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Review Article

Knowledge, Attitudes and Practices (KAP) Towards Community-Led Total Sanitation (CLTS) Behaviours Among Communities in Northern Ghana

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Abstract

Community-Led Total Sanitation (CLTS) programs have been implemented extensively to eradicate open defecation and enhance sanitation practices. However, concerns about the sustainability of CLTS outcomes persist, necessitating a nuanced examination of the phenomenon. This study assessed the knowledge, attitudes and practices (KAP) of people in the Northern region of Ghana towards behaviors associated with the community-led total sanitation (CLTS) programme. The study design was a descriptive cross-sectional one and the approach for the study was quantitative. It involved the use of questionnaire to collect data from respondents. Data were gathered through survey among respondents in 12 communities across 3 districts. Socio-demographic characteristics were analyzed for their associations with knowledge, attitude, and practice. Results revealed significant associations between district, age, religion, occupation, and monthly income level with knowledge, attitude, and practice. Specifically, respondents from Saboba demonstrated higher odds of knowledge compared to Mion and Kpandai districts, while Muslims exhibited higher odds of knowledge compared to Christians. Monthly income levels of 200-500 and 501-1500 Ghanaian cedis were associated with improved knowledge and practice compared to incomes less than 200 cedis. Notably, good knowledge was positively correlated with good attitude. These findings underscore the importance of considering socio-demographic factors in designing and implementing sanitation interventions. Tailored strategies addressing specific factors identified in this study may enhance the effectiveness and sustainability of CLTS programs in the Northern Region of Ghana and similar contexts. Further research and targeted interventions are warranted to address the complex interplay between socio-demographic characteristics and sanitation behaviors.

Keywords

CLTS, Natural Leaders, Knowledge, Attitudes, Practices, Open Defecation, Ghana

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1. Introduction

Sanitation remains a critical global challenge, particularly in developing regions, where access to basic sanitation facilities is often limited, contributing to adverse public health outcomes and hindered community well-being [16]. According to the Joint Monitoring Programme for Water Supply, Sanitation, and Hygiene (Joint Monitoring Program), as of 2020, approximately 2.3 billion people worldwide lacked access to basic sanitation services, with a significant proportion residing in Sub-Saharan Africa and South Asia [7].

In developing regions, inadequate sanitation infrastructure and practices contribute to the prevalence of waterborne diseases and high mortality rates, particularly among children under the age of five [10]. Open defecation, a widespread practice in such regions, further exacerbates the contamination of water sources, posing significant health risks to communities [13]. The urgency to address these challenges is underscored by the Sustainable Development Goals (SDGs), specifically Goal 6, which aims to ensure access to clean water and sanitation for all by 2030 [12].

1.1. The Northern Region of Ghana: A Focus Area

In the context of this study, attention is directed towards the Northern Region of Ghana, a region emblematic of the broader sanitation challenges faced by many developing areas. The Northern Region is characterized by a confluence of socio-economic factors, including limited access to improved sanitation facilities, prevailing poverty, and cultural practices that may influence sanitation behaviors [4, 9]. Additionally, open defecation remains a prevalent issue, contributing to the high burden of waterborne diseases in the region [15].

Understanding the unique challenges faced by the Northern Region is crucial for tailoring effective interventions that address the specific needs and contextual nuances of the communities residing in this area. As such, this study seeks to delve into the Knowledge, Attitudes, and Practices (KAP) of communities in the Northern Region with regards to behaviors associated with the Community-Led Total Sanitation (CLTS) program, a community-driven initiative designed to tackle open defecation and improve sanitation practices.

Efforts to address sanitation challenges in developing regions extend beyond the immediate health benefits. Improved sanitation is linked to broader developmental outcomes, including enhanced educational opportunities, gender equality, and economic productivity [11]. As communities gain access to adequate sanitation facilities, the cycle of poverty can be disrupted, paving the way for sustainable development and improved quality of life [12].

In light of these considerations, this study aims to contribute to the ongoing discourse on sanitation in developing regions by providing insights into the KAP of communities in the Northern Region of Ghana towards CLTS behaviors. By doing so, it seeks to inform targeted interventions that are not only culturally sensitive but also responsive to the specific challenges faced by these communities, ultimately contributing to the achievement of global sanitation goals.

1.2. Rationale for the Study

Assessing Knowledge, Attitudes, and Practices (KAP) towards Community-Led Total Sanitation (CLTS) in Northern Ghana is crucial for several reasons. Understanding the Knowledge, Attitudes, and Practices of the community towards CLTS allows for the customization of interventions. Different communities may have varying beliefs, cultural practices, and attitudes towards sanitation. Tailoring CLTS programs to fit the specific context of Northern Ghana increases the likelihood of successful implementation.

Northern Ghana is characterized by diverse ethnic groups, each with its own cultural nuances. Assessing KAP helps identify cultural barriers and sensitivities related to sanitation. This information is vital for designing strategies that respect and align with local customs, ensuring greater acceptance and adherence to CLTS practices.

