





Situational analysis of sanitation in the bole township, Ghana

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ABSTRACT

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Understanding the socio-cultural and economic factors that influence people's sanitation behavior in the community can help achieve the sanitation-related Sustainable Development Goals. This study examined the sanitation situation in Bole Township, focusing on household latrine ownership and use, open defecation, and the relationship between sanitation practices and disease. The study employed an explanatory sequential design, integrating both quantitative and qualitative methods. Data were gathered from 392 respondents, mainly household heads, through a questionnaire survey, interviews, and observations. The findings showed that socio-cultural beliefs continued to influence sanitation behavior in Bole Township, with 30% of respondents indicating a preference for open defecation because it was their tradition. The study further revealed that many household latrine toilets were in poor condition: 35% of respondents reported that their toilets were poorly constructed but still in use. In comparison, 25% confirmed that their toilets had collapsed or stopped working. 40% of respondents stated that the high cost of construction materials deterred them from building toilets. Furthermore, the study found that most sanitation projects and interventions did not achieve lasting results, with 35% of respondents reporting that earlier sanitation projects were ineffective. Diseases linked to poor sanitation, particularly diarrhea, remained common in Bole Township, with 32% of respondents reporting having suffered sanitation-related illnesses. The study recommends that the District Assembly, the Environmental Health Unit, and NGOs involved in sanitation should collaborate to support toilet construction, enhance health education, and improve waste management through greater community participation, stronger monitoring, and enforcement of sanitation legislation.

Contribution/Originality: This study contributes to the existing literature by exploring the sanitation situation in Bole Township. It offers new insights into the poor sanitation situation and enhances understanding of how it can be attributed to a combination of poverty, cultural practices, and weak enforcement of sanitation laws.

1. INTRODUCTION

Sanitation is globally recognized as a critical component of public health, environmental sustainability, and human dignity. The United Nations, through Sustainable Development Goal Six (SDG 6), emphasizes the need for universal access to clean water and adequate sanitation as a driver of sustainable development. Yet, progress remains uneven, especially in low- and middle-income countries. Recent evidence suggests that despite major investments, millions of households still lack improved sanitation facilities, contributing to high rates of diarrheal diseases and other sanitation-related illnesses worldwide (Hans, 2023; Maharaj & Maharaj, 2021). Scholars further argue that technological innovations such as satellite imagery and artificial intelligence-powered applications are increasingly being applied to track sanitation outcomes and promote behavioral change, yet these innovations often remain

inaccessible to marginalized populations in rural contexts (Kumar & Sankar, 2025). These global sanitation disparities highlight the urgent need for context-specific surveys and studies to understand the barriers faced by vulnerable communities, particularly in Sub-Saharan Africa.

In Africa, sanitation challenges are more pronounced, particularly in rural and semi-urban settings, where poverty, weak institutional frameworks, and cultural practices impede progress. Many African countries continue to struggle with open defecation, poor solid waste management, and inadequate water supply systems. Researchers note that while initiatives such as Community-Led Total Sanitation (CLTS) have helped in some contexts, long-term sustainability remains elusive due to socio-cultural resistance, financial constraints, and policy gaps (Kanyagui & Viswanathan, 2022; Kouassi, Andrianisa, Sossou, Traoré, & Nguematio, 2023; Mariwah, Drangert, & Adams, 2022). The burden of poor sanitation in Africa is also reflected in high diarrheal morbidity and mortality among children under five, which is compounded by rapid population growth and climate change vulnerabilities (Amadu et al., 2023; Merid et al., 2023). More importantly, access to sanitation in African healthcare facilities is uneven, undermining infection prevention and control, especially during health emergencies such as the COVID-19 pandemic (Dubik et al., 2024). This continental picture underlines the persistent gap between policy aspirations and lived realities, making sanitary surveys a useful approach for identifying context-specific sanitation problems.

Ghana reflects these continental trends, with its sanitation situation recognized as one of the most urgent development challenges of the post-Millennium Development Goals era. Although there has been some progress in increasing access to improved sanitation, the country still struggles with widespread open defecation, low levels of household latrine ownership, and unequal access to water and sanitation services. Studies in Ghana show that sanitation outcomes are influenced not only by economic constraints but also by social and cultural factors that affect whether households adopt and maintain toilet facilities (Ayelazuno & Tetteh, 2025; Boateng et al., 2025; Mensah, Amoah, Mattah, & Mensah, 2023). In the northern part of Ghana, districts such as Bole face peculiar sanitation challenges due to poverty, inadequate infrastructure, and cultural practices that hinder latrine adoption. Research conducted in Bole district highlights that socio-cultural norms, economic limitations, and perceptions about hygiene strongly influence whether households construct and use latrines (Nanyim et al., 2024).

