

SCHOOL-BASED SANITATION EDUCATION PROGRAMME AND ENVIRONMENTAL HYGIENE: THE CASE OF TAMALE SENIOR HIGH SCHOOL IN THE SAGNARIGU MUNICIPALITY

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*Doi//https://dx.doi.org/10.4314/gjds.v23i1.2***ABSTRACT**

Sanitation infrastructure provision in Senior High Schools, including Tamale Senior High School (SHS) without a blend with educational intervention is hampering the sustainability of environmental sanitation practices. As such, there is the need to assess the impacts of a school-based sanitation programme on environmental sanitation and changes in environmental hygiene practices by students. The main objective of the study is to assess the impacts of a school-based sanitation education programme in the Tamale SHS. A quasi-experimental pre-test and post-test design was employed, targeting SHS 1 to SHS 3 students across programmes. The study is guided by the social cognitive theory and the theory of planned behaviour. A sample size of 373 students was selected using stratified random sampling. Data were collected through questionnaire administration and observation. Descriptive statistics and paired t-tests were resorted to for quantitative data analysis. The study revealed significant improvements in environmental sanitation and hygienic practices after programme implementation. The study concludes that environmental sanitation and student hygiene behaviours in the Tamale SHS are positively influenced by structured sanitation education coupled with infrastructure support. The study recommends for integration of participatory Water, Sanitation, and Hygiene (WASH) education into school educational programmes by stakeholders.

Keywords: Impacts, School-Based, Sanitation Education Programme, Environmental Hygiene, Student Behaviour

INTRODUCTION

Globally, learning outcomes, student health, and wellbeing are determined by improved sanitation, access to safe water and adequate hygiene facilities in schools (Berhanu et al., 2022; WHO, 2022). Based on the logic of the WASH-in-Schools (WinS) framework, sustainable impact can be achieved when behaviour change interventions and hygiene promotion are embedded in the school environment (Intindencia-Garay, 2025). WinS is a combination of safe water, sanitation, hygiene facilities and education programmes within educational institutions (Intindencia-Garay, 2025). Worm infestation, absenteeism, and higher incidences of diarrhoeal diseases in SHSs are consistently associated with inadequate school sanitation (Sommer et al., 2012; Anyarayer et al., 2019). Also, according to the literature, globally, school-based sanitation and hygiene education programmes transform public health outcomes and student behaviours (Snel, 2003). When paired with functional WASH infrastructure, these programmes empower students to act as “agents of change” who spread the improved hygiene practices to their families (Snel, 2003).

In Ghana, health, environmental, and hygiene education has been integrated into the formal educational curriculum by national policies such as the School Health Education Programme (SHEP) (GES, 2021). In spite of the initiatives there is a gap between policy intent and practical implementation, especially in the Northern Region of Ghana where rapid enrolment growth, infrastructure limitations, and water scarcity converge (GES, 2021). Consequently, there is unprecedented pressure in the existing WASH facilities in the SHSs due to expanding access to secondary education that followed the introduction of Free SHS Policy in 2017. In view of this, some SHSs face challenges such as inadequate handwashing facilities, increased waste accumulation, and overburdened toilets. This is due to the fact that those schools are now operating beyond their capacity (GES, 2021).

As one of the largest boarding schools in the Northern Region without sufficient funding, Tamale SHS is not exempted from these challenges. Its intermittent water supply coupled with growing student population creates a heightened risk for poor environmental hygiene. In spite of the importance of infrastructural support, local and global evidence suggests that without strategies on behavioural change such as school-based sanitation programmes, provision of sanitation facilities alone is unlikely to contribute to sustainable hygiene (Giné-Garriga et al., 2021). This reality underscores the need for an assessment of how student behaviour and environmental hygiene in the Ghanaian SHS context can be impacted by a school-based sanitation education programme. Despite the decades of investment by donors and the Government of Ghana in school WASH infrastructure, many SHSs in Ghana-not excluding those in the Sagnarigu Municipality-continue to have poor facility maintenance, unsafe hygiene practices, and unsanitary conditions (GES, 2021). Recent WASH assessments revealed that in Northern Ghana one-third of schools lack adequate handwashing facilities, over 50% of students do not practice handwashing with soap consistently, and 50% of schools have unhygienic or non-functional toilets (Somer et al., 2012). In the Tamale SHS, water scarcity has often exacerbated the sanitation and

hygiene related challenges, resulting in unclean latrines, open defecation in surrounding areas, and overcrowded and unclean latrines (Anyarayer et al., 2019).

