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SOCIAL DEMOGRAPHIC AND ECONOMIC FACTORS INFLUENCING SUSTAINABILITY OF OPEN DEFECATION-FREE STATUS AMONG ADULT RESIDENTS IN MWINGI WEST SUB-COUNTY, KITUI COUNTY, KENYA

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ABSTRACT

Background: Open defecation remains a public health burden in developing nations. The study aimed to assess social demographic and economic factors influencing sustainability of open defecation-free status among adult residents in Mwingi West Sub-county, Kitui County, Kenya.

Materials and Methods: A cross-sectional design was used in this investigation. Both purposive and Stratified Radom multi-stage sampling techniques were utilized to select those who participated in the research. The chi-square test was used for bivariate analysis, and binary logistic regression was used for multivariate analysis. The cut off for statistical significance was $p<0.05$.

Results: The sustainability of open defecation-free status among adult residents in Mwingi West Sub-County, Kitui County was at 75.3%. Study participants aged 35 to 44 years(OR=2.9,95%CI=0.14-0.89), and study respondents who had completed their tertiary education (OR=4,95%CI=0.07-0.81), and the presence of incentives(OR=2.1,95%CI=0.24-0.88) increased the odds of sustaining open defecation-free status while earning below the poverty line(OR=2.7,95%CI=1.49-4.98) and having a peasant type of occupation(OR=5.4,95%CI=2.38-12.50) reduced the odds of open defecation-free status sustainability.

Conclusion: The open defecation-free status sustainability among adult residents in Mwingi West Sub-County, Kitui County was at 75.3%. Study participants aged 35 to 44 years and study respondents who had completed their tertiary education and the presence of incentives increased the odds of sustaining open defecation-free status while earning below the poverty line and having a peasant type of occupation reduced the odds of open defecation-free status sustainability.

Keywords: Open defecation, Open Defecation Free, Sanitation, and Sustainability.

INTRODUCTION

It is a fundamental human right and necessity to have access to decent and reasonable sanitation. Ensuring everyone has access would significantly lower the rate of disease and mortality, especially in children. Sixty percent of diarrheal fatalities occur in middle-income and low-income nations, where poor water, sanitation, and hygiene conditions claim the lives of about 827,000 people annually.[1] It is estimated that 432,000 of these fatalities were primarily caused by inadequate sanitation.[2] A higher service level that takes into account the final disposal of excreta is provided by sanitation facilities that are securely

operated, in addition to the "basic" service level that requires an upgraded hygiene facility that cannot be shared with other families. An annual 297,000 child deaths under five could be prevented with improved sanitation, cleanliness, and access to water.[3,4] Defecating outdoors perpetuates a poverty and disease cycle. The countries with the greatest number of cases of open defection also have the most prevalent rates of infant mortality, malnutrition, and impoverishment, as well as notable inequality in wealth.[5]

In Kenya, sanitation is a big problem. According to estimates, roughly 33 million people, or 70% of the country's population, do not have access to fundamental sanitation facilities, and five million individuals, or 10% of the population, defecate in the open.[6] With 15% of rural residents and only 3% of urban residents engaging in open defecation, open defecation is primarily a problem in rural areas.[7] The problem of poor rural sanitation in Kenya goes beyond open defecation. Fifteen sizable regions, the majority of which are situated in Arid and Semi-Arid Lands (ASAL), account for about 85% of the country's open defecation incidents. Transhumant pastoralists make up a significant portion of at least ten of the aforementioned fifteen counties, and they are challenging to reach with conventional sanitation interventions.[8]

Kitui was declared an open defecation-free county in 2018 during Global Hand Washing Day, nationally commemorated in Mwingi Town of Kitui County on 15th October 2018. Following the Kenya National Bureau of Statistics (KNBS) report of 2019, Kitui County with a population of 1,136,187 and a total of 261,814 households of which 9.2% were found to have reverted back to depending on bushes for human waste disposal.[9] In the year 2022, the sub-county reported 3, 057 diarrheal problems despite the fact that it was declared ODF.[10] The sub-county also reported 734 cases of stunting in the same year of 2022.[10] One of the most likely reasons contributing to the high prevalence of diarrhea and other illnesses associated with hygiene is the low sustainability of ODF status and hand washing. This suggested the necessity of carrying out research to evaluate the social demographic and economic factors influencing adult residents of Kitui County's Mwingi West Sub County's Sustainable Open Defecation Free (ODF) status.