The persistence of open defecation in many communities in Ghana has been linked to high incidences of diarrheal diseases, malnutrition, and environmental contamination, which together undermine local development and human health (Appiah-Effah et al., 2024; Delaire et al., 2022; Tetteh et al., 2022). At the same time, weak enforcement of sanitation by-laws, coupled with limited capacity of local assemblies, has contributed to poor waste management practices in many rural and semi-urban settlements. Therefore, this study assessed the sanitary conditions and practices in Bole township to determine the challenges and implications for public health, as a means of contributing to the attainment of sanitation-related sustainable development goals in Bole District.

Despite global recognition of sanitation as a human right and its integration into the Sustainable Development Goals (SDGs), access to improved sanitation facilities remains uneven and inadequate, especially in Sub-Saharan Africa. The persistence of poor sanitation practices, coupled with rapid population growth and weak institutional enforcement, continues to undermine public health, environmental quality, and sustainable development. This situation calls for context-specific studies that examine the underlying factors shaping sanitation behaviors in vulnerable areas such as Bole Township. In Ghana, sanitation has long been acknowledged as one of the most pressing public health challenges. Research shows that open defecation, limited latrine ownership, and weak waste management practices remain widespread, particularly in rural and peri-urban communities (Abanyie et al., 2022; Appiah-Effah et al., 2024). Bole, located in the Savannah Region of Ghana, exemplifies these sanitation challenges. Despite being the district capital, Bole continues to face widespread open defecation, poor waste disposal practices, and limited access to improved latrines. Without targeted interventions informed by systematic research, Bole risks falling further behind in achieving national sanitation targets and the broader SDG 6 agenda. This study is therefore

necessary to conduct a sanitary survey that identifies the determinants of sanitation practices, evaluates community behaviors, and informs appropriate interventions for improved public health outcomes.

2. MATERIALS AND METHODS

The study adopted an explanatory sequential design, combining quantitative and qualitative techniques to provide a comprehensive understanding of the sanitation situation in Bole Township. According to Poth and Shannon-Baker (2022), the explanatory sequential design is suitable when a researcher seeks to use qualitative evidence to interpret quantitative findings. This approach was suitable because sanitation challenges in Bole were influenced by multiple factors, including socio-cultural practices, environmental conditions, and economic constraints that could not be adequately captured through numerical data alone. The quantitative component of the study focused on collecting measurable data on sanitation facilities, waste management practices, and access to clean water. Structured questionnaires were administered to household heads to obtain data on the frequency of waste collection, types of toilets available, and household waste disposal methods. These data provided the statistical foundation for identifying the scale and pattern of sanitation challenges across the township.

In addition to the numerical data, qualitative methods such as interviews and direct observation were used to explore residents' perceptions, attitudes, and behaviors towards sanitation. Braun and Clarke (2021) emphasized that qualitative inquiry enables researchers to uncover deeper meanings and social contexts that lie behind observable patterns. Therefore, interviews with environmental health officers and community leaders provided insights into how cultural norms, leadership influence, and public awareness shaped sanitation outcomes in Bole. By integrating both methods, the study enhanced the validity and credibility of its findings through triangulation. This process allowed comparison between what participants said, what was observed, and what was measured statistically. The combination of data sources helped to ensure that findings were consistent and reflective of real conditions within the community.

The target population of the study comprised residents of Bole Township, mainly household heads. This population was selected because household heads were directly responsible for sanitation practices and facilities within their homes. Accordingly, identifying an appropriate target population is essential to ensure that the data collected truly reflects the research objectives (Adeoye, 2024; Willie, 2024). In this study, household heads were in the best position to provide detailed information on household sanitation, water access, and waste management practices. Subsequently, the sample size was decided using Yamane's formula. The formula is mathematically defined $n = N/(1 + Ne^2)$, where n = sample size, N = population size, and e = margin of error. The Bole household population was 20,147 from the 2021 population and housing census (Ghana Statistical Service, 2021), with a 5% margin of error.

$$n = 20147/[1 + 20147(0.05)^2] = 392.19 \quad (1)$$

Therefore, the sample size for the study was 392 households in the Bole township.

