

Research Article

Implementing-Communities' Knowledge of the Community-Led Total Sanitation Approach, A Cross-Sectional Study in The Sagnarigu Municipality of the Northern Region of Ghana

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ABSTRACT

Adequate knowledge of optimum measures for improving sanitation and hygiene is the foundation for adopting the best approach to addressing sanitation challenges. Open defecation is challenging in the Sagnarigu municipality amidst Community-Led Total Sanitation implementation. This study investigated implementing communities' knowledge of the Community-Led Total Sanitation (CLTS) approach and associated sociodemographic factors in the Sagnarigu Municipality of the Northern Region of Ghana. A cross-sectional study involving the quantitative approach was adopted. Systematic sampling was used to select 339 respondents from four (4) Community-Led Total Sanitation-implementing communities. Data collection was done using a structured questionnaire. Analyses were done descriptively with frequencies. At the bivariate level, Pearson's Chi-square (X^2) test of association was conducted to determine a significant association between study variables at 95% confidence levels. From the results, 56.6% were males, 34.2% were within the age range of 31-40 years, 79.1% were from households with 6-20 membership, and 56.3% had no formal education. The study found that 97.6% of the participants had good knowledge of the CLTS approach, and 99.1% perceived the approach to have a positive impact. Marital status, source of information, and perceived impact were significantly associated ($p < 0.05$) with knowledge of the approach. Though knowledge of the CLTS approach was high with a high perceived impact, there was the need for conscious efforts to get the fraction of participants without adequate knowledge to be well educated and sensitized on the CLTS approach for adequate adoption and utilization of the approach for utmost sanitation and healthy life.

Keywords: Community-Led Total Sanitation (CLTS), approach, open defecation, sanitation, knowledge, implementation.

RESUME

Une connaissance adéquate des mesures optimales pour améliorer l'assainissement et l'hygiène s'avère être fondamentale pour l'adoption de la meilleure approche afin de relever les défis de l'assainissement et obtenir les résultats sanitaires et socioéconomiques souhaités. Cette étude a examiné la mise en œuvre des connaissances des communautés sur l'approche d'assainissement total piloté par la communauté (ATPC), son impact perçu et les facteurs associés dans la municipalité de Sagnarigu de la région du Nord du Ghana. Une étude transversale impliquant l'approche quantitative a été adoptée. L'échantillonnage systématique a été utilisé pour sélectionner 339 participants au sein de quatre (4) communautés mettant en œuvre les techniques d'ATPC. La collecte des données a été effectuée à l'aide d'un questionnaire structuré. Les analyses ont été effectuées de façon descriptive avec des fréquences. Au niveau bivarié, le test d'association du chi carré (x^2) de Pearson a été effectué pour déterminer une association significative entre les variables de l'étude à des niveaux de confiance de 95 %. D'après les résultats obtenus, 56,6 % étaient des hommes, 34,2 % étaient dans la tranche d'âge de 31 à 40 ans, 79,1 % provenaient de ménages comptant de 6 à 20 membres et 56,3 % n'avaient pas d'éducation formelle. L'étude a révélé que 97,6% des participants avaient une bonne connaissance de l'approche ATPC et 99,1% ont perçu l'approche comme ayant un impact positif. L'état matrimonial, la source d'information et l'incidence perçue étaient significativement associés ($p < 0,05$) à la connaissance de l'approche. Bien que la connaissance de l'approche ATPC soit élevée et qu'elle ait un impact considérable, il est nécessaire de déployer des efforts dans la conscientisation des masses afin que la fraction des participants qui n'ont pas les connaissances adéquates soit bien éduquée et sensibilisée sur l'approche ATPC d'une part, et pour une adoption et une utilisation adéquates de ces approches pour un assainissement maximal et une vie saine d'autres part.

Mots clés: Approche d'Assainissement Total Piloté par la Communauté (ATPC), défécation à l'air libre, assainissement, connaissances, mise en œuvre.

1. INTRODUCTION

There are 946 million people who defecate in the open among the approximately 2.4 billion people who lack access to appropriate sanitary facilities globally (UNICEF/WHO, 2020). As a result, approximately 1 billion people worldwide suffer from open defecation-related health problems, accounting for nearly 842,000 morbidities from sanitation-related infections each year (WHO/UNICEF, 2015). The majority of individuals impacted are the poor rural populations located in the least developed nations (Armah et al., 2018). It is reported that 5.9 million children under five morbidities are related to diarrhea, which is the third leading cause of mortality, estimated at 1,000 deaths per day (Liu et al., 2016).

Sanitation lags behind access to water worldwide because, while 88.5% of the world's population has access to essential water services, only 68% has the same access to basic sanitation. Only 28% of people in sub-Saharan Africa currently have access to basic sanitation, which makes the situation even more alarming (WHO/UNICEF, 2017). Ghana's sanitation appears unencouraging, with only 25% of the population having access to the most basic sanitary services, 57% utilizing shared or public washrooms, and 18% still defecating in the open. Poor hygiene poses serious public health threats (GSS, 2021). Unfortunately, about 16% of children under five die from diarrheal illnesses in Ghana (Kumi-Kyereme & Amo-Adjei, 2016).