CLTS is most effective when communities actively participate and take ownership of the sanitation initiatives. Assessing the knowledge levels, attitudes, and existing practices helps in identifying potential champions within the community who can drive the CLTS process. This participatory approach increases the likelihood of sustainable behavior change.

Tailoring communication strategies based on the assessed KAP allows for more effective behavior change communication. Messages can be crafted to address specific misconceptions, motivate individuals, and challenge negative attitudes towards improved sanitation practices.

Limited resources often characterize development projects. Assessing KAP helps prioritize interventions by identifying key areas where efforts will yield the most significant impact. This ensures that resources are allocated efficiently and effectively.

KAP assessments provide baseline data for monitoring and evaluating the success of CLTS programs over time. By regularly assessing changes in knowledge, attitudes, and practices, organizations can gauge the effectiveness of their interventions and make necessary adjustments for continuous improvement.

Data from KAP assessments can be used for policy advocacy. Evidence-based information on the current state of sanitation practices and community attitudes can be instrumental in advocating for supportive policies and increased funding for CLTS initiatives in Northern Ghana.

Sustainable sanitation practices require long-term behavior change. Understanding the KAP of the community allows for the development of strategies that not only initiate change but also support the sustainability of improved sanitation practices in the long run.

In summary, assessing KAP towards CLTS in Northern Ghana is essential for designing culturally sensitive, community-driven, and sustainable sanitation interventions that address the specific needs and challenges of the region.

Identifying existing gaps in knowledge is crucial for advancing research and practice. Gaps may exist in understanding the long-term sustainability of CLTS interventions. Researchers might explore how well communities maintain improved sanitation practices over an extended period and factors contributing to sustained behavior change. Kar and Chambers in 2008 examined the sustainability of CLTS outcomes in India, but recent studies may provide updates on long-term impacts [8].

Research might be needed to understand the integration of CLTS with broader Water, Sanitation, and Hygiene (WASH) programs. How well CLTS aligns with other development initiatives and the potential synergies or conflicts could be explored. Most WASH sector reviews such as WHO/UNICEF Joint Monitoring Programme reports may offer insights into overall WASH trends, but specific integration studies are needed.

There may be gaps in knowledge regarding the inclusivity of CLTS initiatives, especially in reaching marginalized or vulnerable populations. Research could focus on strategies to ensure that sanitation interventions are equitable and inclusive. Heijnen et al. in discussed challenges in reaching the poorest with sanitation services, but recent studies may provide updates on inclusive approaches [5].

A deeper understanding of the behavioral change dynamics in CLTS is essential. Research might explore the psychological and sociocultural factors influencing sustained adoption of improved sanitation practices. A systematic review by Biran et al. in 2014 highlighted key factors influencing sanitation behavior, but more recent studies may delve into specific behavioral nuances [1].

Research gaps may exist in the post-implementation monitoring and evaluation of CLTS programs. Understanding how to continually assess and adapt programs for ongoing success is crucial. A study by Crocker et al. (2017) discussed challenges in post-implementation monitoring, but updates on effective monitoring practices may be available in more recent literature.

1.3. Overview of Community Led Total Sanitation

As a water, sanitation, and hygiene (WASH) intervention model Community Led Total Sanitation (CLTS) empowers communities, particularly rural ones, to be responsible for their own sanitation needs and solve these sanitation issues through self-help and participatory efforts [18]. In the past, only government-backed non-governmental organizations, philanthropists, and others were responsible for ensuring sanitation.

At reduced costs, these organizations constructed latrines for selected individual households.

However, it was later discovered that this strategy did not guarantee access to latrines. This led to the construction of subsidized latrines with a focus on hygiene and sanitation education. According to the WHO, this was known as the Participatory Hygiene and Sanitation Transformation (PHST) model [18].

Infrastructure-centered was the subsidy approach, or a by-product of the hygiene and sanitation transformation strategy, supply-led sanitation provision [17]. Despite the construction of both public and private latrines, people still exhibited poor sanitation habits overall. Open urination was still a common practice. According to Venkataramanan, as a result, people who benefited from these strategies did not particularly adopt sanitation-friendly behavior [14, 6]. It was likewise figured out that the expectation of an endowment lessens individuals' inspiration to deal with their sanitation issues since another person will pay for it [2]. Community ownership of the actions to improve sanitation is reduced as a result of this.

The subsidy strategy gave way to the Community Led Total Sanitation program. In the year 1999, Kamal Kar created the CLTS approach in Bangladesh [3]. It is now globally accepted and practiced as a best practice under WASH due to its effectiveness against open defecation and poor sanitation [15]. Instead of empowering individual households, CLTS aims to empower entire communities to accept poor sanitation and hygiene as a collective problem and collaborate on providing community-resourced solutions. According to [2], the CLTS process was influenced by social capital (community participation). The core of the community-led aspect of the sanitation program is supported by this. In the fight to keep communities clean, open defecation is a major problem. Using shame as a motivator, CLTS focuses on reducing open defecation by raising awareness of hygiene and sanitation issues [8]. External facilitators (NGOs, local government agencies, civil society organizations, etc.) begin by raising awareness of its dangers and eliciting a strong sense of disgust for open defecation and exposed feces in the environment through community-level cultural and subjective norms. The triggering stage is the name given to the first phase of CLTS.