Subsequently, a simple random sampling technique was used to collect data from respondents. This method was chosen because it gave all households an equal chance of being included in the study, thereby reducing bias and ensuring the representativeness of the sample. Accordingly, simple random sampling is appropriate when the researcher wants to make generalizations from a sample to a larger population with a known level of confidence (Ahmed, 2024; Rahman, Tabash, Salamzadeh, Abduli, & Rahaman, 2022). The study used both structured questionnaires and interview guides to collect data. The structured questionnaire contained closed-ended questions designed on a five-point Likert scale to capture respondents' opinions on sanitation practices, attitudes, and perceptions. This allowed respondents to indicate the degree to which they agreed or disagreed with statements related to waste disposal, toilet facilities, and environmental hygiene. Likert-scale items were useful in quantifying subjective views, thus facilitating statistical analysis (Alabi & Jelili, 2023; South, Saffo, Vitek, Dunne, & Borkin, 2022).

The interview guide, on the other hand, was designed for use with key informants such as environmental health officers, assembly members, and community leaders. These interviews provided qualitative insights into the causes,

management, and policy responses to sanitation issues in the township. Lim (2025) indicates that interview guides are essential in case studies because they enable the researcher to explore deeper explanations and context-specific experiences that structured questionnaires may not reveal. Data collection was conducted through face-to-face administration of questionnaires and interviews. The researchers, with the assistance of trained field enumerators, visited selected households to ensure proper understanding of the questions and to achieve a high response rate. According to Afreh et al. (2023), personal interaction between the researcher and respondents enhances data accuracy, particularly in Ghanaian communities where literacy levels vary. The quantitative data were first coded and entered into the Statistical Package for the Social Sciences (SPSS) 26.0 for analysis. Frequencies and percentages were computed to describe the distribution of responses across different variables, such as access to toilets, sources of water, and methods of waste disposal. For the qualitative data obtained through interviews, thematic analysis was employed to identify recurring patterns and themes. The interview transcripts were carefully reviewed, coded, and categorized into major themes such as cultural attitudes toward sanitation, institutional enforcement, and challenges in waste management.

Both forms of analysis complemented each other to provide a holistic understanding of the sanitation situation in Bole. The descriptive statistics quantified the extent of the problems, while the thematic findings explained why they existed. This combination made the results more meaningful and reliable (Hochwald et al., 2023; Schoonenboom, 2023). The results were presented in tables and themes. Furthermore, ethical issues were an essential component of the study, given that it involved human participants. The first ethical consideration was informed consent. Before any interview was conducted, respondents were given a clear explanation of the purpose of the study, the procedures involved, and how the information would be used. They were also assured that their participation was voluntary and that they could withdraw at any stage without facing any negative consequences. Only after this process were participants asked to provide either verbal or written consent to participate in the study. Confidentiality and anonymity were also strictly maintained throughout the research process. Since sanitation issues could be sensitive, some respondents feared being judged or exposed. To protect their identity, the researchers did not record participants' names in the interview transcripts or in the final report. Instead, pseudonyms or codes were used to identify respondents anonymously. All data, including audio recordings, field notes, and completed questionnaires, were securely stored and accessed only by the researchers. This assured participants that their contributions would remain private and confidential.

3. RESULTS AND DISCUSSION

3.1. Demographic Characteristics of the Respondents

The demographic data presented in Table 1 show that males made up 52% of the respondents, while females accounted for 48%. The slight difference indicates that both men and women participated in the study almost equally. This balanced participation was significant because sanitation issues involve both sexes in complementary ways. In most Ghanaian households, women are responsible for domestic sanitation activities such as cleaning, waste disposal, and water management, while men often make decisions regarding compound maintenance and the disposal of solid waste. Hence, including both male and female perspectives offered a more comprehensive understanding of the sanitation situation in Bole Township.

The age distribution of respondents showed that the majority (28%) were aged 25-34 years, whereas the minority (12%) were aged 55 years and above. This age pattern revealed that the study included a wide range of age groups, ensuring that the views of both younger and older residents were captured. The dominance of respondents within the productive age group (25-44 years) suggested that most participants were actively engaged in community life and directly involved in sanitation practices within their households.

Table 1. Demographic characteristics of respondents.