Poor sanitation risks people's health and has significant adverse financial and economic effects. For instance, Ghana loses 420 million cedis annually due to poor sanitation. As of 2012, this amount was 1.6% of Ghana's national GDP (Program, 2012). Improved and adequate sanitation, proper hygiene, and access to safe water continue to be the foundation for good health and socioeconomic growth (Mara et al., 2010). In this regard, developing nations have adopted various sanitation techniques, some of which already have the desired effects. One of these strategies is Community-Led Total Sanitation (CLTS), which uses a participative strategy to expand access to basic sanitation in rural areas throughout the developing world (Musembi & Musyoki, 2016). Community-led total sanitation is centered on the SDG of ending open defecation (OD), which is still practiced by some 900 million people (Brown et al., 2019; Kar & Chambers, 2008). CLTS focuses on the behavioral changes required for accurate and long-term results (Kar & Chambers, 2008). It entails putting money into community mobilization rather than hardware and changing the focus from individual family toilet building to forming Open Defecation-Free communities due to behavior change messages (Harter et al., 2018; Kar & Chambers, 2008). Communities are assisted in completing open-defecation assessments and analyses and becoming open-defecation-free (Kar & Chambers, 2008).

The approach (CLTS) incorporates activities implemented in three phases: pre-triggering, triggering, and post-triggering activities at the community level, with local facilitators (Harter et al., 2020; Kar & Chambers, 2008). In the pre-triggering stage, communities are evaluated to determine their "challenge level" for CLTS participation. This phase focuses on community selection, training facilitators, gathering baseline data, and facilitating community admission (Venkataramanan et al., 2018, USAID, 2018).

Triggering requires planning a community-wide event where facilitators lead participatory activities to arouse shame, disgust, and contempt (Venkataramanan et al., 2018). This realization, along with the ensuing emotions of guilt or shame, jolts people into action (Tyndale-Biscoe et al., 2013). Post-triggering refers to regular follow-up visits to verify and confirm open defecation-free (ODF) status in communities through actions taken. The community is visited by moderators once a month until there is no longer any open defecation (Kar & Chambers, 2008).

Within the Rural Sanitation Model and Strategy (RSMS) framework, Ghana implemented the CLTS intervention in 2012. Since then, the approach has been implemented in over 140 districts by eight (8) development partners and international non-governmental organizations (INGOs), including Global Communities, World Vision Ghana, Plan International, Community Water and Sanitation Agency, SNV, Catholic Relief Service, Water Aid, and UNICEF/GoG, which has resulted in a decrease in open defecation (Crocker & Rowe, 2015; White & Boot, 2018). In Northern Ghana, the Sagnarigu Municipal Assembly began CLTS implementation in 8 communities in 2015 and scaled up gradually to 17 communities by the project's close in September 2019 (Ring, 2019).

Studies on CLTS in Ghana and other African countries have largely focused on the utilization of the approach in latrine construction and ending open defecation (Harter et al., 2018; Ogendo et al., 2016), with some evaluating the approach from the perspective of communities (Kumah Nanyim et al., 2022a). A USAID report (USAID, 2018) has revealed that

the approach has yet to serve the intended purpose, especially in sub-Saharan Africa maximally. The phenomenon is attributed to poor implementation due to inadequate knowledge and understanding of the CLTS approach. To ensure the best practice of the CLTS approach, communities are supposed to understand and possess adequate knowledge of the approach. Literature reveals a paucity of data on awareness and knowledge about the CLTS approach (Nanyim et al., 2022; Makotsi et al., 2016; Perez et al., 2012).

After six years of implementing the CLTS approach, the Sagnarigu municipality remains one of the worst-performing districts in the fight against open defecation. The latest ranking of ODF communities in the Northern region revealed that the city placed 13 out of 16 districts, a phenomenon that needs to paint a better picture about the prospects of CLTS in ending open defecation.

Anecdotal evidence suggests that community understanding and appreciation of the CLTS concept for better adoption, socio-cultural and economic factors, community cohesion, and latrine sustainability, among other factors, have hampered open defecation-free status attainment in the Sagnarigu municipality. It was, therefore, imperative that knowledge and understanding of the CLTS approach among implementers be first investigated to appreciate any other factor/s that impede the desired outcome.

Again, due to the need for more scientific literature on the subject in the municipality and the Northern region, filling the knowledge gap will be essential in appreciating the best approach to adopt effective practices among implementing communities for the desired outcome. Against this background, this study examined implementing communities' knowledge of the CLTS approach and associated sociodemographic factors in the Sagnarigu Municipality of the Northern Region of Ghana.