The multifaceted consequences of sanitation and hygiene related challenges are increased risk of communicable diseases and degradation of the school environment (Anyarayer et al., 2019; Sommer et al., 2012). These problems are partly due to the fact that infrastructure-focused interventions are not blended with structured hygiene education programmes that enhance behavioural change among students. In instances where SHEP have been introduced, it often lacks monitoring, gender sensitive approaches, and culturally relevant content, (Giné-Garriga et al., 2021). At the Tamale SHS, anecdotal evidence from students and teachers indicate persistent improper waste disposal, low adherence to hand hygiene, and poor toilet use, in spite of regular cleaning campaigns. The absence of a structured sanitation education impedes the school's ability to address these issues holistically. Without sustained and intentional hygiene education, the school risks the persistence of unhealthy behaviours on the part of students as well as the perpetuation of an environment where facilities are rapidly degrading, nullifying the potential gains from infrastructural improvements.

The impacts of a school-based sanitation education programme on student behaviour and environmental hygiene conditions in the Tamale SHS are systematically examined in this study in order to fill a critical gap in knowledge. By doing so, it sought to provide evidence on whether educational interventions could bridge the gap between infrastructure availability and sustainable sanitation practices. Specifically, the study sought to assess baseline sanitation conditions, evaluate changes in environmental hygiene practices after programme implementation, and to assess student-related hygiene behaviours after programme implementation. The study aims at contributing to the achievement of the objectives of Sustainable Development Goal 6 (Clean Water and Sanitation) and Ghana's Revised Sanitation Policy (2024). The paper is organized into four sections. The first section is focused on introduction which spells out the background to the study, the problem statement, the specific objectives of study, the theoretical underpinning of the study, and the conceptual framework whereas the second section is focused on the study area and methodology. The third section is devoted for results and discussion whereas the fourth section is focused on conclusions and recommendations.

Research Hypotheses

The study will test the following hypotheses:

H1: Implementation of the sanitation education programme leads to statistically significant improvements in environmental hygiene conditions (e.g., cleaner facilities, functional handwashing facilities, and improved waste disposal).

H2: Hygiene behaviour of students such as proper toilet use, responsible waste management, and handwashing with soap improves significantly following the implementation of the school-based sanitation education programme.

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Theoretical Underpinnings of Study

Theories that are usually employed to study behavioural change include Expected Utility Theory, Health Belief Model, Social Cognitive Theory, Theory of Planned Behaviour, Transtheoretical Model of Behaviour Change, and Self-Determinism Theory. However, the Social Cognitive Theory and the Theory of Planned Behaviour are best suited for measuring hygiene behaviour of students. The relevance of the Social Cognitive Theory to this present study lies in its capacity to extend hygiene education beyond the mere transmission of knowledge. In other words, it provides a framework for understanding why and how students adopt sanitation habits by exploring the interaction between environmental, behavioural, and personal factors (Islam et al., 2023). Also, the relevance of the Theory of Planned Behaviour to this current study is in its ability to map the psychological journey of students as they move from a simplistic understanding of hygiene to the actual practice of hygienic behaviours (Moore, 2022).

The Social Cognitive Theory (SCT)

The Social Cognitive Theory is focused on the interplay of environmental, behavioural, and personal factors in shaping the behaviour of human beings (Bandura, 2001 cited in Nickerson, 2024). The theory emphasizes that learning outcomes are influenced by a combination of observation, reinforcement, direct experience, and imitation. A key limitation of the Social Cognitive Theory is that the theory is based on the assumption that changing the environment of an individual will automatically trigger a change in their behaviour without accounting for emotional drivers, systemic barriers, and socio-cultural norms (Bandura, 2001 cited in Nickerson, 2024). In the context of a school-based sanitation education programme, the Social Cognitive Theory emphasizes that student behaviours are influenced by a number of factors. The first influencing factor of student hygiene behaviour is observational learning. This highlights the fact that students often imitate the hygiene practices of peers, teachers, or role models. That is, if respected peers consistently wash hands or manage menstrual hygiene responsibly, others are more likely to follow suit. Observational learning is applicable to this current study because it provides a framework where students acquire hygiene habits by watching peers, staff, and teachers. Also, observational learning models positive behaviours such as safe waste disposal and proper handwashing (Bandura, 2001 cited in Nickerson, 2024). Another influencing factor of student hygiene behaviour is reinforcement. This means that repetition of good hygiene practices is encouraged by positive reinforcement from teachers. Behaviour change can also be driven by negative reinforcement such as discomfort of illness. Reinforcement is applied in this study because it serves as a behavioural mechanism to encourage desired student action. By resorting to rewards, structured habits and peer recognition programmes, sanitation practices are shaped into long-term independent behaviours rather than temporary actions (Duijster et al., 2020). Self-efficacy is also an influencing factor of student hygiene behaviour. The Social Cognitive Theory emphasizes that in spite of barriers, individuals are confident in their ability to practice hygiene. The application of self-efficacy to this current study is in view of the fact that it provides a bridge between

knowledge on hygiene and actual practice by explaining why some students do not maintain sanitation habits while others do (Duijster et al., 2020).