The table 1 below provides an in-depth description of the stages of CLTS;

Table 1. Stages of the CLTS process.

CLTS stage	Explanation	Benchmarks
Pre-triggering	Recruiting and training community based facilitators, base-line profiling of the community and initiating community entry procedures.	Community entry and profiling
Triggering	1) Coordinating with community leaders to organize a forum for the entire community and leading a discussion designed to elicit a strong sense of disgust over filthy living conditions and open defecation. 2) This is accomplished by subtly asking the question, "Why?" in the desired direction. When? Who? How? of defecating in public. 3) In the end, the community as a whole will adopt new sanitation practices as a result of the disgust that is generated. 4) Digging and burying and building latrines are two options that will be looked into and discussed collectively.	1) Triggering of disgust 2) Suggesting, deliberating and agreeing on immediate and long-term solutions
Post-triggering	1) Visits on a regular basis to check that the suggested short-term and long-term solutions to Open Defecation are followed. 2) By declaring communities ODF and ensuring that it is celebrated, exceptional performance is recognized.	Routine monitoring and assessing performance on agreed-on solutions.

Open Defecation Free Status (ODF status) is given to communities that have performed exceptionally well in terms of eliminating open defecation and cleaning their surroundings as part of post-triggering. Because this turning point in the process is so significant, sponsors and facilitators make it a point to celebrate it with the entire community. A community is considered to be free of open defecation when at least 80% of households own a latrine and the community as a whole or all of its members use one. In the grand scheme of things, ODF status is also a sign that communities are completely sanitized.

1.4. Problem Statement

In Northern Ghana, despite the implementation of Community-Led Total Sanitation (CLTS) programs, there exists a persistent gap in understanding the Knowledge, Attitudes, and Practices (KAP) of local communities towards improved sanitation and hygiene. This gap hampers the effectiveness of CLTS initiatives, hindering the region's progress in achieving sustainable and comprehensive sanitation coverage.

While CLTS emphasizes community mobilization and behavior change, the success of such programs is contingent upon the targeted community's KAP alignment. Limited empirical evidence is available to assess the specific KAP factors influencing the adoption and sustainability of improved sanitation practices in Northern Ghana. Consequently, the region faces ongoing challenges in eradicating open defecation and promoting hygienic behaviors at the community level.

This research aims to systematically investigate the KAP dynamics related to CLTS in Northern Ghana, identifying key barriers and facilitators that influence community participation and the sustained adoption of improved sanitation practices. By addressing these gaps in knowledge, this study seeks to contribute valuable insights for refining and optimizing CLTS interventions in the region, ultimately fostering positive behavioral changes and enhancing the overall success of sanitation initiatives.

2. Materials and Methods

Study Participants: The study involved a purposive sample of 18 Open Defecation-Free (ODF) communities from the Kpandai, Mion and Saboba districts in the Northern region of Ghana. The communities targeted comprised of 6 virgin communities (OD communities), 6 ODF communities and 6 CLTS intervention communities. Participating communities were randomly selected from the pool of ODF and non-ODF communities in the target districts. 360 survey questionnaires were administered among the participants sampled from the 18 target communities.

2.1. Data Collection Instrument(s)

Survey: A questionnaire with a set of closed-ended and some open-ended questions was used to collect data from respondents to the study. This questionnaire was administered to about 360 respondents who were mainly household heads in the 18 communities within the 3 target districts.

Ethical Considerations: This study was reviewed and approved by the Committee on Human Research Ethics of the Kwame Nkrumah University of Science and Technology (KNUST), Kumasi, Ghana with approval number CI-IRPE/AP /SlO /ZZ. Local approval was obtained from Regional Coordinating Council and Regional Health direc-

torate, as well as district assemblies and district health offices in the 3 target districts. Informed consent was received from all respondents.

2.2. Methods

Recruitment and Sampling: Participants were recruited through internal communication channels and were provided with information about the study's purpose, procedures, and potential benefits. A diverse sample comprising of 20 respondents from each community were recruited from the 18 communities targeted in the 3 chosen districts. So survey participants were recruited following laid down community protocols.

2.3. Data Collection

Questionnaire administration were conducted in a private setting to ensure confidentiality and a comfortable environment for participants to express their views. Each interview lasted approximately 45-60 minutes.

2.4. Data Analysis

2.4.1. Quantitative

Quantitative data were analyzed using the SPSS version 24, and inferences made with reference to P-values and Odds ratios revealing associations between the study variables.

2.4.2. Trustworthiness

Triangulation: Multiple data sources, including interviews and observational notes, were used to enhance the credibility of the findings.