2. MATERIALS AND METHODS

2.1. Study Settings and Design

This study was conducted in the Sagnarigu Municipality of the Northern Region of Ghana. The municipality is among the current 16 districts in the region and constitutes one of the districts implementing the CLTS concept to fight open defecating and other sanitation challenges. This study adopted a cross-sectional design and involved the quantitative approach to investigate the knowledge of implementing communities on the CLTS approach and sociodemographic factors associated with knowledge in the Sagnarigu municipality. The design and approach provided a snapshot of participants' understanding of the intervention at a single point in time among a representative sample, making the findings somewhat generalizable. Again, The approach made room for determining the magnitude of outcomes regarding frequency and statistical association tests between study variables (Sileyew, 2020).

2.2. Study Population and Sampling

As indicated in the preceding paragraphs, the study population consisted of CLTS-implementing communities in the Sagnarigu municipality in the northern region of Ghana. The Cochran formula (Cochran, 1977) was used to calculate the study's sample size (339).

$$n = \frac{Z^2 p(1-p)}{d^2}$$

n - sample size

z - confident interval at 95% = 1.96

p - prevalence of CLTS uptake, assumed prevalence of 30% = 0.30

q= 1- p

d - margin of error = 0.05

Substituting the values into the above equation;

$$n = \frac{(1.96)^2 \times 0.30(1-0.30)}{(0.05)^2} = \frac{3.8416 \times 0.30(0.30)}{0.0025} = \frac{0.8064}{0.0025}$$

$$n = 322.56$$

A 5% provision was made for incomplete questionnaires/dropouts; = 5% of 322.56 = 16.13.

Therefore, 322.56 + 16.13 = 338.69. Thus, the total sample size was approximately 339 households.

A total of 4 implementing communities were purposively sampled. In every community, the selection of households was done systematically. Each community was first zoned into four (East, West, South, and North). With this, a clear geographical picture of each community was obtained. Households were then sampled systematically using two (2) household interval margins. Within each household, a senior member above the age of 18 years and willing to participate in the interview was interviewed for the study. Households from only CLTS-implementing communities were involved in the study.

The study excluded communities that needed to implement the CLTS approach. Households that had lived in a community for less than one (1) year prior to data collection for the study were excluded. Household heads or representatives less than 18 years of age were excluded. Household heads or representatives who were too sick and weak to attend to the researchers during the data collection period and bereaved households were all excluded.

2.3. Data Collection Instrument and Procedure

A structured questionnaire was adapted from peer-reviewed related published studies (Adjibolosoo et al., 2020; Nanyim et al., 2022b). The adaption was carefully done to ensure the questionnaire was suitable for the objective of the study. A total of 26 questions constituted the questionnaire and were grouped into two main parts. Part (I) Sociodemographic characteristics solicited responses on gender, age, household size, religion, education, etc. Part (II) Knowledge on CLTS approach, first of all, solicited responses on awareness, the three main phases (Pre-triggering, triggering, and post triggering), community involvement, selection of natural leaders, training given, women and children involvement, etc. then finally a question on the perceived impact of the CLTS approach. The study adopted the interviewer-assisted data collection procedure to enable the enumerators to explain the instrument's content well, especially in the local (Dagbani) language, before soliciting a desirable response. Data were collected over 6 weeks commencing from August to October 2022.

2.4. Validity and Reliability

For validity purposes, the questionnaire was carefully drafted from existing published literature (Adjibolosoo et al., 2020; Kumah Nanyim et al., 2022b). It was then subjected to pretesting in five CLTS implementing communities in a sister district (Tamale metropolis). The aftermath of the pilot study prompted necessary modifications and rephrasing to exclude ambiguous responses, which may suggest guessing. An expert in CLTS implementation with Global Communities Ghana was made to review the questionnaire to verify its suitability and face validity for the study objective. After all modifications, a reliability test (Cronbach's Alpha) of the scales of knowledge was run using SPSS to affirm further internal consistency and reliability, and a reliability coefficient of $\alpha_0 = 0.72$ obtained for the pilot instrument was further improved to 0.81 for the final instrument used for the main study. The $\alpha_0 = 0.81$ Cronbach's Alpha coefficients implied the instrument was acceptably reliable (Azhar et al., 2018; Cronbach, 1951).

2.5. Data Analysis

Completed questionnaires were thoroughly checked and re-checked for data consistency. Data was cleaned while coded with Microsoft Excel v2016 before exporting to SPSS v26 for statistical analyses. Sociodemographic data were analyzed using frequencies. Similarly, for knowledge variables (table 2), frequencies were used to describe the data. An overall knowledge was determined. For the sixteen (16) questions (table 2) used to determine the overall knowledge, each question answered positively was awarded a score of one (1). In contrast, a negative answer attracted a zero (0) score. In total, all questions answered correctly should attract a score of 16. Using the fifty percent mid-point score of 8, participants who scored eight and above were classified as having good knowledge of the CLTS intervention. In contrast, those who scored below eight were classified as having low knowledge of the intervention. In effect, binary data was generated (good knowledge, overall score ≥ 8 , and poor knowledge, overall score < 8). A Pearson's Chi-square (χ^2) association test was then conducted to determine factors (sociodemographic, source of information, and impact) that were significantly associated with knowledge of CLTS intervention at a 95% confidence level (0.05 margin of error).