The last influencing factor of student hygiene behaviour is reciprocal determinism. It provides a feedback loop that undermines or sustains hygiene behaviour in order to enhance interaction between students, their hygiene practices (behaviour), and the availability of sanitation facilities. The application of reciprocal determinism to this current study enables the provision of a framework for the measurement of not only student knowledge on hygiene but also for designing interventions to target provision of facilities, encouraging peer-led hygiene routines, and offering sanitation and health education (Bandura, 2001 cited in Nickerson, 2024). According to Boateng et al., (2020), hygiene practices in Ghana have been effectively improved by peer-led sanitation clubs in Ghana. The Social Cognitive Theory predicts that adolescent behaviours are strongly shaped by peer influence and social modelling. This underscores the relevance of the Social Cognitive Theory in the examination of the impacts of a school-based sanitation education programme on student behaviour and environmental sanitation.

Theory of Planned Behavior (TPB)

The Theory of Planned Behaviour developed by a psychologist, Icek Ajzen in 1985 originated from the Theory of Reasoned Action. While the Theory of Reasoned Action is of the view that behaviour is driven directly by intentions which stem from subjective norms and attitudes, Ajzen detected that this theory failed to account for behaviour over which people lack complete volitional control (Ajzen, 1985). To bridge this gap, Ajzen added a third core component known as perceived behavioural control. This addition gave birth to the Theory of Planned Behaviour in 1985 (Ajzen, 1985). The Theory of Planned Behaviour is an established framework that provides an explanation to environmental and health behaviours (Ajzen, 1985). The theory is of the view that the most immediate predictor of action (behavioural intention) is influenced by three key constructs. The first construct is subjective norms. This refers to the social pressure that is perceived to influence an individual not to perform or to perform a behaviour. In terms of relative importance, it is typically the weaker predictor of behavioural intentions compared to perceived behavioural control and attitudes (Chen and Slade, 2026). Applying subjective norms to a school-based sanitation education study translates public health standards into actionable and measurable guidelines for education and hygiene practices of students. This framework evaluates how knowledge translates into lasting behavioural shift particularly in improving health outcomes and environmental cleanliness (Snel, 2003).

The second construct is perceived behavioral control. This refers to the extent of capability of an individual to perform a behaviour given available opportunities and resources. In terms of relative importance, it is the next stronger predictor of behavioural intentions after personal attitudes (Chen & Slade, 2026). Applying perceived behavioural control to a study on school-based sanitation and hygiene education programme requires looking at how a student perception of their ability to perform hygiene actions (like disposal of waste

properly and washing hands with soap influences their actual behaviour) (Snel, 2003). The third construct is attitude toward the behavior. This refers to the intended benefits or the intended harmful effects associated with the extent of executing hygiene practices. In most applications of the Theory of Planned Behaviour, personal attitudes are the strongest predictor of behavioural intentions (Chen & Slade, 2026). Applying personal attitudes to a study on school-based sanitation and hygiene education programme facilitates the measurement of attitudes of students toward cleanliness and how it drives their actual practice. Positive attitudes significantly increase the likelihood that students will regularly wash their hands, manage waste, and properly use latrines (Snel, 2003).

In the context of a school-based sanitation education programme, the Theory of Planned Behaviour suggests that there is the likelihood of students to engage in proper toilet use, proper handwashing, or proper menstrual hygiene. This can be influenced by possessing positive attitudes on environmental sanitation and hygiene and also having the belief that they are expected by teachers and peers to act hygienically. To buttress on the significance of the Theory of Planned Behaviour in the context of a school-based sanitation education programme, Antwi-Agyei et al., (2017), discovered that student handwashing practices in Ghanaian schools were strongly influenced by their perceived social norms. Similarly, in a study conducted in India by Shinde et al., (2025), it is revealed that hygiene behaviour adoption is significantly influenced by peer norms. This indicates that adolescent decision making is reinforced by the importance of social expectations. In other words, the decision of an adolescent to perform or not perform a behaviour is influenced by perceived social pressure.

Conceptual Framework

From the conceptual framework in Figure 1, the impacts of a school-based sanitation education programme on student behaviour and environmental sanitation in the Tamale SHS are clear. The Social Cognitive Theory and the Theory of Planned Behaviour are manifested in the conceptual framework. The conceptual framework illustrates that a school-based sanitation education programme (independent variable) influences attitudes, skills and knowledge of students regarding hygiene. These behaviours and cognitive changes contribute to improved environmental hygiene conditions (functionality and cleanliness of toilets, improved waste disposal systems, improved handwashing facilities), as well as improved student hygiene-related behaviours (proper toilet use, proper waste management, and proper handwashing). Intervening variables such as availability of WASH facilities, cultural norms and gender sensitivity, teachers and peer influence, as well as policy and institutional support are acknowledged by the conceptual framework. The dependent variables (expected outcomes) are enhanced environmental hygiene conditions and improved student hygiene practices which collectively lead to a more conducive learning environment, better student health, and reduced absenteeism. See Figure 1 below.