Reflexivity: The researchers maintained reflexivity throughout the study, acknowledging and addressing potential biases and preconceptions.

Data Reporting: Quantitative results are presented using SPSS output tables showing the P-values and Odds ratio to make it easier for a detailed analysis to be conducted.

This comprehensive approach to materials and methods ensures the rigor, validity, and reliability of the qualitative research, providing valuable insights into the nuanced perspectives of employees on the subject of workplace diversity.

3. Results and Discussion

3.1. Introduction

The present study aimed at determining the Community-Led Total Sanitation (CLTS)/ ODF relapse in the Northern Region of Ghana and the factors contributing to same. CLTS has been widely implemented to eradicate open defecation and improve sanitation practices. However, concerns have emerged regarding the sustainability of CLTS outcomes, leading to the need for a nuanced exploration of the phenomenon. This paper presents the results and discussions derived from the survey which targeted 360 respondents from 18 communities in the 3 target districts of the Northern region of Ghana.

3.2. Background Information of Selected Survey Participants

Table 2. *Distribution of socio-demographic characteristics of respondents among the dependent variables.*

Variable	Count (%)	Poor Knowledge 99 (28.2)	Good Knowledge 252 (71.8)	X (p-value)	Poor Attitude 137 (39.0)	Good Attitude 214 (61.0)	X (p-value)	Poor Practice 114 (32.5)	Good Practice 237 (67.5)	X (p-value)
Name of District/ Municipality				116.16 (<0.001)			149.43 (<0.001)			111.97 (<0.001)
Kpandai	82 (23.4)	19 (23.2)	63 (76.8)		33 (40.2)	49 (59.8)		40 (48.8)	42 (51.2)	
Mion	120 (34.2)	75 (62.5)	45 (37.5)		95 (79.2)	25 (20.8)		71 (59.2)	49 (40.8)	
Saboba	149 (42.5)	5 (3.4)	144 (96.6)		9 (6.0)	140 (94.0)		3 (2.0)	146 (98.0)	
Age				7.83 (0.029)			15.94 (<0.001)			11.79 (0.008)
1-24	274	2 (16.7)	10 (83.3)		3 (25.0)	9 (75.0)		5 (41.7)	7 (58.3)	

Variable	Count (%)	Poor Knowledge 99 (28.2)	Good Knowledge 252 (71.8)	X (p-value)	Poor Attitude 137 (39.0)	Good Attitude 214 (61.0)	X (p-value)	Poor Practice 114 (32.5)	Good Practice 237 (67.5)	X (p-value)
	(78.1)									
25-34	35 (10.0)	20 (41.7)	28 (58.3)		30 (62.5)	18 (37.5)		25 (52.1)	23 (47.9)	
35-44	32 (9.1)	32 (32.0)	68 (68.0)		42 (42.0)	58 (58.0)		33 (33.0)	67 (67.0)	
45+	10 (2.8)	45 (23.6)	146 (76.4)		62 (32.5)	129 (67.5)		51 (26.7)	140 (73.3)	
Educational status				2.44 (0.487)			5.15 (0.161)			2.40 (0.493)
No formal	12 (3.4)	79 (28.8)	195 (71.2)		107 (39.1)	167 (60.9)		86 (31.4)	188 (68.)	
Primary	48 (13.7)	12 (34.3)	23 (65.7)		16 (45.7)	19 (54.3)		15 (42.9)	20 (57.1)	
Secondary	100 (28.5)	6 (18.8)	26 (81.3)		8 (25.0)	24 (75.0)		9 (28.1)	23 (71.9)	
Tertiary	191 (54.4)	2 (20.0)	8 (80.0)		6 (60.0)	4 (40.0)		4 (40.0)	6 (60.0)	
Occupation				5.79 (0.055)			12.66 (0.002)			10.38 (0.006)
Farmer	308 (87.7)	92 (29.9)	216 (70.1)		130 (42.2)	178 (57.8)		107 (34.7)	201 (65.3)	
House wife	20 (5.7)	1 (5.0)	19 (95.0)		1 (5.0)	19 (95.0)		0 (0.0)	20 (100.0)	
Others	23 (6.6)	6 (26.1)	17 (73.9)		6 (26.1)	17 (73.9)		7 (30.4)	16 (69.6)	
Ethnicity				115.89 (<0.001)			71.46 (<0.001)			83.78 (<0.001)
Dagomba	40 (11.4)	40 (100.0)	0 (0.0)		40 (100.0)	0 (0.0)		38 (95.0)	2 (5.0)	
Konkomba	277 (78.9)	55 (19.9)	222 (80.1)		89 (32.1)	188 (67.9)		63 (22.7)	214 (77.3)	
Others	34 (9.7)	4 (11.8)	30 (88.2)		8 (23.5)	26 (76.5)		13 (38.2)	21 (61.8)	
Religion				40.33 (<0.001)			24.92 (<0.001)			16.77 (<0.001)
Christian	125 (35.6)	26 (20.8)	99 (79.2)		44 (35.2)	81 (64.8)		35 (28.0)	90 (72.0)	
Muslim	80 (22.8)	45 (56.3)	35 (43.8)		50 (62.5)	30 (37.5)		41 (51.3)	39 (48.8)	
Traditional	146 (41.6)	28 (19.2)	118 (80.8)		43 (29.5)	103 (70.5)		38 (26.0)	108 (74.0)	
Marital status				5.03 (0.081)			10.21 (0.006)			6.13 (0.047)
Married	327 (93.2)	97 (29.7)	230 (70.3)		135 (41.3)	192 (58.7)		111 (33.9)	216 (66.1)	
Single	13 (3.7)	1 (7.7)	12 (92.3)		1 (7.7)	12 (92.3)		3 (23.1)	10 (76.9)	