Variables	Category	Frequency (n = 392)	Percentage of Respondents (100 %)
Gender	Male	204	52.0
	Female	188	48.0
Age group	18–24 years	71	18
	25–34 years	110	28
	35–44 years	94	24
	45–54 years	70	18
	55 years and above	47	12
Education level	No formal education	47	12.0
	Primary school	70	18.0
	JHS/Middle school	118	30.0
	SHS/Vocational	94	24.0
	Tertiary (HND/Degree)	63	16.0
Occupation	Farming/Agriculture	137	35.0
	Trading/Small business	118	30.0
	Formal employment	70	18.0
	Casual labour/artisan	47	12.0
	Unemployed/Student	20	5.0
Household Size	1 - 3 persons	70	18.0
	4 - 6 persons	157	40.0
	7 - 9 persons	118	30.0
	10 or more persons	47	12.0

Regarding educational background, the majority of respondents (30%) had a Junior High School level of education, while 12% had no formal education. The results showed that most respondents had a basic education, which likely influenced their understanding of hygiene and sanitation. Education plays a crucial role in shaping sanitation practices, as individuals with higher educational levels are often more aware of proper waste management and environmental hygiene (Bishir, 2026; Debrah, Vidal, & Dinis, 2021).

With respect to occupation, the majority of respondents (35%) were engaged in farming/agriculture, followed by traders/small business owners (30%), whereas unemployed respondents, mainly students, formed the minority (20%). The occupational distribution reflected the dominant economic activities within Bole Township. The high number of farmers and traders was expected, as the local economy largely depended on agriculture and petty trading. Occupational differences also influenced sanitation behavior, since income levels often determined the ability to construct toilets or pay for waste collection services (Biswas et al., 2024; Tolera, Diriba, Gutema, & Kaweti, 2023).

In terms of household size, most respondents lived in households with 4 to 6 persons (40%), while fewer households had 10 or more persons (12%), as shown in Table 1. The data indicated that large households were common in Bole Township, which had implications for sanitation management. Larger families produced more waste and needed more sanitation facilities. However, in low-income areas, such households often faced overcrowding and lacked proper sanitation infrastructure, leading to environmental health risks.

3.2. Socio-Cultural and Economic Factors Influencing Sanitation Practices

The results revealed that socio-cultural beliefs continue to influence sanitation behavior in Bole Township. Thirty percent of respondents indicated a “*preference for open defecation because it is our tradition,*” as shown in Table 2, while 22 percent mentioned that “*children’s feces are not harmful like those of adults and therefore do not need proper handling.*” These statements reflect long-held perceptions shaping sanitation practices in many rural Ghanaian settings. Although only 8 percent believed that latrines attract evil spirits, this minority belief still carries cultural weight in decision-making. Fifteen percent of respondents also reported that religious doctrines discourage shared toilet facilities, with one respondent explaining that “*our faith teaches us not to mix with other families in one toilet.*” However, a growing number (25 percent) said that none of these beliefs influenced them, suggesting that education

and modernization are gradually weakening such traditional barriers. These findings align with those of Nanyim et al. (2024), who observed that cultural taboos in Northern Ghana often delay household toilet construction.

Table 2. Socio-cultural and economic factors influencing sanitation practices in Bole township (N = 392).

Variable	Category	Frequency (f)	Percentage (100 %)
B1: Cultural beliefs/Traditions influencing latrine use	Belief that children's faces are harmless	86	22.0
	Belief that latrines attract evil spirits	31	8.0
	Preference for open defecation as a tradition	118	30.0
	Religious beliefs discourage shared toilets	59	15.0
	None of the above	98	25.0
B2: Decision maker on sanitation investment	Husband	110	28.0
	Wife	39	10.0
	Household head (male or female)	137	35.0
	Family elders	31	8.0
	Joint family decision	75	19.0
B3: Economic constraints to latrine ownership	High cost of construction materials	157	40.0
	Lack of credit or financial support	78	20.0
	Limited income from livelihoods	98	25.0
	High maintenance cost	39	10.0
	None of the above	20	5.0
B4: Influence of community or religious leaders	Promote latrine use through meetings	149	38.0
	Impose sanctions against open defecation	78	20.0
	Remain silent on sanitation issues	98	25.0
	Provide labour or materials for community latrines	47	12.0
	Discourage latrine use due to traditional beliefs	20	5.0
B5: Incentives to improve latrine ownership	Provision of subsidies or financial support	125	32.0
	Availability of trained local artisans	39	10.0
	Community savings or credit schemes	78	20.0
	Education and awareness campaigns	98	25.0
	Provision of materials by the government or NGOs	52	13.0