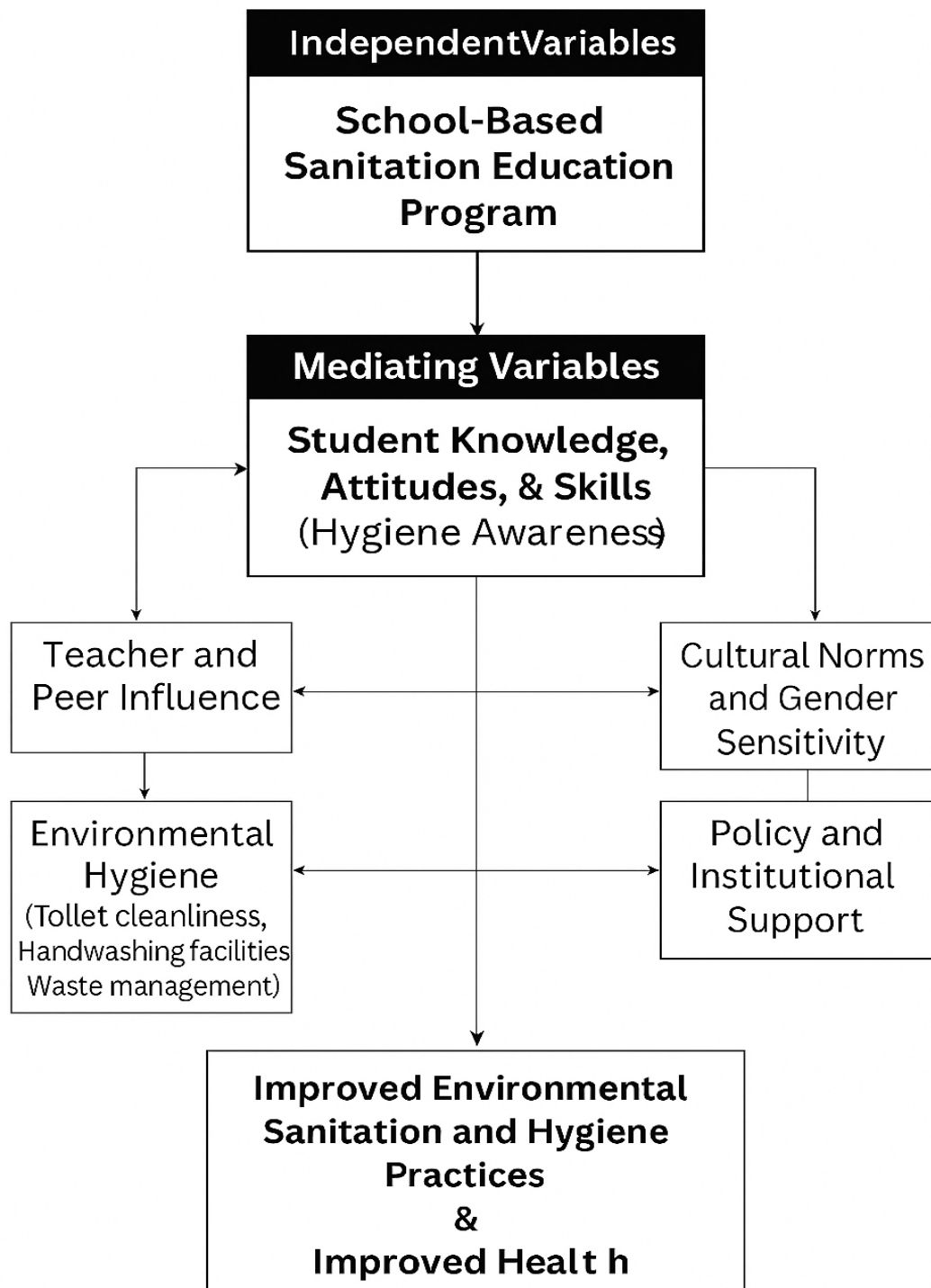


Figure 1. Conceptual Framework of Study

The conceptual framework clearly links the intervention to measurable outcomes and incorporates mediating factors that can enhance or hinder effectiveness. It also aligns directly with the specific objectives of the study: assessing baseline conditions, evaluating environmental sanitation conditions and assessing behavioral changes.

STUDY AREA AND METHODOLOGY

Study Area

The Sagnarigu Municipality is located in the central part of the Northern Region of Ghana. It falls between Longitudes 0057" N and 00 57" W and Latitudes 9016" N and 9034" N. The Municipality has an estimated total land size of 114. 29 km². It shares boundaries to the North with Savelugu Municipal and Nanton District to the North- East, Tamale Metropolis to the South and East, to the West with Tolon District, and to North-West with Kumbungu Municipal (Ghana Statistical Service, 2021). Figure 2 is a map of Ghana indicating Sagnarigu Municipality whereas Figure 3 is a map of the Sagnarigu Municipality indicating Tamale SHS.