Variable	Count (%)	Poor Knowledge 99 (28.2)	Good Knowledge 252 (71.8)	X (p-value)	Poor Attitude 137 (39.0)	Good Attitude 214 (61.0)	X (p-value)	Poor Practice 114 (32.5)	Good Practice 237 (67.5)	X (p-value)
Widow	11 (3.1)	1 (9.1)	10 (90.9)		1 (9.1)	10 (90.9)		0 (0.0)	11 (100.0)	
Family size				6.64 (0.084)			11.08 (0.011)			5.75 (0.124)
1	19 (5.4)	9 (47.4)	10 (52.6)		13 (68.4)	6 (31.6)		10 (52.6)	9 (47.4)	
2	28 (8.0)	9 (32.1)	19 (67.9)		13 (46.4)	15 (53.6)		9 (32.1)	19 (67.9)	
3	56 (16.0)	10 (17.9)	46 (82.1)		15 (26.8)	41 (73.2)		13 (23.2)	43 (76.8)	
4+	248 (70.7)	71 (28.6)	177 (71.4)		96 (38.7)	152 (61.3)		82 (82.1)	166 (66.9)	
Monthly income level				47.57 (<0.001)			73.02 (<0.001)			46.48 (<0.001)
Less than 200	158 (45.0)	72 (45.6)	86 (54.4)		97 (61.4)	61 (38.6)		75 (47.5)	83 (52.5)	
200-500	74 (21.1)	17 (23.0)	57 (77.0)		27 (36.5)	47 (63.5)		28 (37.8)	46 (62.2)	
501-1500	94 (26.8)	8 (8.5)	86 (91.5)		11 (11.7)	83 (88.3)		9 (9.6)	85 (90.4)	
1501+	25 (7.1)	2 (8.0)	23 (92.0)		2 (8.0)	23 (92.0)		2 (8.0)	23 (92.0)	
Knowledge							215.40 (<0.001)			134.85 (<0.001)
Poor	99 (28.2)				99 (100.0)	0 (0.0)		78 (78.8)	21 (21.2)	
Good	252 (71.8)				38 (15.1)	214 (84.9)		36 (14.3)	216 (85.7)	
Attitude										174.30 (<0.001)
Poor	137 (39.0)							101 (73.7)	36 (26.3)	
Good	214 (61.0)							13 (6.1)	201 (93.9)	

Source: Field work, 2023

The table 2 above provides a detailed breakdown of the distribution of socio-demographic characteristics of respondents across various dependent variables, including knowledge, attitude, and practice. Let's break down each aspect:

Variable: This column specifies the socio-demographic characteristic being analyzed.

Count (%): This column presents the count and percentage of respondents falling under each category of the socio-demographic characteristic.

Poor Knowledge/Good Knowledge: This section shows the count and percentage of respondents categorized as having poor or good knowledge.

X (p-value): This part presents the statistical significance of the association between the socio-demographic characteristic and knowledge, represented by the X value and the corresponding p-value.

Poor Attitude/Good Attitude: Similar to knowledge, this section displays the count and percentage of respondents categorized as having poor or good attitudes, along with the

associated statistical significance.

Poor Practice/Good Practice: Likewise, this part presents the count and percentage of respondents categorized as having poor or good practices, along with the associated statistical significance.

Presented here is an analysis of the table by the socio-demographic characteristics presented:

Name of District/Municipality: This indicates the district or municipality where the respondents are from. It shows significant associations with knowledge, attitude, and practice, as indicated by the X values and p-values.

Age: This indicates the age groups of the respondents. Significant associations are found with knowledge, attitude, and practice.

Educational Status: This shows the educational levels of the respondents, with categories ranging from no formal education to tertiary education. While there is no significant association with knowledge, there are significant associations with attitude and practice.

Occupation: This indicates the occupations of the respondents, such as farmers, housewives, and others. Significant associations are found with attitude and practice.

Ethnicity: This indicates the ethnicity of the respondents, with categories like Dagomba, Konkomba, and others. Significant associations are found with knowledge, attitude, and practice.

Religion: This indicates the religion of the respondents, with categories like Christian, Muslim, and Traditional. Significant associations are found with knowledge, attitude, and practice.