The households' decision-making on sanitation showed a clear gender dimension. About 35% of respondents said the household head decided whether to construct a latrine, while 28% reported that the husband made the final decision. Only 10% indicated that women made such decisions independently. A middle-aged woman explained, "*The men decide because they control the money.*" Another woman added that, "*when my husband delayed, I started saving small to build the toilet myself.*" These voices revealed how women were beginning to challenge traditional authority by taking small initiatives. However, 8% of respondents reported that family elders made such decisions, while 19% said the decision was taken jointly, with a young man remarking, "*our fathers decide everything; we just follow what they say.*" These responses highlighted a prevailing patriarchal pattern, though a slow shift towards shared decision-making was emerging. Doma et al. (2023) similarly observed that joint decision-making in families enhances shared responsibility for sanitation.

Furthermore, economic constraints were another major influence on sanitation practices. Forty percent of respondents identified the high cost of materials as the main challenge, with one farmer stating that "*cement and blocks are too expensive; we can't even feed the home, how can we build a toilet?*" Twenty percent of respondents cited limited income and a lack of credit or financial support as constraints to building a toilet facility. A trader stated, "*If we can get soft loans or help from the district assembly, we will build toilets.*" High maintenance costs were also a concern, as one

woman explained, “When the toilet cracks or fills up, we just stop using it because we don’t have money to repair it.” Only five percent said they had no economic difficulties. These findings confirm that economic hardship remains the biggest barrier to sanitation improvement. They are consistent with the views of Asare, Barimah, Mensah, Munkaila, and Addo (2023), who reported that limited finances continue to hinder sanitation progress in northern Ghanaian communities.

The study findings indicated that the role of leaders and local authorities in promoting sanitation was mixed. 38% of respondents claimed that community leaders discussed toilet use during community meetings, with 20% reporting that some chiefs fined people who defecated in the bush. Conversely, 25% testified that leaders remained silent on sanitation issues, while 12% said that chief or community leaders sometimes provided labor or land for communal toilets. These mixed responses suggest that while some leaders were proactive, others were less involved. A youth stated that “the district assembly talks too much but does little regarding sanitation,” indicating weak enforcement of sanitation by-laws in Bole township. Nanyim et al. (2024) and Mensah et al. (2023) also found that ineffective monitoring and inconsistent leadership hinder the success of sanitation campaigns in Ghana.

Finally, respondents proposed several incentives to promote toilet ownership. Thirty percent preferred financial support or subsidies, while twenty-five percent mentioned education and awareness campaigns as ways to promote the use of sanitation facilities in Bole township. Twenty percent of respondents wanted community savings or credit schemes, and thirteen percent called for government or NGO support for construction materials for sanitation facilities. A woman in an interview observed that “if we have trained masons here, we can easily call them to build for us.” Another respondent suggested that “if we praise people who keep their places neat, others will emulate.” These responses indicated that both financial and social motivation could improve sanitation outcomes. This is supported by the findings of John and Ajibade (2024) and Malima et al. (2022), who posited that small incentives, local training, and recognition of good practices encourage community action toward better sanitation.

3.3. Prevalence of Open Defecation and Household Latrine Ownership

The study found that open defecation remains a significant sanitation issue in Bole Township, with 30% of respondents confirming they practiced it, as shown in Table 3. 25% of respondents reported sharing toilets with neighbors. 28% stated their households owned and used their own toilet facilities. Surprisingly, 17% depended on both shared toilets and open defecation, choosing whichever was more convenient at the time. Similar findings have been reported by Appiah-Effah et al. (2024) and Delaire et al. (2022), who found that open defecation persists in many Ghanaian communities due to poverty, social acceptance, and weak enforcement of sanitation regulations.

Table 3. Environmental and institutional factors influencing sanitation practices in Bole township (N = 392).