MATERIAL AND METHODS

Study design

Cross-sectional design was used in this investigation. Both quantitative and qualitative data were collected simultaneously. Quantitative data was used for generalization, and qualitative data was utilized to fully understand the community's viewpoint on ODF sustainability.

Study area

The Mwingi West Sub County of Kitui County served as the investigation's location. The Sub County as a whole has 133,349 residents, per the 2019 KNBS survey. Through independent observers, UNICEF Kenya and the Ministry of Health confirmed Mwingi West as an Open defecation-free sub-county in 2018. This indicated that every home in the subcounty had a latrine and was using one as well as a sink for hand washing. According to the same survey, 1.2% of households had returned to OD while 98.8% of them had maintained ODF.

Study population

The investigation's target population consisted of 133,349 people who live in 28,607 families in Mwingi West Sub County. (9)

Sample size determination

Using Yamane's formula, a sample size of 439 respondents was selected from the 133,349 people living in Mwingi West Sub-County, which was the target population.[11]

$$N = \frac{N}{1+N\,(e)^2}$$

Where

e = (probability of error, i.e., the desired precision, e.g. 0.05 for 95% confidence level).

N =the estimate of the population size, the target population being 133,349 individuals in Mwingi West sub-county.

Application of the formulae:

$$n = \frac{133{,}349}{(1+133{,}349)\ x\ (0.05)^2} = 399\ participants$$

and 10% Non-response rates to questionnaires: 10/100 x 399 = 40 participants making a total of 439 participants for this study.

Sampling technique

Purposive sample technique was used to select the key informants and organize a Focused Group Discussion with the stakeholders involved in ODF status sustainability in Mwingi West Sub-County, Kenya, while a stratified random sampling technique was utilized to select those who participated in the four wards of Mwingi West Sub-County, Kitui County, Kenya.

Data collection tools and procedures

Primary data was gathered in Kitui County, Kenya's Mwingi West Sub-County, regarding the ODF status sustainability. A self-administered, structured questionnaire was utilized to gather quantitative data. Data on the sustainability of open defecation-free status were collected using a structured questionnaires, While ten,[10] participants in the Focused Group Discussion were the subject of a distinct Focus Group Discussion (FGD) and Key Informant Interview guide, which was additionally utilized to gather qualitative data from the ten,[10] randomly selected key informants from the four wards of Mwingi West Sub-County, Kitui County, Kenya. Using an audio recorder, group moderators took charge of the data recording process while gathering qualitative data.

Data management and analysis

Data was entered into a computer excel software then cleaned, arrange, coded, and the quantitative data that had been gathered was then analysed using SPSS V26. The chi-square test was used for bivariate analysis, and binary logistic regression was used for multivariate analysis. The cutoff for statistical significance was $p<0.05$. Using narratives based on themes and sub-themes, Nvivo version 11 was used to conduct a thematic analysis of the qualitative data.

Ethical consideration

Before the investigation was carried out, permission to gather data in Kitui County, Kenya's Mwingi West Sub-County was requested via an introductory letter and ethical clearance from Mount Kenya University's ethics and review committee. Authority was sought from NACOSTI in Kenya, to collect data through interaction with the residents of Mwingi West Sub-County, Kitui County Kenya, in this case, a research license was provided by Nacosti. Permission was sought out from the Kitui County Government from the Department of Health and Security. Research participants over the age of eighteen,[18] who took part in the ODF sustainability process in Mwingi West Sub-County, Kitui County, Kenya, signed a consent form. Participants received assurances that the research would only be used for educational purposes and would not be used for any other purposes.