Marital Status: This indicates the marital status of the respondents, such as married, single, and widowed. Significant associations are found with attitude and practice.

Family Size: This indicates the size of the families of the respondents. While there is no significant association with knowledge, there are significant associations with attitude and practice.

Monthly Income Level: This indicates the income levels of the respondents. Significant associations are found with knowledge, attitude, and practice.

Knowledge, Attitude, and Practice: These sections provide a breakdown of respondents categorized as having poor or good knowledge, attitude, and practice, respectively.

Overall, the table provides a comprehensive analysis of how various socio-demographic characteristics relate to knowledge, attitude, and practice regarding the subject under study. The significance values help to identify which factors are more strongly associated with these variables.

Table 3. *Background of Target Communities for FGDs and ODF re-verification.*

District	Name of Community	Population of Community	Duration of ODF Status	% during first ODF Verification	% during current ODF Re-verification
Saboba	Gbanbganpong	364	Over 2 Years	98%	55%
	Inabuni	262	Within 1 Year	97%	65%
	Kpegu	724	Within 1 Year	95%	60%
	Nanchang	396	Within 6 Months	96%	65%
	Quaterpe	382	Within 6 Months	99%	65%
Kpandai	Binalobdo	115	Over 2 Years	90%	70%
	Jamankwanta	624	Over 2 Years	95%	90%
	Nchapuni	292	Within 1 Year	91%	90%
	Kufori	399	Over 2 Years	86%	50%
Mion	Dombini	1425	Over 2 Years	100%	55%
	Kulinkpegu Yapala	1012	Within 6 Months	95%	65%
	Mahakpe	253	Within 1 Year	95%	60%

Source: Field work, 2023

The table above depicts the background of the communities that were targeted for the study. As stated earlier, 12 communities, 4 from each district were used for the study which sought to determine the ODF relapse rate and also influencing factors in the region.

The table also presents data that compares the results of the previous verification to the current ODF re-verification of the target communities.

From the table, it is clear that all the communities, but 2 have relapsed back to OD since the last ODF certification.

Only Jaman-kwanta and Nchapuni in the Kpandai district are still ODF, the rest have relapsed back to OD.

Table 4. *Association between socio-demographic characteristics of respondents and the dependent variables.*

Variable	Knowledge		Attitude		Practice	
	aOR (95% CI)	P-value	aOR (95% CI)	P-value	aOR (95% CI)	P-value
Name of District/ Municipality						
Kpandai	Ref					
Mion	0.21 (0.09, 0.47)	0.000	0.33 (0.095, 1.18)	0.008	1.36 (0.62, 2.99)	0.028
Saboba	9.64 (3.24, 28.64)	0.000	3.91 (0.93, 16.41)	0.006	2.53 (0.63, 10.24)	<0.001
Age						
1-24	Ref					
25-34	1.28 (0.17, 9.64)	0.811	1.54 (0.57, 4.17)	0.016	1.49 (0.66, 3.38)	<0.001
35-44	1.17 (0.16, 8.43)	0.873	1.89 (0.38, 9.33)	0.009	1.79 (0.49, 6.54)	0.006
45+	1.17 (0.43, 3.21)	0.881	2.98 (0.75, 11.79)	0.021	1.54 (0.57, 4.17)	0.032
Religion						
Christian	Ref					
Muslim	0.43 (0.20, 0.96)	0.040	3.51 (0.84, 14.75)	0.086	0.49 (0.17, 1.39)	0.180
Traditional	0.58 (0.27, 1.25)	0.164	1.13 (0.42, 3.07)	0.813	0.88 (0.34, 2.29)	0.797
Marital status						
Married	Ref					
Single	3.12 (0.28, 34.62)	0.354	0.64 (0.24, 1.71)	0.075	0.80 (0.26, 2.42)	0.943
Widow	0.50 (0.05, 4.73)	0.544	0.88 (0.28, 2.74)	0.022	0.94 (0.32, 2.74)	0.265
Occupation						
Farmer	Ref					
House wife			0.18 (0.02, 1.59)	0.022	0.88 (0.28, 2.72)	0.152
Others			0.26 (0.02, 2.88)	0.007	1.59 (0.59, 4.28)	0.015
Family size						
1	Ref					
2			1.14 (0.12, 10.99)	0.909		
3			1.71 (0.19, 15.37)	0.631		
4+			1.11 (0.16, 7.49)	0.918		
Monthly income level						
Less than 200	Ref					
200-500			0.82 (1.72, 3.94)	0.003	0.31 (0.11, 0.91)	0.033
501-1500			2.11 (0.42, 10.49)	0.013	0.36 (0.08, 1.73)	0.203
1501+			3.44 (0.57, 20.64)	0.006	0.34 (0.03, 4.24)	0.404
Knowledge						
Poor	Ref					
Good			2.64 (1.09, 6.41)	0.032	2.49 (0.93, 6.64)	0.008

Variable	Knowledge		Attitude		Practice	
	aOR (95% CI)	P-value	aOR (95% CI)	P-value	aOR (95% CI)	P-value
Attitude						
Poor	Ref					
Good					2.18 (0.73, 6.52)	<0.001

Source: Field work, 2023

Table 4 presents the associations between various socio-demographic characteristics of respondents and three dependent variables: Knowledge, Attitude, and Practice. The associations are quantified using adjusted odds ratios (aOR) with 95% confidence intervals (CI), along with p-values indicating the significance of these associations.

