.409$, $p = 0.94>0.05$), household size ($\chi^2 = 1.782$, $p = 0.56>0.05$), and the sustainability of ODF. On the other hand, the odds ratio for employment status suggests that significant association (OR=1.333; $p = 0.007$*<0.05; 95% CI: 1.082-1.642), where employed individuals were 1.333 times more likely to sustain ODF status. Further analysis revealed that employment status was a statistically significant predictor of post-ODF sustainability (aOR=1.837 P=0.011; 95% CI: 1.132-2.980). The study concluded that most households (91%) did not sustain post-ODF status after the ODF declaration. It was recommended that health practitioners improve door-to-door monitoring and develop post-ODF tracking tools at the household level, focusing on important parameters from Ministry of Health guidelines. The government and other Water sanitation and hygiene (WASH) stakeholders should support communities in establishing and enhancing economic empowerment programs to increase household income and encourage investments in sanitation infrastructure and hygiene promotion activities.*

Keywords: Households, Post-Open Defecation Free, Socio-Demographic Enablers, Sustainability

I. INTRODUCTION

One of the most significant markers of human progress has long been sanitation (Workman et al., 2021). Two billion people worldwide lack access to latrines and toilets, and 673 million still engage in defecation openly in places such as water, vegetation, open playfields, sandy shores, and sidewalks (Maharaji & Maharaj, 2021). As part of an international health and well-being plan, the percentage of people without access to eco-sustainable sanitation has been falling short of what is needed to meet the Sustainable Development Goals by 2030 (Andrés et al., 2021).

Recent global research shows that the proportion of persons practicing defecation in public is decreasing (Abebe & Tucho, 2020). Despite the reduction of Open Defecation (OD) from 22%-18% between 2015 and 2020, high growth of population has led to low progress in sustaining Open Defecation Free (ODF) status in Africa, making the ODF reversal rate to be at 10-13% per year. Moreover, a comparative cross-sectional study by Megersa et al. (2019) showed that an estimated 230 million people living in rural parts of Sub-Saharan countries continue to engage in OD practice leading to the high prevalence of diarrhoea.

In Malawi, Leal Filho et al. (2020) sought to identify gaps in the ODF strategy and National ODF and Hand Washing with Soap (HWWS) Campaign whilst incorporating lessons and practical experiences from field application. Findings showed that there had been positive results and progress towards achieving strategic targets from 2015. Nonetheless, there were still significant challenges to the achievement of key goals of HWWS across Malawi. The current approach was limited to the use of Community Led Total Sanitation (CLTS) but does not consider the use of other participatory approaches including Participatory Hygiene and Sanitation Transformation (PHAST) and mechanisms to accomplish ODF.

Singh and Balfour (2015) state that poor sanitation costs Kenya Ksh27 billion (US $324 million) annually, making it one of the nation's largest development obstacles. The percentage of the population that uses better sanitation is 30%, with minimal variation between rural areas (30%) and urban areas (31%). Nonetheless, the percentage of people who practice OD in rural areas is significantly higher (15%) than in urban areas (3%). This corresponds to almost 5 million people who live in rural areas who defecate outside. Since poverty dominates in rural regions, those with the lowest incomes bear the social and health consequences of inadequate sanitation, with open defecation being the most severe form of unimproved sanitation per person. This suggests that in most Kenya's rural settings, the sustainability of post-ODF is uncertain.

The Kenyan government and WASH stakeholders had already made sizeable financial and technical investments in the CLTS strategy to ensure that communities had a better opportunity for sanitation and water supplies. Kakamega County, in collaboration with the United States Agency for International Development-funded Integrated Water Sanitation and Hygiene Project in Kenya (USAID), implemented and integrated a comprehensive systematic approach to Water, Sanitation and Hygiene (WASH) and social behaviour change communication (Mulatya et al., 2021). But, research revealed that among ODF-certified villages, households are reverting to OD status. Advancing up the hygiene ladder remains a hurdle to ODF households, particularly for impoverished and disadvantaged communities (Odagiri et al., 2017).