2.6. Ethical Considerations

Ethical approval was obtained for the study from the Committee on Human Research and Publications Ethics (CHRPE/AP/145/22) of the Kwame Nkrumah University of Science and Technology (KNUST). The Sagnarigu Municipal

Assembly and the Environmental Health Directorate granted official permission. Verbal and written consent was obtained from all participants after the purpose of the study was explained to them.

3. RESULTS

3.1. Sociodemographic characteristics of respondents in the CLTS program

About gender, as shown in Table 1, 56.6% of participants were males. Less than fifty per cent (34.2%) were within the age range of 31-40 years, and 29.2% were within 21-30 years. More than two-thirds (79.1%) were from households with 6-20 members. Participants belonging to the Islamic religion (91.1%) dominated the study. About 84.6% of the participants were married. A little above half (56.3%) of participants had no formal education, while 10.0% had attained primary education. On ethnicity, nearly all (98.8%) were Dagombas.

Table 1. Sociodemographic information of participants

Variables	Frequencies (n=339)	Percentages (%)
Gender		
Male	192	56.6
Female	147	43.4
Age groups (Years)		
18-20	25	7.4
21-30	99	29.2
31-40	116	34.2
41-50	66	19.5
51-70	33	9.7
Household size (members)		
1-5	18	5.3
6-20	268	79.1
21-33	53	15.6
Religions		
Christianity	24	7.1
Islamic	309	91.1
Traditionalist	6	1.8
Marital status		
Married	287	84.6
Single	43	12.7
Separated	1	0.3
Divorced	2	0.6
Widow	6	1.8
Educational status		
No formal education	191	56.3
Primary	34	10
Junior High	57	16.8
Senior High	39	11.5
Tertiary	18	5.4
Ethnicity		
Dagomba	335	98.8
Gonja	2	0.6
Frafra	1	0.3
Mamprusi	1	0.3

3.2. Awareness and sources of information on CLTS intervention

Regarding awareness of CLTS and source of awareness on the CLTS intervention, as shown in Figure 1, almost all (99.1%) participants had never heard of CLTS, and only 0.9% had never heard of CLTS. When asked about the source of information on CLTS (Figure 2), the majority (70.8%) had information on CLTS from the environmental health staff of the municipality. In comparison, 10.9% had information on CLTS from an NGO.

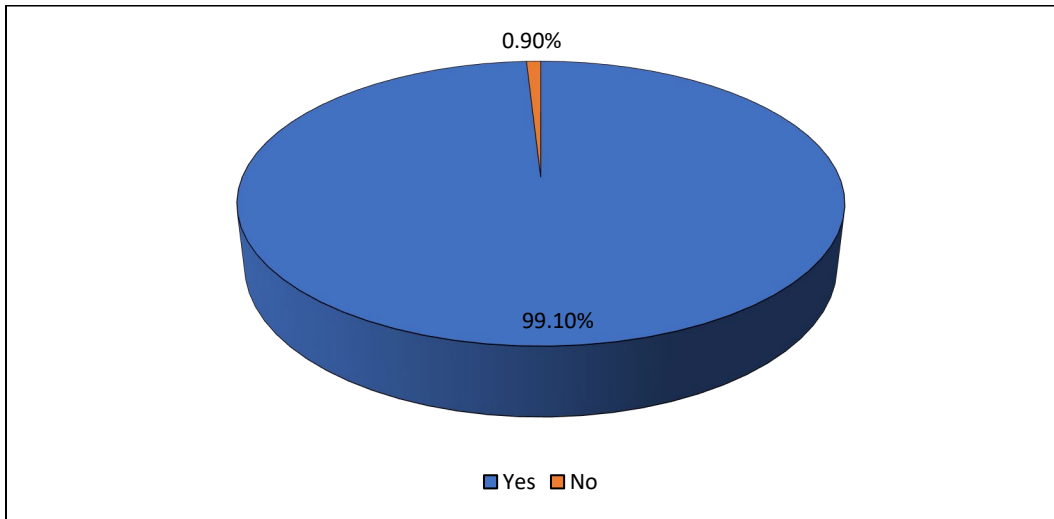


Figure 1. Distribution of participants' answers to "Have you ever heard of CLTS."