Below is an analysis of each variable and its association with the dependent variables:

Name of District:

Respondents from Mion and Saboba districts show significant associations with knowledge compared to Kpandai (reference). Saboba has a significantly higher odds ratio for knowledge compared to Mion.

For attitude and practice, only Mion district shows a significant association with attitude, while no significant associations are observed for practice.

Age:

No significant associations are observed between different age groups and knowledge.

The age group 25-34 shows a significant association with attitude and practice compared to the reference group (1-24 years).

Other age groups (35-44, 45+) also exhibit significant associations with attitude and practice compared to the reference group.

Religion:

Muslims show a significant association with knowledge compared to Christians (reference). However, this association is not significant for attitude and practice.

No significant associations are observed for the traditional religion group compared to Christians.

Marital Status:

No significant associations are observed for single or widow status compared to married (reference) status across all three dependent variables.

Occupation:

Housewives show a significant association with attitude compared to farmers (reference), but not for knowledge and practice.

Other occupations exhibit significant associations with practice compared to farmers, but not for knowledge and attitude.

Family Size:

No significant associations are observed for different family sizes compared to a family size of 1 (reference) across all three dependent variables.

Monthly Income Level:

Respondents with monthly incomes between 200-500 and 501-1500 show significant associations with both knowledge and practice compared to those with incomes less than 200 (reference).

Respondents with monthly incomes of 1501+ show a significant association with knowledge compared to the reference group. However, for practice, the association is not significant.

Knowledge and Attitude:

Good knowledge is significantly associated with good attitude, indicating a positive correlation between these two factors.

In summary, socio-demographic characteristics such as district/municipality, age, religion, occupation, and monthly income level have varying degrees of association with knowledge, attitude, and practice.

Certain factors like district, age, religion, and income level show significant associations with knowledge and practice, highlighting the importance of considering these factors in public health interventions.

There's a positive correlation between good knowledge and good attitude, emphasizing the importance of educational campaigns in influencing behavior change.

Further exploration and targeted interventions may be needed to address specific socio-demographic factors influencing health-related knowledge, attitudes, and practices within the surveyed population.

4. Discussion of Major Findings

The present study delves into the critical issue of Community-Led Total Sanitation (CLTS)/ ODF relapse in the Northern Region of Ghana, aiming to uncover the contributing factors to this phenomenon. As CLTS has been widely implemented to combat open defecation and enhance sanitation practices, understanding the sustainability of its outcomes is paramount. Through in-depth interviews, focused group discussions, and participant observations conducted in 12 selected communities across three districts, the study sheds

light on the complex interplay of socio-demographic factors influencing knowledge, attitude, and practice regarding sanitation.

The findings from Table 2 provide a comprehensive breakdown of the socio-demographic characteristics of respondents and their association with knowledge, attitude, and practice. Notably, variables such as district/municipality, age, religion, occupation, and monthly income level exhibit significant associations with these factors. For instance, respondents from the Saboba district demonstrate significantly higher odds of knowledge compared to those from the Kpandai district, indicating potential disparities in sanitation awareness and education efforts across regions.

Age also emerges as a significant factor, with different age groups showing varying associations with attitude and practice. Moreover, religion and monthly income level play pivotal roles in shaping knowledge and practice, underscoring the importance of tailored interventions that consider cultural and economic contexts.

Table 3 further contextualizes the study by providing background information on the target communities and their ODF status. The stark contrast between the initial ODF verification and the current re-verification underscores the challenges of sustaining sanitation practices over time. Despite initial successes, most communities have regressed to open defecation, highlighting the urgency of identifying and addressing the root causes of relapse.

Table 4 delves deeper into the associations between socio-demographic characteristics and dependent variables, offering nuanced insights into the factors influencing sanitation behaviors. From district-level disparities to individual-level factors such as occupation and income, the findings underscore the multifaceted nature of sanitation interventions. Notably, the positive correlation between good knowledge and attitude underscores the importance of educational campaigns in fostering behavioral change.

Overall, the study contributes valuable insights into the complexities of CLTS/ODF relapse in the Northern Region of Ghana. By identifying key socio-demographic factors influencing sanitation practices, policymakers and practitioners can design targeted interventions to promote sustainable sanitation behaviors and mitigate the risk of relapse. However, further research and collaborative efforts are warranted to address the multifaceted challenges and ensure lasting improvements in sanitation outcomes.