In Kenya, there has not been any methodological investigation or achievement of the concept of manageability of sanitation (Abu & Elliott, 2020). Due to ODF reversion, long-term sustainability has proven difficult for CLTS to achieve at scale (Tyndale-Biscoe et al., 2013). It is critical to learn more about the causes and prevention of ODF village lapse and relapse since the motivators are uncertain (Singh and Balfour, 2015). Kenya now has an open defecation rate of 10.34%, whereas the percentage in Kakamega County is 15% (Musamali et al., 2019). There have been instances of ODF communities switching to OD notwithstanding the County health and sanitation department rolling out CLTS approach at the community level and the steady rise in certified ODF communities (Thomas, 2016).

Despite the efforts by the Kenyan government, along with various stakeholders, investing significantly in community-led total sanitation (CLTS) strategies, challenges such as ODF slippage and relapse persist. Therefore, exploring the interplay between socio-demographic enablers and sustainability of ODF status specifically in Butere Sub-County provides an opportunity to assess the effectiveness of these interventions and identify predictors of sustainability within the context of ongoing sanitation initiatives in Kakamega County.

1.1 Objectives of the Study

i. To establish the percentage of households that sustained post open defecation free status after the Open Defecation Free declaration in Butere sub-county, Kakamega County.
ii. To determine the influence of socio-demographic enablers on post-Open defecation-free sustainability of households in the Butere sub-county in Kakamega County.

II. LITERATURE REVIEW

2.1 Theoretical Review

The Theory of Planned Behaviour (TPB) by Ajzen (2020), which is based on the circumstances of this study, assumes that behaviour is a result of attitude, subjective norms, and perceived behaviour control that is influenced by the intention to carry out good sanitation practices that improve the sustainability of open defecation free status among household level. Only when one's intention is linked to the benefits of sanitation for health can socio-demographic enablers like gender, household size, employment, income, education level, and the presence of children under five years old, shape the positive attitude in maintaining the post-open defecation status among households (Taylor & Glowacki, 2023).

Ajzen and Schmidt's (2020) study revealed that households with higher literacy levels are more aware of the connection between open defection-free habits and health, which motivates them to maintain good sanitation practices

at home. Infrastructure for sustainable sanitation is typically invested in by households with higher wealth indexes. Larger families and those with children under five face challenges in maintaining their ODF status, which influences good health practices. Women's role in promoting sanitation is hindered by their caregiving responsibilities, which contributes to poor sanitation practices that encourage open defecation among ODF households. Thus, in the Butere sub-county of Kakamega County, Kenya, the TPB describes the elements that require good behaviour to finally lead to sustained open defecation-free households.

1.2 Empirical Review

According to Tribbe et al. (2021), regular maintenance and persistent usage of sanitation facilities are necessary to sustain the post-ODF status. In India, Thattil et al. (2024) assessed the percentage of rural households with children under five that are aware of and Safe Management of Faeces (SMoF). Among the 320 children under the age of five who participated in the study, 84.3% were ambulatory and 15.7% were pre-ambulatory. Of the caretakers, 92.5% thought that children should use the latrine to relieve themselves, and only 23.7% realized that children's faeces were more infectious than adult faeces. This implies that children under 5 years are contributors to OD because of the caregivers' assumptions that their faeces are not infectious. Hence, awareness of SMoF is critical to reduce the incidences of water-related diseases and improved sanitation.

In rural Benin and Chad, Gaffan et al. (2023) estimated the annual number of people who would continue to practise OD between 2018 and 2022. In Chad, open defecation has become habitual and chronic. The ODF status durability issue has been noted globally in both developed and developing countries. For instance, Kendra (2017) studied the sustainability of the ODF initiative in Nepal using a sample of 1,927 families. Over 97% of the families had access to sanitation facilities, according to the results. Therefore, 75% of households conform to ODF as stipulated by the Government of Nepal by meeting all five of these metrics. This study, nevertheless, did not continue to investigate whether the households continued to use the sanitary facilities even after they attained ODF status.