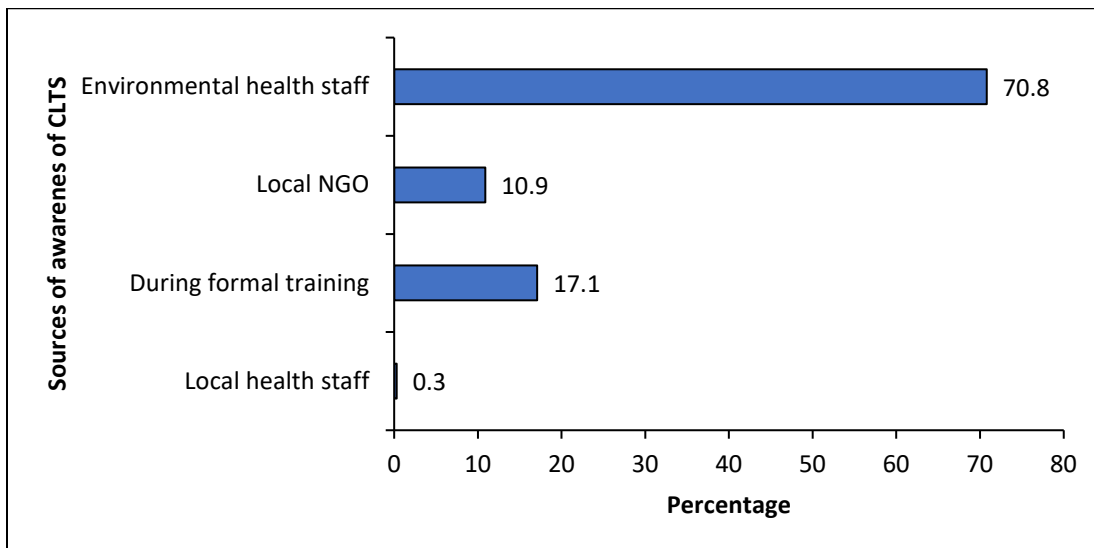


Figure 2. Sources of information on the CLTS approach.

3.3. Knowledge of CLTS approach

Regarding stages involved in the CLTS implementation, as presented in Table 2, 83.2% of the participants knew the steps involved. About 59.6% knew about the pre-triggering stage, 31.9% knew about the triggering stage, etc. (table). A total of 305 (90.8%) participants said the community was involved in the CLTS implementation process. About 98.2% of the participants confirmed the appointment of natural leaders. Nearly all (98.8%) participants said there had been training on the CLTS program, and 70.8% revealed that the training was related to the construction of hygienic latrines. In comparison, 18.9% said it was related to gender participation (both male and female) in CLTS. About 98.5% of participants indicated that all families had equal roles in CLTS implementation activities, and 98.2% added that women had proportionate and active roles in CLTS implementation.

About 93.2% of participants said community members had benefited equally from CLTS. Over half (53.4%) of participants revealed no adequate technological options for constructing cheap latrines. On whether there was any form of support for poor people, only 34.2% responded positively. On the kind of support received by communities, 83.6% said the support was financial, while 16.4% revealed that it was material donations. A total of 90% of the participants indicated that there were systems for assessing CLTS performance in the communities.

Table 2. Knowledge of the CLTS approach

Variables	Frequencies (n=339)	Percentages (%)
Know the stages involved in CLTS implementation		
Yes	282	83.2
No	57	16.8
If yes, for Pre-triggering		
Yes	168	59.6
No	114	40.4
Total	282	100
If yes, for triggering		
Yes	90	31.9
No	192	68.1
Total	282	100
If yes, for post-triggering		
Yes	90	31.9
No	192	68.1
Total	282	100
If yes, for scaling up		
Yes	282	100
Involved as a community in the CLTS intervention		
Yes	305	90
No	34	10
Community-appointed natural leaders		
Yes	333	98.2
No	6	1.8
Training given on the CLTS programme		
Yes	335	98.8
No	4	1.2
Training programs related to;		
Construction of hygienic latrines	240	70.8
Management training related to CLTS	35	10.3
Gender participation in CLTS	64	18.9
Women and children have a proportional and active role in CLTS		
Yes	335	98.8
No	4	1.2
Families have an equal role in CLTS activities		
Yes	334	98.5
No	5	1.5
If yes, which category of family are they from		
Rich families	2	0.6
Poor families	4	1.2
All are equally participative	333	98.2
Community members have benefited equally from CLTS		
Yes	316	93.2
No	23	6.8

Adequate local and technological options for the construction of cheap latrines		
Yes	158	46.6
No	181	53.4
Support for poor people		
Yes	116	34.2
No	223	65.8
Form of support		
Material support	19	16.4
Financial support	97	83.6
Total	116	100
Available system for assessing CLTS performance.		
Yes	305	90
No	34	10

3.4. Overall Knowledge of the CLTS Approach

With regards to general knowledge of the CLTS approach as shown in Figure 3, the majority (97.6%) of the participants demonstrated good knowledge of the intervention.