Figure 2. Map of Ghana Indicating Sagnarigu Municipality, constructed from Arc Geographic Information System (2026)

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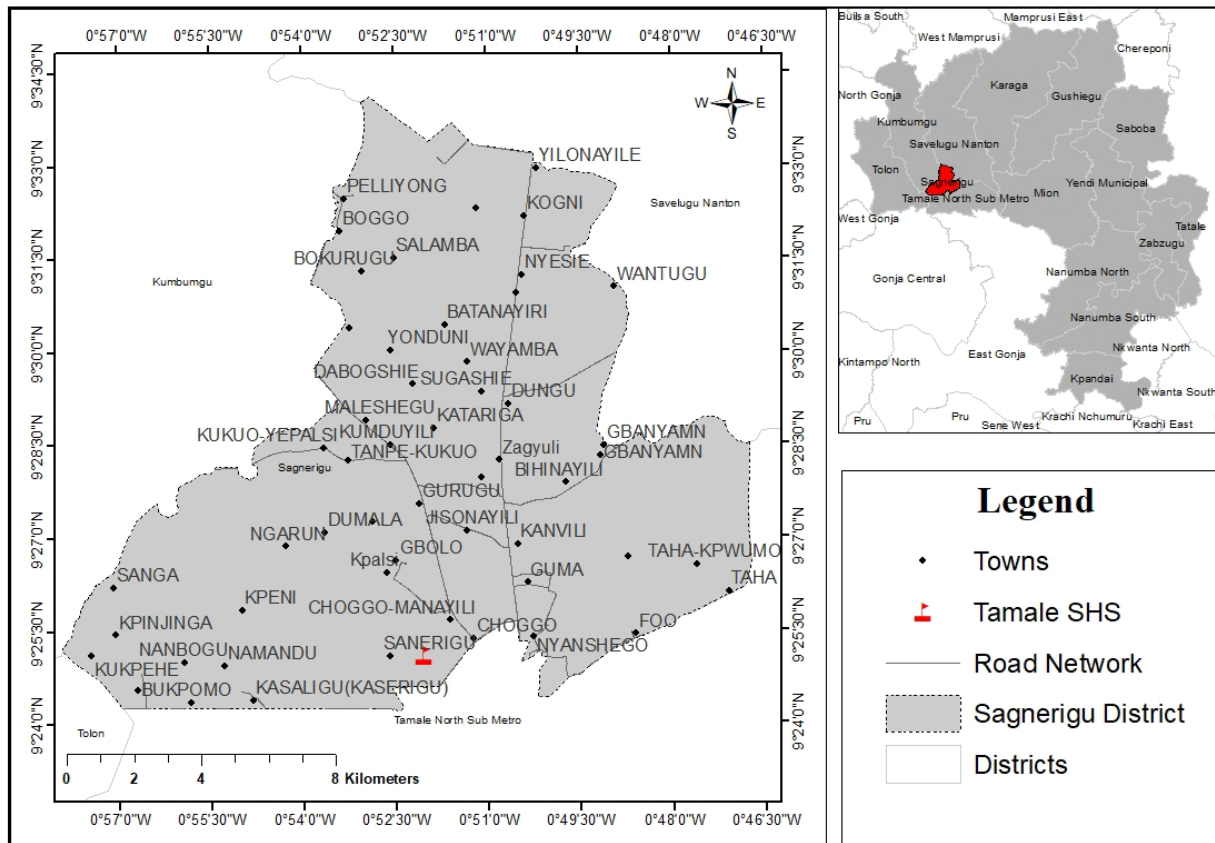


Figure 3: Map of Sagnarigu Municipality indicating Tamale Senior High School, constructed from Arc Geographic Information System (2026)

Tamale Senior High School (TAMASCO), located in the Sagnarigu Municipality, is one of the largest SHSs in Northern Ghana. The school has a diverse student population drawn from multiple regions, and offers the following programmes: General Science, General Arts, Languages, Agriculture, Business, Technical, Visual Arts, and Home Economics. Its few sanitation facilities, high student population coupled with low level of sanitation and hygiene education makes it an ideal site for assessing the impact of school-based sanitation interventions (Ghana Education Service, 2023).

METHODOLOGY

The methodology of study takes into consideration the research approach, research design, study population, target population, and accessible population, sample and sampling procedure, data collection and data analysis.