Kim et al. (2024) conducted a retrospective study using 210 learners from each region and a questionnaire that had been verified. It assessed cholera and hygiene-related expertise, mindset, practices (KAP), and external variables. The data were examined by descriptive statistical methods and chi-square testing. The survey found significant disparities in educational attainment, toilet ownership, and accessibility to care. The finding of this study acknowledged a significant linkage between level of education and adoption of appropriate sanitation practices among adolescents in schools.

Trivedy and Khatun (2024) conducted a district-by-district assessment of water and sanitation conditions and inequality in West Bengal using secondary information from the NFHS-5. The cumulative index technique was used to analyse the WASH circumstances, whereas Atkinson's index, Lorenz Curve, and Gini coefficient were used to investigate district-specific variability in WASH conditions. Furthermore, linear binary logistic regression was used to examine the relationship between WASH circumstances and socioeconomic and demographic factors. The study showed significant data about the association between WASH and variables related to socioeconomic status. Family members with a greater income score have enhanced hygiene, water drainage, and hand washing options.

Immurana et al. (2022) conducted a systematic examination and reported that 17 papers (54.84%) investigated the connection between financial status and OD behaviour, with 14 studies (82.35%) establishing that there was a statistically significant association. This research supports the findings of a Ghanaian study, which found that households with low incomes are 0.62 times more likely to practice OD than those who have substantial incomes. Estimates show that even after gaining certification that they were ODF, 1 in 6 Ethiopian households still engaged in the OD. This suggests that the 2030 Sustainable Development Goal (target 6.2) which seeks to access to basic sanitation, is not likely to be achieved (Abebe & Tucho, 2020). Other studies in Sub-Saharan Africa (Belay et al., 2022) and Nigeria (Abubakar, 2018) have revealed that OD conduct is more widespread among individuals with low incomes.

According to a systematic review, Linggar et al. (2019) investigated the association between sex and open defecation behaviour, but their findings revealed that sex did not affect OD behaviour. This study is supported by data from Ghana, where sex is not associated with OD behaviour. This can be ascribed to the simple fact that sex is a tricky and ambiguous issue when considering the capacity to act; every gender has the same probability of engaging in OD, wherein they have hypersensitive areas of their bodies that are concealed from the view of others.

In Kenya, 5.6 million individuals continue to defecate in public, while more than 30 million people still use harmful sanitation methods (Busienei et al., 2019; Joseph et al., 2020). Kenyan rural areas experience higher rates of open defecation (15%) than urban areas (3%) (Njuguna, 2019). In a local study, Riungu (2018) examined factors that have an impact on the ODF status's long-term sustainability in Kisumu County's Nyando Sub-County. According to

the results, 97.9% of the households that were subjected to inspection paid attention when the authorities declared the villages free of open defecation. Therefore, the present study sought to determine the socio-demographic enablers of post ODF status among households in Butere Sub-County, Kakamega County.

III. METHODOLOGY

3.1 Study area

The study was conducted in Kakamega County, which is situated at 0°16'.8316"N and 34°45'.7068"E on a GPS has a 3,020 square kilometres area and holds a population of 1,867,579 according to the Kenya National Bureau of Statistics (KNBS) in 2019. This makes it a significant and representative region to study owing to its sizeable population and geographic spread. Butere Sub-County was selected because it has been engaged in sanitation endeavours in collaboration with governmental and non-governmental entities through the Integrated Water Sanitation and Hygiene Project. The study area epitomizes a typical rural environment in Kenya, where issues concerning sanitation, hygiene, and access to clean water are often more conspicuous compared to urban areas.

3.2 Research Design

The research adopted a cross-sectional survey to assess the viability of the open defecation-free status at the household level. A descriptive cross-sectional survey approach provided insight into the outcomes and characteristics related to the variables at a specific point in time (Levin, 2006). The study used a mixed-methods approach for a more robust and comprehensive analysis.

3.3 Study population

The study population included household heads selected from a pool of 6,286 households living in 66 ODF-certified villages across three specific wards (Marama Central, West, and Marenyo-Shianda) that went through the CLTS implementation process within Butere Sub-County. This area had a total population of 139,780 residents. Alongside this, the study involved three Focused Group Discussions (FGDs) and three Key Informant Interviews (KIIs), involving three public health officers and three community leaders, representing elected officials, youth, and women from these wards.