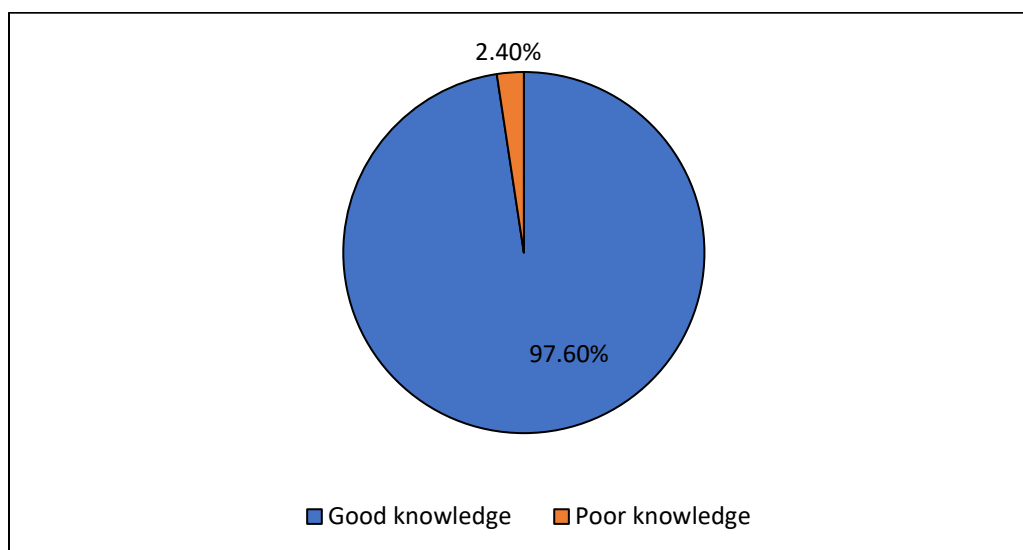


Figure 3. Overall knowledge of the CLTS approach

3.5. Perceived Impact of the CLTS Approach

As depicted in Figure 4, further interrogation of participants on the overall impact of the CLTS intervention revealed that almost all (99.1%) participants, upon further probe, indicated that the CLTS intervention had a positive impact in the communities through promoting sanitary conditions and social harmony. For the few who said it had a negative impact, CLTS was money, and time-wasting was the major reason given.

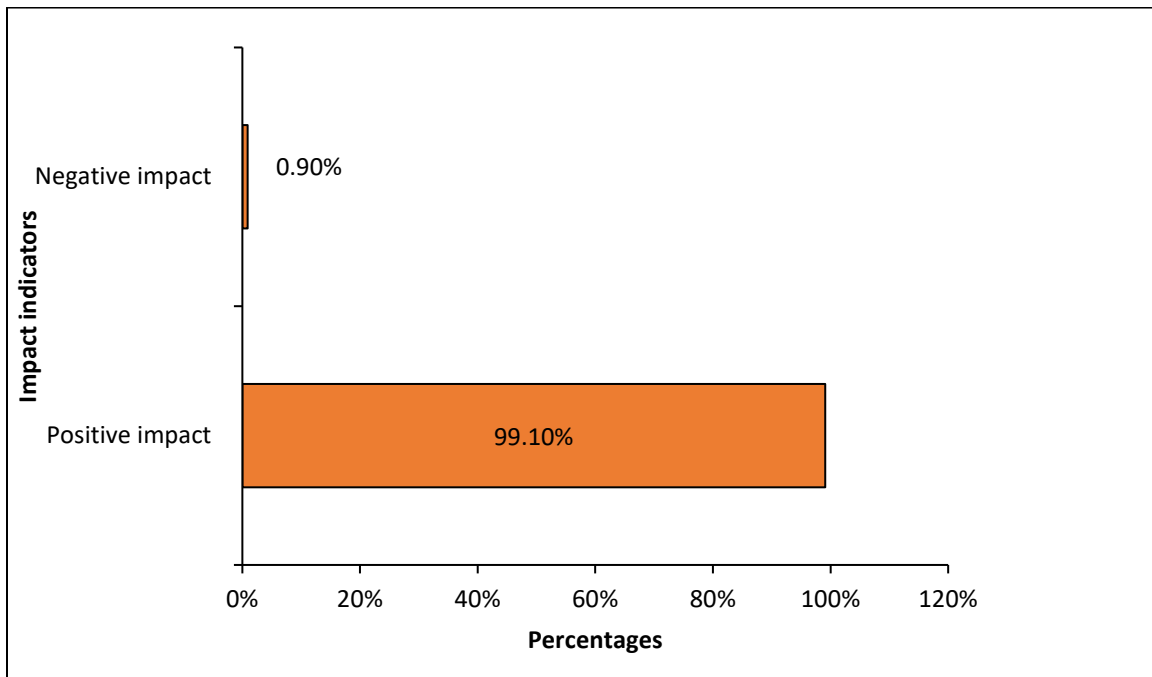


Figure 4. Perceived impact of the CLTS approach

3.6. Factors associated with participants' knowledge of CLTS intervention

Most (99.0%) of male participants demonstrated good knowledge of the CLTS intervention compared to females (95.9%). There was no statistically significant association ($X^2=3.476$, $P=0.062$) between gender and knowledge of CLTS. Similarly, the majority (98.3%) of the participants aged 31 to 40 demonstrated a good understanding of the CLTS Intervention. No significant ($X^2=9.034$, $P=0.060$) association was observed between age and knowledge of CLTS.