Variable	Category	Frequency (f)	Percentage (%)
C1: Common sanitation practice in the neighbourhood	Most households have their own latrines	110	28.0
	Households share latrines with neighbours	98	25.0
	Most people practice open defecation	118	30.0
	A combination of sharing and open defecation	66	17.0
C2: Condition of household latrines	Well-built and properly maintained	86	22.0
	Poorly constructed, but in use	137	35.0
	Collapsed or not functional	98	25.0
	Rarely used or abandoned	71	18.0
C3: Places where open defecation occurs	Near farms	59	15.0
	Bushes around homes	157	40.0
	Riverbanks or streams	98	25.0
	Public open spaces	39	10.0

Variable	Category	Frequency (f)	Percentage (%)
	All of the above	39	10.0
C4: Barriers to latrine construction	High construction cost	157	40.0
	Lack of land or space	78	20.0
	Unfavourable soil or rocky ground	47	12.0
	Lack of technical skills or labour	59	15.0
	Restrictions by landlords	51	13.0
C5: Local projects or NGO/government efforts	Yes, and they have been effective	78	20.0
	Yes, but they have not been effective	137	35.0
	No, there are no such efforts	118	30.0
	Not aware of any initiatives	59	15.0

The study further showed that many household toilets in Bole were in poor condition: 35% of respondents reported that their toilets were poorly constructed but still in use. In comparison, 25% confirmed that their toilets had collapsed or stopped working. Only 22% of the respondents indicated that their toilets were well-built and maintained, and 18% admitted that their toilets were rarely used or abandoned. In an interview, a respondent indicated that *“our toilet cracked during the rainy season, and since then, we stopped using it,”* and another respondent observed that *“the pit got full and the wall cracked, so we stopped using it.”* These showed that the structural integrity of many of the toilets was poor because the toilets were built with poor materials or without technical supervision. Consequently, Osumanu and Amin (2023) observed that rural toilets in some communities in Ghana collapse within two years due to bad construction and poor soil conditions.

The study also found that many people faced economic and land challenges when trying to build toilets. Forty percent of respondents stated that the high cost of construction materials deterred them from constructing toilets, whereas twenty percent indicated that they lacked land or space to do so. These responses show that construction material costs and land ownership were serious barriers to building sanitation facilities in Bole township. This is supported by Hlongwa, Nkomo, and Desai (2024), who postulated that poor income, expensive construction materials, and weak access to credit affect rural sanitation in sub-Saharan Africa. Additionally, Osumanu and Amin (2023) observed that the lack of local builders worsens the situation because people must hire masons from far away, which costs more.

Furthermore, the study findings showed that most sanitation projects and interventions did not achieve lasting results, with 35% of respondents indicating that earlier sanitation projects were not effective. A community leader confirmed that NGOs supported by UNICEF and World Vision operated in the Bole District, educating and supporting households on various CLTS modules; however, the CLTS programs were not sustained upon completion. This agrees with findings by Dubik, Amegah, Kwakye, and Ashinyo (2024), who revealed that most sanitation projects in Ghana fail because of weak follow-up and poor funding. To improve sanitation in Bole township, efforts should be made to combine education, access to affordable local construction materials, strong community involvement, and better monitoring by local authorities.

3.4. Relationship Between Sanitation Practices and Sanitation-Related Diseases

The study revealed that diseases linked to poor sanitation, particularly diarrhea, remained common in Bole township. 32% of respondents reported suffering from sanitation-related illnesses, as indicated in Table 4, while 38% claimed that sanitation-related illnesses were common in Bole township. Sanitation-related diseases could be attributed to open defecation and poor waste disposal, especially during the rainy season when floodwaters mix with human excreta. Accordingly, diarrheal diseases are still widespread in communities without proper sanitation facilities, with children under five years and elderly people being the most affected groups (Alum, Obeagu, & Ugwu, 2024; Bazaanah & Mothapo, 2024).

Table 4. Relationship between sanitation practices and sanitation-related diseases in Bole township (N = 392).

Variables	Category	Frequency (f)	Percentage (%)
D1: Frequency of diarrhoea and sanitation-related diseases	Reported Illness	125	32.0
	Common	149	38.0
	Rare	78	20.0
	Not common at all	39	10.0
D2: Belief that poor sanitation contributes to illness	Yes, strongly believe	176	45.0
	Yes, somehow believe	138	35.0
	No, they do not believe	39	10.0
	Not sure	39	10.0
D3: Common hygiene practices observed in households	Regular handwashing with soap and water	98	25.0
	Safe water storage and handling	78	20.0
	Proper disposal of children's feces	39	10.0
	None of the above	59	15.0
	All of the above	118	30.0
D4: Common household responses to diarrhoea or related illnesses	Use home remedies or herbs	78	20.0
	Visit a health facility or clinic	157	40.0
	Buy medicine from a drug store	98	25.0
	Consult a traditional healer	39	10.0
	Take no action	20	5.0
D5: Measures that could reduce diarrhoea and sanitation-related diseases	Improved latrine construction and use	118	30.0
	Clean water supply and proper storage	98	25.0
	Regular health and hygiene education	59	15.0
	Handwashing and environmental cleanliness	78	20.0
	Improved access to health services	39	10.0