3.4 Sample of the Study

This study focused on 6,286 households representing 66 ODF-accredited villages in Butere Sub-County, which were declared ODF between January 2015 and December 2022. A sufficient sample size was determined using Yamane's formulas, as illustrated below.

$\frac{N}{1+N(e)^2}$ **Source:** Lohr (2021). Where.

n=Sample size

N=No. of households (N=6,286)

e=Desired precision level (taken at 5%)

$\frac{6286}{1+6286(0.05)^2} = \frac{6286}{1+6286\,(.0025)} = \frac{6286}{16.715}$ ==376 households (**n=376)**

Table 1

Sample Size Distribution

Ward	Villages	Households	Sample
Marama West	30	2,570	171
Marama Central	15	1,702	85
Marenyo- Shianda	21	2,014	120
Total	66	6286	376

3.7 Tools and Techniques for Data Collection

The data collection strategies comprised household-level semi-structured questionnaires, three KII guides distributed to technical experts at the Sub County level, and three FGDs guides distributed to key community groups in three wards because of the valued depth of inquiry over a breadth of coverage. By conducting fewer interviews and focus groups, more time and attention were dedicated to each contact, resulting in deeper and more complete data

collection. Observation checklists were employed to assess measures of ODF status in rural households, such as the presence of latrines, signs of latrine usage, privacy indicators, and other hygiene-related criteria. Structured questionnaires were administered at household levels to a total of 376 participants. The collection of quantitative data was done with the assistance of the area Chiefs who informed the population about the research in advance. The Health Committee Chairpersons from the Health Centres assisted in recruiting participants for FGDs and in-depth interviews from the CHPs where the FGDs were conducted.

3.8 Reliability and Validity of the Research Tools

The study method was evaluated using a validity test to ensure that it addressed the inquiries on the proposed topic as determined by the researcher. Quantitative data was gathered using a standardized questionnaire that subjected all participants to items of the same type and applied the same coding system for their answers. Cronbach's alpha was used to ensure reliability. It assisted in deciding whether transcripts could be repeated by ensuring a specific threshold was met. The outcomes of the entire investigation and the sampling design were examined to obtain a correlation matrix. According to Hanson et al (2005), a study required an alpha of at least 0.7 to be considered legitimate.

3.9 Data Analysis

Statistical Package for Social Sciences (SPSS) version 28.1 was used to analyse quantitative data. The analysis involved three stages; univariate, bivariate and multivariate analyses. For univariate, variables were described as single using frequency and percentages. For bivariate analysis, Karl Pearson 2x2 Chi-square tests were used to analyse if there was a statistically significant association between independent and dependent variables. Binary logistics regression was conducted to estimate the probability of the post-ODF status (whether the ODF was sustainable or not sustainable) based on the values of the predictors (independent variables) and crude Odds Ratio (OR) was computed. Further, multivariate analysis was done to show if the relationship between multiple variables was statistically significant and adjusted Odds Ratio (aOR) was calculated. The quantitative data was presented using tables and charts. Qualitative data were analysed thematically as per study objectives by arranging them into themes and patterns.

IV. FINDINGS AND DISCUSSION

4.1 Response Rate

Upon administering 376 questionnaires to the participants, 376 filled questionnaires were returned giving a 100% response rate which was acceptable for the study.

4.2 Demographic Characteristics

The study obtained demographic information of the respondents and presented in Table 2. Results indicate that over half (68%) of the respondents were female while 32% were male. Nearly half (44%) fell into the 36-55-year age bracket, 27% were between 18-35 years, 19% between 56-65yrs and the least (10%) were at the age of 66 years and above. The majority (81%) of respondents were married, while 12% were widows/widowers and small percentages were single (6%) and divorced and separated 1%. Slightly less than half (44%) of the households had children below five years old. In terms of educational level, 48% had completed secondary education, followed by primary education (39%) and the least (5%) had a university education. Moreover, over half (56%) of the respondents were unemployed, (37%) were self-employed and the least (7%) had formal employment. Further findings showed that the majority (56%) had no source of income, (24%) earned between Ksh. 1-10,000, (15%) had an earning between Ksh. 10,001-20,000 and the least (1%) had an income above Ksh. 20,000. A significant portion (56%) of the households comprised 4 to 6 members, 31% had 1 to 3 members, and 13% composed of more than 6 members.