Research Design

This study adopted a quasi-experimental research design with a pre-test and post-test structure. Quasi-experimental designs are characterized by the absence of random assignment of participants to treatment and control groups, while still allowing the researcher to examine causal relationships (Quansah et al., 2019). It is mostly used in

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educational research, especially in dealing with instances where randomization may be unethical or impracticable. The quasi-experimental research design was chosen because environmental sanitation conditions and changes in hygienic practices before and after an intervention can be measured systematically and at the same time provide a robust causal inference as compared to descriptive approaches (Creswell & Creswell, 2018). The strengths of quasi-experimental research design are numerous: it enables the assessment of intervention effects even without full randomization (Hakim & Ikhsan, 2022); it is suitable for real-world educational settings where random assignment is challenging; and it provides clear measures of change attributable to an intervention. However, the weaknesses of quasi-experimental research design are that the absence of randomization increases the risk of selection bias (Creswell & Creswell, 2018); and also, external factors may influence observed outcomes if not properly accounted for.

Accessible Population

The accessible population of Tamale SHS consisted of SHS 1 to SHS 3 students pursuing General Science, General Arts, Languages, Agriculture, Business, Technical, Visual Arts, and Home Economics. Students of the accessible population are familiar with the school environment and sanitation culture. Assessing this group enables the study to capture meaningful changes in hygiene behavior resulting from a structured sanitation education Programme. Table 1 is an illustration of the Accessible population of students.

Table 1: Accessible Population of Student by Programmes (2024/2025 Academic Year)

Programme	SHS 1	SHS 2	SHS 3	Total
General Science	442	493	566	1,501
General Arts	439	325	530	1,294
Languages	128	344	-	472
Agriculture	148	103	13 2	383
Business	139	109	100	348
Technical	83	82	103	268
Visual Arts	111	349	108	568
Home Economics	297	105	357	759
Total				5,599

Field Survey (2025)

Sample Size and Sampling Procedure

The accessible student population of Tamale SHS for the 2024/2025 Academic Year was 5,599 students from SHS 1 to SHS 3 across programmes. Using the Yamane 1967 formula for computation of sample size, a sample size of 373 students was determined across programmes. The computed sample size is illustrated below using the Yamane (1967) formula.

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

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Where, n designates sample size; N designates total number of students across programmes; e designates the margin of error which is 5 % given a confidence interval of 95%. The margin of error quantifies the uncertainty in survey results, indicating how much the sample results might differ from the true population value. It essentially provides a range within which the true population value is likely to fall, given the sample data and a certain level of confidence (Thompson and Liu, 2005). A smaller margin of error suggests greater accuracy and confidence in the survey results. A margin of error of 5% is a justification of 95% confidence interval which also justifies the accuracy of the results (Thompson & Liu, 2005). The study's sample size is computed as follows. The total number of students of Tamale SHS from SHS 1 to SHS 3 across programmes is 5, 599.

$$n = \frac{5,599}{1 + 5,599(0.05)^2} = 373$$

Table 2 is an illustration of apportionment of sample size by programmes using proportionate sampling. The formula for proportionate sampling is as follows:

$$X = \frac{P}{N} \times n$$

where X is the proportionate sample of students of a programme.

P is the total number of students on a programme.

N is the total number of students on all programmes.

n is the sample size

Table 2: Apportionment of Sample Size by Programmes using Proportionate Sampling

Programme	Student Population from SHS 1 to SHS 3 (2024/2025 Academic Year)	Apportionment	Sample Size
General Science	1,501	$\frac{1,501}{5,599} \times 373$	100
General Arts	1,294	$\frac{1,294}{5,599} \times 373$	86
Languages	472	$\frac{472}{5,599} \times 373$	31
Agriculture	383	$\frac{383}{5,599} \times 373$	26
Business	348	$\frac{348}{5,599} \times 373$	23
Technical	268	$\frac{268}{5,599} \times 373$	18
Visual Arts	568	$\frac{568}{5,599} \times 373$	38
Home Economics	759	$\frac{759}{5,599} \times 373$	51
Total	5.599		373

Field Survey (2025)

Also, Tamale SHS was purposively selected for the study in view of the fact that it is one of the Senior High Schools in the Northern Region of Ghana with a high student population and also because it is characterized by inadequate sanitation and hygiene facilities. The students of each class (from SHS 1 to SHS 3) across programmes were sampled for interaction by means of stratified random sampling. The stratification was chiefly based on classes and programmes. The respective classes (SHS1 to SHS 3) across all programmes were proportionately represented in the sample size. Stratified random sampling enhances research accuracy by dividing populations into homogeneous subgroups (strata); it ensures proportional representation of all key groups and reduces sampling error. It also provides higher precision than simple random sampling by allowing for a comparative analysis between subgroups (Cresswell & Cresswell, 2018).