Regarding household size, 98.1% of the participants of 6-20 members of household size exhibited good knowledge of the CLTS intervention. Again, the study found no significant association between household size and knowledge. In terms of marital status and CLTS knowledge, married participants (97.6%) demonstrated good knowledge of the CLTS intervention. Marital status was found to have a significant association ($X^2=42.615$, $P<0.001$) with knowledge of the CLTS intervention. For educational status and ethnicity, participants without formal education (99%) and Dagombas (97.6%), respectively, were the majority who demonstrated good knowledge of the CLTC intervention in the municipality. Neither of them was associated significantly ($p >0.05$) with knowledge (table 3).

The cross-tabulation and chi-square test of association further revealed that environmental health staff/sanitary inspectors provided information on CLTS for the majority (97.5%) of the participants. Formal training received on CLTS also served as a source of information for an appreciable proportion (98.3%) of participants. A significant association ($X=20.680$, $P<0.001$) was observed between the source of information on CLTS and overall knowledge of the CLTS intervention. Environmental health unit constituted the main source of knowledge for the majority (97.5%)

Again, there was a statistically significant association between the impact of CLTS and knowledge, as 97.9% of the participants who revealed that CLTS positively impacted them demonstrated good knowledge of the intervention. A significant association ($X=19.754$, $P<0.001$) was observed between perceived impact and knowledge (table 3).

Table 3 Factors associated with participants' knowledge of CLTS intervention

Variables	Poor knowledge		Good knowledge		X ² value	P-value
	Frequencies	Percentages (%)	Frequencies	Percentages (%)		
Gender					3.476	0.062
Male	2	1	192	99		
Female	6	4.1	139	95.9		
Age					9.034	0.060
18-20	0	0	24	100		
21-30	6	6.1	93	93.9		
31-40	2	1.7	114	98.3		
41-50	0	0	66	100		
51-70	0	0	33	100		
Household size					1.542	0.463
1-5	1	5.6	17	94.4		
6-20	5	1.9	263	98.1		
21-33	2	3.8	51	96.2		
Religion					0.795	0.672
Christianity	0	0	24	100		
Islamic	8	2.6	301	97.4		
Traditionalist	0	0	6	100		
Marital status					42.615	0.000
Married	7	2.4	280	97.6		
Single	0	0	43	100		
Separated	1	100	0	0		
Divorced	0	0	2	100		
Widow	0	0	6	100		
Educational status					7.085	0.131
No formal education	2	1	189	99		
Primary	2	5.9	32	94.1		
Junior High	3	5.3	54	94.7		
Senior High	0	0	39	100		
Tertiary	1	5.6	17	94.4		
Ethnicity					0.098	0.992
Dagomba	8	2.4	327	97.6		
Gonja	0	0	2	100		
Frafra	0	0	1	100		
Mamprusi	0	0	1	100		
Source of information on CLTS					20.680	0.000
Local health staff	1	50	1	50		
During formal training	1	1.7	57	98.3		
Local NGO	0	0	37	100		
Environmental health staff/sanitary inspector	6	2.5	234	97.5		
Impact of CLTS					19.754	0.000
Positive	7	2.1	329	97.9		
Negative	1	50	1	50		

4. DISCUSSION

Evidence suggests that the possibility of latrine ownership and utilization among CLTS-triggered communities or households was higher than among non-CLTS-triggered households (Alemu et al., 2018; Mosler et al., 2018). Similarly, awareness of CLTS among CLTS-implementing communities is higher than among non-CLTS-implementing communities

(Makotsi et al., 2016). Therefore, adequate knowledge of the CLTS approach will significantly enhance household appreciation, adoption, and full participation in the approach.

This study revealed that most participants were aware of the CLTS approach, and most were made aware of it by the environmental health staff and NGOs. These results were quite expected considering the number of years the municipality adopted the CLTS approach. Like other districts in Northern Ghana, the Sagnarigu municipality adopted the approach in 2015 (Ring, 2019) to end open defecation and other sanitation woes, probably due to the failure of different methods. The approach was first implemented in the municipality by non-governmental organizations and subsequently taken over by the municipal assembly's environmental health and sanitation directorate after most NGOs had folded. It was, therefore, not surprising that environmental health staff and NGOs constituted the major sources of awareness on the CLTS approach for most participants. This result indicates that the environmental health directorate was putting the required measures in place to get everyone in the district on board with the CLTS implementation process and attainment of good sanitation status. However, considering the collective fight against sanitation woes, the fraction of households unaware of the approach gives cause for worry, as this may affect their overall knowledge and appreciation of CLTS, thereby affecting their adoption of the approach.

This finding slightly differs from the study of Makotsi et al. (2016) in Kenya, in which 52.2% of household heads were aware of the CLTS approach. This difference could be attributed to the sample size and approach adopted in the two studies. Again, this study's finding on the source of information contradicts that of Nanyim et al. (2022b), in which NGOs served as the main source of awareness of the CLTS approach. In the case of Nanyim et al., Global Communities and UNICEF were the main international NGOs that served as sources of awareness for participants on the CLTS approach. For the Sagnarigu municipality, the evidence gathered revealed that the NGOs initiated the approach in the early years when the CLTS approach was adopted. However, in subsequent years, the district environmental health and sanitation directorate took over implementing the approach to deal with sanitation challenges in the municipality, a probable reason the environmental health staff constituted the main source of information on CLTS as discovered by this study.