Table 2

Univariate Analysis of Socio-Demographic Characteristics of the Participants

Demographic characteristics		Freq(N=376)	Percentage
Status in the family	Unrelated Adult Member/Visitor	11	3%
	Head of household	158	42%
	The spouse to the household's head.	203	54.0%
	Children < 18 years	4	1%
	Total	376	100.0%
Distribution by sex	Male	120	32%
	Female	256	68%
	Total	376	100.0%
Distribution by Age	18yrs-35yrs	101	27%
	36yrs-55yrs	163	44%
	56yrs-65yrs	75	19%
	66yr and older	37	10%
	Total	376	100%
Marriage status	Single	22	6%
	Married	304	81%
	Widow/widower	45	12%
	Divorced/separated	5	1%
	Total	376	100.0%
Household size	1-3 members	116	31%
	4-6 members	209	56%
	>6 members	51	13%
	Total	376	100%
>5 years old Children	Yes	167	44%
	No	209	56%
Level of Education	Never attended school	29	8%
	Primary	146	39%
	Secondary	180	48%
	University	21	5%
	Total	376	100%
Employment status	Unemployed	212	56%
	Formal/salaried Employment	28	7%
	Self-employed	136	37%
	Total	376	100.0%
Monthly Income	1-10,000	91	24%
	10,001-20,000	55	15%
	Above 20,000	18	5%
	None	212	56%
	Total	376	100%

4.2 Percentage of Households that are still Open Defecation-Free following the Open Defecation-Free Declaration

This study aimed to establish the percentage of households in Butere Sub County that are still ODF following the Open Defecation free declaration and the results are presented in Figure 2. The results revealed that only (9%) of households met the sustainability criteria based on the CLTS parameters. This trend aligns with previous studies by Robinson and Gnilo (2016), Abu and Elliott (2020), Chambers and Myers (2016), Crocker et al. (2017), Abebe and Tucho (2020), showing a decline in sustainability after initial CLTS success, raising concerns about CLTS's long-term effectiveness and the challenge in maintaining ODF status, crucial for Africa's progress towards achievement of SDG 6 target 6.2 (Achieving success to adequate and equitable sanitation and hygiene for all and end open defecation). This decline raised doubts about post ODF long-term effectiveness, consistent with Leal Filho et al. (2020).