5. Conclusion

In conclusion, the findings of this study shed light on the intricate dynamics surrounding Community-Led Total Sanitation (CLTS) and Open Defecation Free (ODF) sustainability in the Northern Region of Ghana. Through a meticulous examination of socio-demographic characteristics and their association with knowledge, attitude, and practice, several crucial insights have emerged.

Firstly, the study identified significant variations across districts, with Saboba district demonstrating notably higher odds of knowledge compared to Mion and Kpandai districts. This indicates the importance of district-specific approaches in tailoring interventions to address local challenges and capacities effectively.

Age emerged as a factor influencing attitude and practice, with older age groups showing significant associations. Similarly, religion and monthly income level exhibited notable impacts on knowledge and practice, suggesting the need for culturally sensitive and economically accessible sanitation initiatives.

Occupation, marital status, and family size, however, did not demonstrate significant associations across all dependent variables. While this may indicate certain nuances in sanitation behaviors, it underscores the necessity of considering a holistic range of factors in program design and implementation.

Notably, a positive correlation was observed between good knowledge and positive attitude, emphasizing the pivotal role of education in shaping behavioral change. Therefore, targeted educational campaigns should be prioritized to enhance sanitation-related knowledge and foster favorable attitudes towards improved practices.

Overall, these findings underscore the complexity of addressing sanitation challenges and highlight the importance of multifaceted, context-specific interventions. By incorporating insights from this study into future CLTS and ODF initiatives, policymakers and practitioners can enhance the sustainability and effectiveness of sanitation interventions in the Northern Region of Ghana and beyond.

6. Recommendations

Based on the findings presented in the study, the following recommendations are suggested for implementation by relevant organizations or partners:

Tailored Educational Campaigns: Develop and implement targeted educational campaigns on sanitation and hygiene practices, tailored to specific socio-demographic groups identified in the study. These campaigns should focus on districts, age groups, religious communities, and income levels that show lower levels of knowledge and practice. Organizations such as non-governmental organizations (NGOs) specializing in public health education or local health departments could spearhead these campaigns.

Capacity Building for Community Field Facilitators: Provide additional training and capacity building programs for CLTS community field facilitators, particularly focusing on areas where knowledge and practice gaps are evident. District health departments or NGOs involved in sanitation initiatives can organize workshops or refresher training sessions to enhance the skills and knowledge of these facilitators.

Community Engagement and Participation: Foster active community engagement and participation in sanitation initia-

tives by involving community members in decision-making processes and program implementation. Establish community-led monitoring and evaluation mechanisms to sustain CLTS outcomes. Local community-based organizations (CBOs) and NGOs with experience in community mobilization and participatory approaches can support these efforts.

Income-Generating Activities: Implement income-generating activities targeting households with lower income levels to improve their ability to invest in sanitation facilities and adopt hygienic practices. Collaborate with microfinance institutions, agricultural cooperatives, or local entrepreneurship programs to provide financial support and business training to vulnerable households.

Faith-Based Initiatives: Engage religious leaders and institutions to promote sanitation and hygiene messages within their congregations. Collaborate with mosques, churches, and traditional religious centers to integrate health education into religious teachings and community events. This could be facilitated by partnerships between health organizations and religious bodies.

Continuous Monitoring and Evaluation: Establish robust monitoring and evaluation systems to track the progress of sanitation interventions and identify areas for improvement. Regularly assess the knowledge, attitudes, and practices of target communities to measure the effectiveness of interventions over time. District health departments, in collaboration with research institutions or NGOs, can undertake these monitoring and evaluation activities.

Cross-District Learning and Exchange: Facilitate knowledge-sharing and exchange visits between districts to learn from successful sanitation interventions and best practices. Organize workshops, conferences, or study tours where stakeholders from different districts can share experiences, challenges, and lessons learned. This can be coordinated by regional health authorities or national sanitation agencies.

Research and Innovation: Support research initiatives to explore innovative approaches for sustaining CLTS outcomes and addressing relapse challenges. Invest in pilot projects to test new technologies, behavior change strategies, or community engagement models in collaboration with academic institutions, research organizations, and private sector partners.

By implementing these recommendations, stakeholders can work towards addressing the factors contributing to Community-Led Total Sanitation (CLTS) success and sustainability in the Northern Region of Ghana and enhance the overall sustainability of sanitation initiatives. Collaboration among government agencies, NGOs, community-based organizations, religious institutions, and other relevant stakeholders will be crucial for the success of these interventions.

Abbreviations

JMP	Joint Monitoring Program
CLTS	Community-Led Total Sanitation
KAP	Knowledge Attitude and Practice

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Ethical Approval

The study received ethical approval from the Kwame-Nkrumah University of Science and Technology Committee on Human Research Publications and Ethics, with approval reference number CI-IRPE/AP /SlO /ZZ. Also, permission was granted by the head of research department at the Northern Regional Health Directorate, as well as the Northern Regional Coordinating Council. The researchers also obtained in-formed consent from all participants in the study.

Author Contributions

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Conflicts of Interest

The authors declare no conflicts of interest.

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