In addition, most respondents demonstrated awareness of the connection between sanitation and health, as 45% of the respondents strongly believed and 35% somewhat believed that poor sanitation led to illness, while only a few disagreed or were uncertain. However, there was a clear gap between knowledge and behavior. Although people understood the health risks of open defecation, many continued the practice due to a lack of toilets and financial constraints. This confirms the view of Tseole, Mindu, Kalinda, and Chimbari (2022) that behavior change remains limited when structural barriers such as poverty, land issues, and inadequate facilities are not addressed. Furthermore, hygiene practices in the community were found to be inconsistent, as 30% of households said they regularly practiced handwashing, safe water storage, and proper disposal of children's feces; others admitted that soap use was irregular due to poverty. During the fieldwork, the researchers observed that handwashing stations such as tippy taps were rarely found, though some households learned the practice during the COVID-19 period. As Osumanu and Amin (2023) observed, people in rural areas often have good intentions toward cleanliness but face material challenges that prevent regular hygiene practices. These results showed that limited access to soap, clean water, and hygiene materials continues to undermine efforts to improve household sanitation in the Bole township.

Regarding treatment of sanitation-related illnesses, households used both modern and traditional methods. Forty percent of respondents indicated that they visited health facilities when they were ill, while twenty-five percent reported that they bought medicine from over-the-counter drug stores when they suspected they were suffering from a sanitation-related illness. However, twenty percent reported that they used home remedies such as herbal medicine when they were ill with sanitation-related diseases. These practices showed that home-based and traditional remedies still played an important role in rural health behavior. According to Dotse-Gborgbortsi et al. (2022), due to the

distance to health facilities and transport costs, hospital visits are often delayed. The reliance on both traditional and orthodox medication for sanitation-related illnesses reflects the coexistence of traditional beliefs and modern medicine in managing sanitation-related illnesses.

In general, the findings revealed that while awareness of sanitation and health is growing in Bole township, progress remains slow due to poverty, poor infrastructure, and weak institutional support. Strengthening community participation, hygiene education, and access to affordable toilet construction materials could help reduce sanitation-related diseases in the township.

4. CONCLUSION

The study assessed the sanitary conditions and practices in Bole township to determine the challenges and implications for public health. The study adopted an explanatory sequential design and combined both quantitative and qualitative research methods. The study revealed that sanitation practices in Bole Township were strongly influenced by both socio-cultural and economic factors. Financial constraints emerged as the most significant barrier to the construction of sanitary facilities, with 40% of the respondents stating that the high cost of construction materials deterred them from constructing toilets. Culturally, open defecation remained an accepted practice among some residents, with 30% of the respondents relying on this practice and only 28% of the households having their own toilets. The sanitation problem in Bole township was not only due to limited sanitation infrastructure but also weak enforcement of sanitation by-laws and low community commitment to hygiene standards. In addition, the study established a clear link between poor sanitation practices and the prevalence of sanitation-related diseases such as diarrhea, cholera, and typhoid within Bole township, as 32% of the respondents reported having suffered from sanitation-related illnesses. The study further found that interventions by NGOs and government agencies, such as the CLTS initiative, had limited long-term impact due to poor coordination and lack of follow-up. The poor sanitation situation in Bole Township can be attributed to a combination of poverty, cultural practices, and weak enforcement of sanitation laws. The study, therefore, recommends institutional collaboration, regular monitoring, active community participation in sanitation management, and the enforcement of sanitation by-laws to improve the sanitation situation in Bole township towards the attainment of the sanitation-related SDGs.

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Transparency: The authors state that the manuscript is honest, truthful, and transparent, that no key aspects of the investigation have been omitted, and that any differences from the study as planned have been clarified. This study followed all writing ethics.

Competing Interests: The authors declare that they have no competing interests.

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