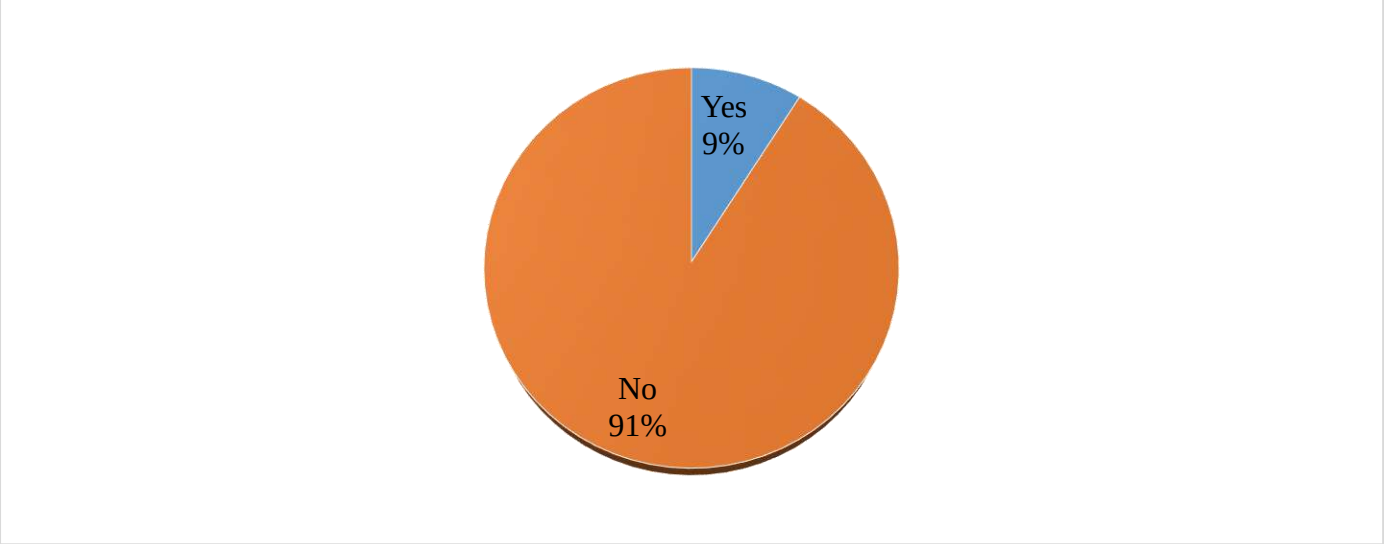

Figure 1
Open Defecation-Free Status

Further, an evaluation was done based on CLTS parameters criteria as per the Ministry of Health guidelines (CLTS guideline by Kar & Chambers, 2008) and the results are presented in Table 3.

Table 3
CLTS Parameters Measure of ODF Sustainability

CLTS parameters	No	%
Have a Functional Latrine		
Yes	268	71%
No	108	29%
Total	376	100%
Functional Hand washing Facility		
Yes	94	25%
No	282	75%
Total	376	100%
Have a drop-hole cover		
Yes	89	24%
No	287	76%
Total	376	100%
Sanitation facility has Privacy		
Yes	137	36%
No	239	64%
Total	376	100%
Do not practice Open Defecation		
Yes	224	60%
No	152	40%
Total	376	100%
ODF Sustainability		
Yes	34	9%
No	342	91%
Total	376	100%

Results as shown in table 3 above revealed that the presence of a functional latrine was at (71%), a functional hand washing facility (25%), the presence of a drop-hole cover (24%), privacy of sanitation facilities (36%), and the absence of open defecation practices (60%). Furthermore, a report from FGD1 highlighted knowledge and awareness of post-ODF sustainability. With regards to understanding the importance of ODF, respondent A reported:

"Everyone is aware of the important role of Open Defecation Free (ODF) communities. It concerns both health and dignity." (FGD-1).

The above sentiment was echoed by respondent B who acknowledged:

"We've been taught about the risks associated with open defecation. It damages our ecosystem and spreads illness." (FGD-1).

Nevertheless, Respondent C, who took part in the KII-1, lamented the difficulties in adhering to the ODF status:

"Even if everyone understands its significance, compliance is not always straightforward. We must overcome certain obstacles like lack of drop-hole covers and persistent use of hand washing facilities. Yes, we make every effort, although maintaining ODF status in every household might be challenging at times." (KII-1).

There were additional findings regarding the availability of toilets without privacy. One respondent stated, for example:

"Most of the homes now have latrines, but not all of them have everything they need. Certain latrines are unfinished because they lack basic components like drop-hole covers and doors." (KII-2).

According to the above findings, most homes had working latrines but were missing necessary facilities like stations for hand washing and drop-hole covers. Extreme weather posed a significant threat to the long-term viability of unimproved sanitation facilities, resulting in collapses from faulty foundations. These results highlight the necessity of post-ODF tactics and methods and highlight the importance of investigating more techniques beyond initial CLTS to maintain ODF status in communities. These results are consistent with the findings published by Abebe and Tucho (2020) in rural Ethiopia, who found that a few years after the rural area was designated as ODF, the projected aggregated rate of ODF slippage was 15%. A situation occurs when the system of sanitation is disrupted, and floods and eroding soil are blamed for the substandard development of the soil. In a relative study by Gaffan et al. (2023) communities in rural Benin villages that had previously been classified as ODF reverted into Open defecation between the years 2018-20222 due to environmental challenges associated with topography and climatic patterns.

4.2 Socio-Demographic Enablers of Post-ODF Sustainability of Households in the Butere Sub-County

This study also sought to determine the socio-demographic enablers of post-ODF sustainability of households in Butere Sub County. The findings are presented in Table 4 below as follows.