RESULTS

Response Rate

The investigation's response rate was 90.2%, meaning that 396 investigation questionnaires were deemed suitable for data analysis.

Sustainability of Open defecation Free Status

In comparison to the Kenyan national target of 100% open defecation-free status by 2030, which is in line with sustainable growth goal number six, as indicated in figure 1, the of open defecation-free status sustainability among adult residents in Mwingi West Sub-County, Kitui County, was 75.3%.

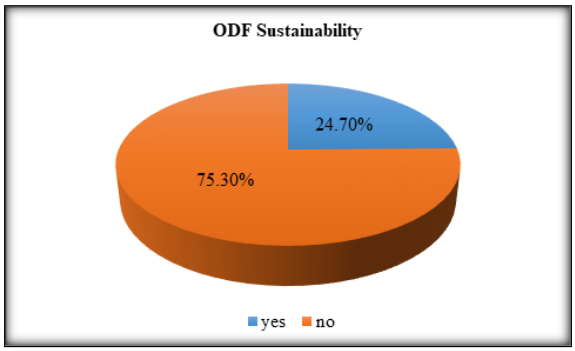

Figure 1: Sustainability of Open Defecation Free Status

Social Demographics Characteristics of the Study Respondents.

Table 1 below provides the social demographic characteristics of the study participants. Concerning household heads, the majority (92.2%) of the study partakers were males. In terms of the participants' marital status, the majority of those involved in the study were married (81.6%). Concerning educational attainment, nearly half (45.7%) of the investigation's participants had completed secondary school, and nearly a quarter (26.8%) had completed primary school. When it came to the size of the households, nearly a quarter (28.5%) of the households surveyed had 1-4 members, and more than half (61.1%) of the households had 5-8 members. [Table 1]

Bivariate and Multivariate Analysis on Social Demographic Factors Associated with the Sustainability of Open Defecation-Free Status.

In the social demographic factor, the following variables were found to be significantly associated with open-defecation-free status sustainability; The age of the study respondents ($X2=19.182$, $df=3, p=<0.001$)., household size($X2=8.005, df=2, p=0.01$), and education level ($X2=15.521$, $df=3, p=0.001$) hence they were imported for multivariate analysis. Open defecation-free status sustainability was not statistically correlated with the study participant's gender ($X2=0.02$, $df=1, p=0.887$). and marital status ($X2=0.441$, $df=4, p*=0.979$).

As indicated in Table 2 below, age was statistically associated with the sustainability of open defecation-free status in the multivariate analysis($p=0.009$). In addition, education level was statistically associated with the sustainability of open defecation-free status in the multivariate analysis($p=0.002$).

These findings were consistent with qualitative data where the majority of the focused group discussants noted that:

“Level of education is a key factor towards doing away with open defecation. You will find somebody who already understands the importance of not defecating in the environment since they understand the consequences. I would say a higher level of education is of key importance in promoting open defecation status in society.”

Social-Economic Characteristics of the Study Respondents.

Table 3 below provides the socioeconomic characteristics of the study participants. Concerning the occupation type of study participants: nearly half (42.7%) reported being employed. Regarding the study participants' income status, 81.6% of the participants earned more than the poverty line. Concerning financial options needed to construct a latrine, close to three-quarters (73.2%) of the study respondents reported income being the source of capital to aid in building a latrine. Concerning obstacles to latrine ownership, the majority (80.1%) of the study respondents cited finance as being an obstacle to latrine ownership. Concerning the provision of incentives when constructing a new pit latrine, close to a quarter (27.3%) of the study respondents reported the provision of incentives. Regarding the type of incentive provided when building a pit latrine, more than half (59.3%) of the

study partakers cited the provision of labor. Concerning non-financial resources needed in the construction of a latrine, the majority (89.4%) of the study respondents reported using non-financial resources in the construction of a pit latrine.