Data Collection

The study relied on questionnaire administration and observation for data collection. Administered structured questionnaire captured student self-reports on hygiene behaviours, and perceptions of sanitation conditions. Observation was also used to objectively assess cleanliness, availability, and functionality of sanitation facilities such as toilets, urinals, handwashing facilities, and waste bins before and after the intervention with the aid of a guided checklist. Data collection occurred in three sequential phases:

The first was the **baseline assessment (Pre-Test) phase**. During the baseline assessment, questionnaires were administered and observations were made prior to the intervention (First Term of the 2024/2025 Academic Year). The second was the **intervention phase**. During the intervention phase, the sanitation education Programme was implemented over one academic term (Second Term of the 2024/2025 Academic Year), focusing on hand hygiene, toilet use, and waste management. The third was the **Post-Test Assessment**: During the post-intervention assessment, questionnaire administration and direct observation were employed to measure changes in environmental sanitation and hygiene behaviours of students (Third Term of the 2024/2025 Academic Year). This process provided reliable measurement of the impacts of the school-based sanitation education programme which is also logical to the quasi-experimental design (Gyampoh et al., 2020).

Data Analysis

Quantitative data analysis utilized a component of SPSS version 20 known as descriptive statistics (percentages, frequencies). Also, inferential statistical analysis was conducted using the paired sample t-tests to measure variations in pre-intervention and post-intervention outcomes in order to determine the effectiveness of the school-based sanitation education programme.

Results and Discussion

The demographic characteristics of respondents as well as the empirical results are presented and discussed in this section.

Demographic Characteristics of Respondents

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A total of 373 SHS 1 to SHS 3 students across all programmes participated in the study. The demographic characteristics of the respondents are captured in Table 3. Demographic Characteristics of Respondents (N = 373)

Characteristic	Frequency	Percentage (%)
Sex		
Male	163	43.7
Female	210	56.3
Age (years)		
15–17	96	25.7
18–20	242	64.9
21+	35	9.4
Residence		
Urban	217	58
Rural	156	42

Field Survey (2025)

Table 3 illustrates the sex composition of respondents with a majority female representation (56.3%). It is also revealed in Table 3, that the majority of respondents (64.9%) were within the age bracket of 18–20-years which is typical to SHS students. This is indicative that participants possess the cognitive maturity to respond to questions on the impacts of a school-based sanitation education programme on student behaviour and environmental sanitation (Safo-Adu et al., 2022). The results further disclose a mix of rural (42%) and urban (58%) respondents which indicate that the majority of respondents possess sufficient knowledge on environmental hygiene and facility use. This diversity facilitates generalizability of findings and provides explanation on behaviour change potentials across varied residential backgrounds.

EMPIRICAL RESULTS

Baseline Environmental Hygiene Conditions

The functionality and cleanliness of sanitation facilities such as handwashing facilities, toilets, and waste management systems prior to the implementation of the school-based sanitation education programme were measured. See Table 4.

Table 4: Baseline Environmental Hygiene Conditions (N = 373)

Indicator	Functional & Clean (%)	Partially Functional (%)	Non-Functional (%)
Toilets	42	31	27
Handwashing facilities	28	37	35

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Waste management (bins, disposal)	38	32	30
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Field Survey (2025)

From Table 4, the results of the baseline assessment show that environmental hygiene at the Tamale SHS was sub-optimal with less than 50% of the sanitation facilities clean and fully functional. The study also disclosed that handwashing facilities were inadequate with only 28% supplied consistently with soap and water. These results are in support of national reports emphasizing persistent deficiencies of WASH in Northern Ghana schools (Hornsby et al., 2025). The necessity of coupling infrastructure provision with structured sanitation education programmes in order to enhance sustainable behavioural change underscores the observed poor hygiene conditions of the Tamale SHS. Empirical evidence consistently reveals that school sanitation conditions in low- and middle-income countries remain inadequate despite policy commitments and infrastructural investments. The availability and functionality of toilets, handwashing facilities, and waste disposal facilities are often limited, leading to negative impacts on student health, attendance, and learning outcomes (Mensah et al., 2022). Abawari et al., (2026) reported that nearly half of schools in sub-Saharan Africa lack access to basic sanitation services, and even where infrastructure exists, maintenance challenges frequently render these facilities unusable.

In Ghana, studies highlight a similar pattern. Safo-Adu et al., (2022) found that although most senior high schools of Western North Region had toilet facilities, many were overcrowded, poorly maintained, and lacked consistent water supply. In the Zabzugu District of Northern Region, Tiswin et al., (2019) observed that the majority of WASH facilities in schools were either dysfunctional or were avoided by students due to unhygienic conditions, such as foul odors, lack of privacy, and absence of soap for handwashing. Such baseline conditions suggest that assessing sanitation in schools requires not just a count of facilities but also evaluation of cleanliness, accessibility, functionality, and student perceptions. These findings further underscore that infrastructural provision alone does not guarantee improved hygiene outcomes. Where schools lack regular maintenance and student sensitization, facilities quickly deteriorate, discouraging use and reinforcing unhygienic behaviors (Safo-Adu et al., 2022). For research focused on Tamale Senior High School, establishing a baseline picture of sanitation conditions is critical to contextualize the effects of subsequent hygiene education interventions.