Table 4

Bivariate Analysis of Chi-Square Test between Socio-Demographic Factors and Post-ODF Sustainability

		Sustainability of Open defecation Free						
		Sustainable		Not sustainable		Statistics		
		N	%	N	%	df	Chi-square (X^2)	p-value
Status in family	Family member	14	5.8%	12	8.9%	1	1.250	0.264
	Non-family member	226	94.2%	123	91.1%			
Gender	Male	74	30.8%	44	32.6%	1	0.124	0.009*
	Female	166	69.2%	91	67.4%			
Distribution by age	18yrs-55yrs	185	77.1%	102	75.6%	1	6.471	0.025*
	>55yrs	55	22.9%	33	24.4%			
Marital status	Single	11	4.6%	11	8.1%	1	10.409	0.94
	Married/Divorced/separated/ Widow/widower	229	95.4%	124	91.9%			
Household size	1-6members	202	84.2%	108	80.0%	1	1.782	0.56
	>6 members	38	15.8%	27	20.0%			
<5 years children	Yes	110	45.8%	52	38.5%	1	1.884	.004*
	No	130	54.2%	83	61.5%			
Level of Education	Never attended school	31	12.9%	21	15.6%	1	5.726	0.006*
	Attended	209	87.1%	114	84.4%			
Employment status	Unemployed	146	60.8%	99	73.9%	1	9.602	0.006*
	Employed	94	39.2%	35	26.1%			
Monthly Earning	With income	88	36.7%	58	43.0%	1	11.783	<0.001*
	No income	152	63.3%	77	57.0%			

The chi-square tests revealed a statistically significant association between respondents' gender ($\chi^2 = 0.124$, p = 0.009<0.05), age distribution ($\chi^2 = 6.471$, p=0.025 < 0.05), presence of children under 5 years old in the household ($\chi^2 = 1.884$, p = 0.004<0.05), level of education ($\chi^2 = 5.726$, p = 0.006*<0.05), employment status ($\chi^2 = 9.602$, p = 0.006<0.05), monthly earning brackets ($\chi^2 = 11.783$, p<0.001<0.05) and post ODF sustainability. However, there is no significant association between marital status ($\chi^2 = 10.409$, p = 0.94>0.05), household size ($\chi^2 = 1.782$, p = 0.56>0.05), status in the family ($\chi^2 = 1.250$, p = 0.264 >0.05), and the sustainability of post-ODF (Table 4). The findings further revealed that monthly earnings may have a considerable impact on ODF sustainability, with higher income bands associated with a greater proportion of ODF sustainability at household level.

This finding corroborate with those of Trivedy and Khatun (2024) which showed significant association between WASH and variables related to socio-economic status, that is, family members with a greater income score have enhanced WASH status. This finding backed up those of Kim et al. (2024) which revealed significant disparities in education and intention to construct household latrine. Engaging women's groups and community networks in ODF initiatives can enhance social support and collective action for sustaining ODF outcomes. However, these findings disagree with those of Linggar et al. (2019) who showed that gender did not affect OD behaviour in rural Ghana.

Table 5

Bivariate Analysis of Odds Ratio (OR) for Socio-demographic Enablers and Post-ODF Sustainability

Variable (Ref=Sustainable)			OR	95% C.I		P-value
				Lower	Upper	
Step 1[a]	Status of the participants in this family	Family member	.554	.241	1.274	.165
		Non-family member	1.805			
	Gender	Male	1.562	.890	2.742	.120
		Female	0.640			
	Age	18yrs-55yrs	1.247	.939	1.657	.127
		>55yrs	0.802			
	Marriage Status	Married	1.339	.552	1.010	.058
		Not married	.747			
	Household Size	>6 persons	1.026	.742	1.418	.878
		<6 persons	0.975			
	>5 years Children in the household	Yes	.641	.399	1.031	.067
		No	1.560			
	Level of education	Attended school	1.874	.647	1.180	.378
		Never attended	0.534			
	Employment status	Employed	1.333	1.082	1.642	.007*
		Unemployed	0.750			
	Monthly income	With income	1.562	.890	2.742	.120
		No income	0.640			
	Constant		3.618			