Bivariate and Multivariate Analysis of Social Economic Factors Associated with the Sustainability of Open Defecation-Free Status

In the social economic factor, the following variables were found to be significantly associated with open-defecation-free status sustainability; type of occupation of study participants (X2=16.511, df=3,p=0.001), income(X2=17.510,df=1,p=<.001), and the presence of incentives(X2=6.469,df=1,p=0.01), hence they were imported for multivariate analysis. Financial options (X2=4.803, df=2,p=0.09), non-financial resources required for latrine construction(X2=0.278,df=1, p=0.598), and barriers to latrine ownership(X2=6.781, df=3,p=0.07) were not statistically associated with the sustainability of open-defecation-free status.

As indicated in Table 4 below, Income level was statistically associated with the sustainability of open defecation-free status in the multivariate analysis(p=0.001). These findings collaborated with those of the qualitative data where one of the key informants noted that:

"Issues to do with income have a critical role on the sustainability of open defecation-free status. Building a pit latrine is not easy as a lot of capital, labor is needed to have one which means households with poor income cannot sustain building a toilet that is friendly to use. Nevertheless, there should be a program supporting such households and this will aid in eradicating open defecation which is a public health concern.."

From this study, the type of occupation was statistically associated with the sustainability of open defecation-free status in the multivariate analysis(p=0.01). Furthermore, there was a statistical association between the provision of incentives and the sustainability of open defecation-free status in the multivariate analysis(p=0.01). These findings collaborated with those of the qualitative data where one of the key informants noted that:

"Not everybody is in a capacity to afford to build a pit larine when these incentives are provided, they play a critical role in preventing open defecation which has a bad effect on the surrounding. I would say incentives such as labor, funds, and provision of building material is a critical component for sustaining open defecation-free status."

Table 1: Social Demographic Characteristics of the Study Respondents

Independent Variables	Categories	Frequency	Valid Percentage%
Gender	Male	365	92.2%
	female	31	7.8%
Age	25_34	73	18.4%
	35-44	86	21.7%
	45-54	203	51.3%
	54-64	34	8.6%
Marital Status	married	323	81.6%
	single	15	3.8%
	window	26	6.6%
	divorced	4	1%
	separated	28	7.1%
Educational Level	primary	106	26.8%
	secondary	181	45.7%
	tertiary	35	8.8%
	No formal education	74	18.7%
Household Size	1-4	113	28.5%
	5-8	242	61.1%
	More than 9	41	10.4%

Table 2: Multivariate Analysis of Social Demographic Factors

	Variables	B	S.E	Wald	Df	Sig	Exp(B)	95% C.I for EXP(B)	
								Lower	Upper
Step 1a	**age**			11.684	3	0.009			
	25-34	-1.86	.55	11.28	1	.11	.15	.05	.46
	35-44	-1.04	.48	4.76	1	.03	2.9	.14	.89
	45-54	-.82	.43	3.72	1	.06	.44	.19	1.01
							Ref		
	Education level			14.81	3	0.002			
	primary	.09	.37	.07	1	.789	1.10	.54	2.27
	secondary	-.87	.36	5.72	1	.03	.42	.21	.86
	tertiary	-.78	.61	5.34	1	.02	4	.07	.81
							Ref		
	Household size			5.07	2	0.07			
	1-4	-.74	.49	2.20	1	.14	.49	.19	1.22
	5-8	.02	.42	0.00	1	.96	1.02	.44	2.34
							Ref		
	Constant	-.144	.632	.05	1	0.82	.866		

Table 3: Social Economic Characteristics of the Study Respondents

Independent Variables	Categories	Frequency	Valid Percentage%
Occupation Type	Farmer	32	8.1%
	Peasant	44	11.1%
	employed	169	42.7%
	Self-employed	151	38.1%
Income level	Below poverty line	73	18.4%
	Above poverty line	323	81.6%
Financial Option	Borrowing	33	8.3%
	From income	290	73.2%
	Well-wishers support	73	18.4%
Obstacles to L.Ownership	Finance	317	80.1%
	Culture	6	1.5%
	Lack of skills	33	8.3%
	Lack of land or space	40	10.1%
Non-financial Resources	Yes	354	89.4%
	No	42	10.6%
Presence of Incentives	Yes	108	27.3%
	No	288	72.7%
Type of Incentive	materials	24	22.2%
	Funds	20	18.5%
	Labor	64	59.3%