Going beyond awareness, the study revealed good knowledge of the CLTS approach among most participants. This finding is largely in tandem with what the conceivers of the concept have described (Kar & Chambers, 2008), though a significant number of the participants did not particularly know about the three main stages of the approach. Inadequate knowledge of the main phases may be due to participants' inability to comprehend these technical terms or they not being well explained especially in the local parlance. Notwithstanding, the demonstration of adequate knowledge of other components, that is, community involvement, selection of natural leaders, training organized, involvement of women and children, support, etc., as propounded by Kar & Chambers, was a positive indication of overall good knowledge. This result is slightly higher than the 66.3% overall knowledge reported by (Kumah Nanyim et al., 2022b) in a related study conducted in the Bole district of the Savannah Region. Though the difference in the two studies could be attributed to sample size variations, both studies point out some positive steps to achieving the country's sanitation goals and Sustainable Development Goal Six (6). Contrary to these findings, Fuseini, (2020), in assessing the influence of CLTS, established a very low knowledge among study participants on waste disposal and handling of human feces.

Perceived Impact of CLTS

Based on the knowledge shared, the perceived impact of CLTS on sanitation and hygiene in the community was examined from the participants' perspective. The study revealed that a high proportion of the participants believe that the CLTS intervention has a positive impact on their communities. This result may arise from what household heads have experienced and the benefits the communities have gained from adopting and participating in the CLTS implementation process. These benefits are largely the improvement in sanitary conditions in the communities. Further probe revealed that adopting the CLTS approach has promoted social harmony, attributable to the general community cohesion (involvement) irrespective of gender and social class. Stakeholders in the municipality could leverage this advantage to intensify community knowledge and participation. This study finding corroborates the study of Pickering et al. (2015), where an impact evaluation of the CLTS revealed high success in promoting sanitary situations, particularly "increasing access to private latrines, improving the quality of latrines, and reducing self-reported open defecation."

Factors Associated with Knowledge of CLTS

Gender and age were not significantly associated with knowledge of the CLTS approach. However, it could be observed from the results that for gender, the number of males and females who demonstrated good knowledge was almost equal. Advocates for including everybody, including children, in the implementation process are well-documented (Kar & Chambers, 2008). This study's results indicate that both males and females in implementing communities were involved, enhancing their understanding of what goes into the CLTS approach. Similar explanations could be given about the age groups of participants who exhibited good knowledge of CLTS. The age group 31 to 40 constituted the majority to have good knowledge of the CLTS approach. This could be attributed to the youthful exuberance demonstrated by this age group, especially with participation in activities and processes involved in the CLTS approach, which leads to acquiring in-depth knowledge of the process. Unfortunately, the literature revealed no study to relate these findings.

Marital status was found to be significantly associated with knowledge of CLTS. More married participants were found to have good knowledge of CLTS. The results were not surprising because the study participants were adults. As indicated in earlier paragraphs, the CLTS concept requires the involvement of all persons irrespective of social class or marital status. Couples could be encouraged to share knowledge on the concept while inculcating the same in their children to enhance the collective goal of achieving implementation success.

Again, the source of information on CLTS was significantly associated with overall knowledge of the approach. As highlighted earlier, participants who were made aware of CLTS by environmental health staff exhibited good knowledge of the CLTS approach compared to those from other sources. Finally, most participants who reported that the CLTS approach had a positive impact demonstrated good knowledge of the approach. How well the approach is understood, adopted, and appreciated may have an impact. Suppose communities adopt the approach and fully participate in all phases as propounded by Kar and Chambers amid all support and assistance. In that case, the positive impact will certainly be felt among communities. Again, this study did not find any literature to refute or support the association between knowledge of CLTS and impact.

5. CONCLUSION AND RECOMMENDATION

Overall, participants had a high knowledge of the CLTS approach, though many needed to have adequate knowledge of the three main phases. The municipality's staff of the Environmental Health Directorate served as the principal source of knowledge of the approach. With this high knowledge, future studies must focus on the determinants of open defecation in the municipality despite the implementation of the CLTS approach. A more rigorous evaluative approach or a quasi-experimental or more suitable design is recommended to investigate the impact of the CLTS concept on implementing communities.

6. LIMITATIONS OF THE STUDY

The study involved only four of the several communities in the municipality; therefore, generalizing the findings took a lot of work. Again, the impact component of the findings was perceived based on participants' knowledge of the CLTS approach rather than based on technical monitoring and evaluation of the full impact of CLTS activities in the communities.

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methodology, and validation, formal analyses of data, and drafted original manuscript. 3. Abukari Wumbei: Supervised and oversaw leadership production of the manuscript from the idea conception stage through literature review, fieldwork, data analysis, draft of the original manuscript, and review and editing.

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