P-value = less than 0.05

From the bivariate analysis in Table 5, the odds ratio (OR) for gender indicates that being male increased ODF sustainability by a factor of 1.562 (OR=1.562; p = 0.120>0.05; 95% C.I: 0.890-2.272). The odds ratio indicates that persons of above the age of 55years were more likely to increase post-ODF sustainability by a factor of 1.247 than those aged below 55 years (OR=1.247; p = 0.127; 95% C.I: 0.939-1.657). The odds ratio for unmarried participants was 0.747, suggesting that the unmarried were less likely to sustain ODF status, and the result was not statistically significant (OR=0.747; p = 0.058; 95% CI: .552-1.010). The odds ratio for household size indicates that for each additional person in the household, the odds of post-ODF sustainability increased by a factor of 1.026 (OR=1.026; p = 0.878>p=0.05; 95% CI: .742-1.418). The odds ratio for having children under 5 years in the household was 1.641 suggesting that having children above the age of five in the household enhanced the likelihood of post-ODF sustainability by 64%(OR=1.641; P=0.067 >0.05; 95% CI: 0.399-1.031). The odds ratio for those who attended school was 1.874 implying that more educated household heads were well informed of the dangers of poor sanitation and thus more likely to sustain ODF status than those who did not attend (OR=0.874; p=.378>0.05; 95% CI: 0.647-1.180). Findings indicated that employed individuals were 1.333 times more likely to sustain ODF status (OR=1.333; p = 0.007*<0.05; 95% CI: 1.082-1.642) and a unit increase in employment status increased the likelihood of post-ODF

sustainability by 33%. Additionally, those with monthly earnings were 1.562 times more likely to sustain ODF status than those without income (p=1.562>0.05; 95% CI: 0.890-2.742). These findings indicated that there was not statistical significant association between gender, household size, the presence of children below the age of five years, income and level of education and post-ODF sustainability in Butere Sub-County except for the status of employment.

Table 6

Multivariate Analysis of adjusted Odds Ratio for Demographic Enablers and Post-ODF Sustainability

Predictor (Ref=Sustainable)			**aOR**	**95% C. I**		**P-value**
				Lower	**Upper**	
Step 1[a]	Employment status	Employed	1.837	1.132	2.980	.011*
		Unemployed	1			
	Constant					

The finding in Table 6 shows that employment status is a statistically significant predictor of post-ODF sustainability by 83.7% (aOR=1.837 P=0.011; 95% CI: 1.132-2.980). This indicates that employed individuals were 1.837 more likely to sustain ODF status compared to unemployed individuals. This finding backed up those of Trivedy and Khatun (2024) which showed that a better wealth index is a significant predictor of improved WASH facilities. According to Immurana et al. (2022), individuals with high economic levels are 0.38 times less likely to have OD compared to those with low economic levels.

V. CONCLUSIONS & RECOMMENDATIONS

5.1 Conclusion

Despite 81% of respondents agreeing that their villages had been classified as ODF, individual families had different perspectives on their ODF status. Most of the households (91%) failed to meet key metrics for ODF sustainability, including functional latrines, hand washing facilities, drop-hole coverings, sanitation privacy, and the absence of open defecation. This implies a considerable reversal rate from open defecation-free status, emphasising the difficulties in maintaining ODF practices over time. It was clear that education, employment status, and household demographics all play important roles in determining the post-ODF sustainability of sanitation practices. This study concluded that education, employment, and family demographics are critical in sustaining the ODF status at the household level while Employment stood out as the greatest predictor of ODF sustainability.

5.2 Recommendations

The study recommended that health practitioners should improve on Door-to-door monitoring and develop post-ODF tracking tools to track ODF sustainability at the household level, focusing on important parameters from Ministry of Health guidelines. The study further recommended that the Government, NGOs, and other WASH stakeholders should support communities in establishing and enhancing economic empowerment programmes to increase household income and encourage investments in sanitation infrastructure and hygiene promotion activities.

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