Table 4: Multivariate Analysis of Social Economic Factors Associated with the Sustainability of Open Defecation-Free Status

	Variables	B	S.E	Wald	Df	Sig	Exp(B)	95% C.I for EXP(B)	
								Lower	Upper
Step 1a	**incentives**	-.77	.33	5.56	1	0.01	2.1	.24	.88
							ref		
	occupation			17.58	3	0.01			
	farmer	1.00	.48	4.39	1	.03	2.72	1.07	6.92
	peasant	1.69	-42	16.12	1	.00	5.46	2.38	12.50
	employed	.48	.31	2.39	1	.12	1.61	0.88	2.94
							ref		
	income	1.001	0.308	10.54	1	.001	2.72	1.49	4.98
							ref		
	Constant	-.173	.542	.05	1	0.72	.796		

DISCUSSION

In comparison to the Kenyan national target of 100% open defecation-free status by 2030, which is in line with sustainable growth goal number six, the of open defecation-free status sustainability among residents in Mwingi West Sub-County, Kitui County, was 75.3%. This was significantly lower. These findings were close to those of a study in Kenya where open defecation-free status was at 76.5%.[12] Another study conducted in Ghana revealed a higher open defecation-free status sustainability of 98%.[13]

From this study, study participants who had completed their tertiary education had a fourfold higher chance of maintaining their status as free of open defecation than those who had not received any formal education. Higher education is correlated with better sanitation and hygiene standards. These findings were in agreement with a study done in Kenya where a higher level of education promoted open-defecation-free status sustainability.[14] These findings are contrary to two other studies done in Ethiopia.[15,16] In addition, those participating in the study between the ages of 35 and 44 were 2.9 times more likely to maintain open defecation-free status sustainably than participants between the ages of 54 and 64. This may be related to the fact that they are now adults and understand the advantages of being free from open defecation. The findings of this study agreed with those of Brazilian research.[17] This was contrary to two other studies done in Vietnam.[18]

Study partakers who were earning below the poverty line were 2.7 times less likely to sustain open defecation-free status, this could be linked to a lack of capital to build a sustainable pit latrine. Findings from this study were supported by those of a study done in Ghana.[19] The provision of incentives increased the odds of sustaining open defecation-free status by 2.1. The provision of incentives such as labor, building materials, and funds ensures the easy provision of pit latrines which is a key component in eradicating open defecation in the community. Findings from this study were supported by two other investigations done in Cote Divoire and Nepal where the provision of incentives increased the odds of open defecation-free status sustainability.[20,21] Peasant study respondents were 5.5 less likely to sustain open defecation-free status as compared to the self-employed study respondents. Better income promotes good hygiene and sanitation practices which enhance the maintenance of open defecation-free status. The findings from this investigation were consistent with a study done in Indonesia where occupation status was linked to open-defecation-free status sustainability.[22]

CONCLUSION

The open defecation-free status sustainability among adult residents in Mwingi West Sub-County, Kitui County was at 75.3%. Study participants aged 35 to 44 years and study respondents who had completed their tertiary education and the presence of incentives increased the odds of sustaining open defecation-free status while earning below the poverty line and having a peasant type of occupation reduced the odds of open defecation-free status sustainability. Ensuring safe equitable access to water and sanitation services may play a key role in the sustainability of open defecation-free status in developing nations.

Recommendations

1. WASH partners and stakeholders should introduce sanitation programs aimed at educating the community on the consequences of open defecation and the need to sustain latrine use which will aid in preventing fecal oral-related diseases and promote a healthy environment.
2. Kenyan Government, WASH partners and other stakeholders should introduce sanitation skills upgrading artisanal training to members of the community to avoid collapsing of constructed latrines.
3. Kenya Government, WASH partners should empower communities on the importance of adhering to social norms related to the sustainability of Open defecation-free status by enforcing existing Sanction programs.

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