Impacts of Sanitation Education Programme on Environmental Hygiene

The impacts of the Sanitation Education Programme on the school environment was assessed to determine improvements in sanitation infrastructure, utilization and maintenance.

Table 5: Environmental Hygiene Conditions (Pre- and Post-Intervention) (N = 373)

Indicator	Pre-Test (%)	Post-Test (%)	Mean Difference (%)	t-value	p-value
Functional & clean toilets	42	79	37	16.88	0.001
Handwashing facilities with soap	28	75	47	18.74	0.001
Proper waste management	38	72	34	15.63	0.001

Field Survey (2025)

From Table 5, the post-intervention results indicate statistically significant improvements in environmental hygiene. Functional and clean toilets increased by 37% (with a t-value of 16.88) indicating that implementation of a school-based sanitation education programme significantly contributes to functional and clean toilets. Also, handwashing facilities with soap increased by 47% (with a t-value of 18.74) indicating that implementation of a school-based sanitation education programme significantly enhances hand washing facilities with soap in a school environment. More so, proper waste management increased by 34% (with a t-value of 15.63) indicating that implementation of a school-based sanitation programme significantly enhances proper waste management in a school environment. These findings confirm Hypothesis H1 (Implementation of sanitation education Programme leads to statistically significant improvement in environmental hygiene conditions) and reinforce the role of education in complementing infrastructure improvements. Similar outcomes have been reported by Safo-Adu and Hanson, (2019) and Hornsby et al., (2025), who note that behavior-focused interventions enhance facility utilization and maintenance. This suggests that schools should adopt combined infrastructure and behavior-focused strategies for sustained improvements. This is supported by the Theory of Planned Behaviour which is of the logic that students are more likely to engage in consistent handwashing, or toilet use, if they hold positive attitudes toward these behaviors, believe that peers and teachers expect them to act hygienically, and feel that they have access to water, soap, and private facilities.

Student Hygiene Practices Post-Intervention

The study evaluated changes in student hygiene behaviors following the sanitation education Programme (see Table 6).

Table 6: Student Hygiene Practices (Pre- and Post-Intervention) (N = 373)

Hygiene Practice	Pre-Test (%)	Post-Test (%)	Mean Difference (%)	t-value	p-value
Handwashing with soap	32	78	46	18.32	0.001
Proper toilet use	45	82	37	16.47	0.001
Proper waste disposal	38	70	32	14.56	0.001

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Field Survey (2025)

From Table 6, the study indicated significant improvements in all measured hygiene behaviors following the intervention. Handwashing with soap increased from 32% to 78% (with a t value of 18.32), confirming hypothesis one, that structured hygiene education can substantially enhance compliance to hand washing with soap on the part of students. Proper toilet use improved from 45% to 82% (with a t-value of 16.47) demonstrating that school-based sanitation education reinforces appropriate toilet facility use and can reduce contamination risks. Proper waste disposal practices increased by 32% (with a t-value of 14.56) indicating that school-based sanitation programmes significantly enhance proper waste disposal. These results also confirm hypothesis two (student hygiene behaviour significantly improves as a result of the sanitation education Programme). There is substantial empirical evidence that sanitation education positively influences student behavior when effectively implemented. In Kenya, Dreibelbis et al., (2014) conducted a randomized control trial and found that structured hygiene education significantly improved handwashing with soap and appropriate toilet use among primary school children. Similarly, Alnadwi et al., (2022) in Makkah City in Saudi Arabia reported that targeted school-based hygiene education led to an increase in regular handwashing with soap among primary school students, demonstrating that behavioral change is achievable when knowledge is reinforced through practice.

These findings also corroborate prior research asserting that school-based WASH education positively influences student hygiene behaviors (Giné-Garriga et al., 2021; Sommer et al., 2012). This implies that structured hygiene education is effective in promoting consistent and safe hygiene behaviors. Thus, schools should integrate ongoing monitoring and reinforcement to sustain improved practices. This is in line with the Social Cognitive Theory which holds that social modeling and peer influence strongly shape adolescent behaviors. It is also in line with the Theory of Planned Behaviour which is of the logic that students are more likely to engage in consistent handwashing, or toilet use if they hold positive attitudes toward these behaviors, believe that peers and teachers expect them to act hygienically, and feel that they have access to water, soap, and private facilities.

Conclusion and Recommendations

The study sought to assess baseline sanitation conditions, evaluate changes in environmental hygiene practices after Programme implementation, and to assess student-related hygiene behaviours after Programme implementation. The following conclusions were drawn from the study. Firstly, baseline sanitation conditions were inadequate, with poor cleanliness of facilities, limited handwashing facilities, and weak waste management systems. Also, structured sanitation education, combined with infrastructural support positively influences environmental sanitation in Tamale SHS. More so, after the intervention, significant improvements were observed in handwashing practices, proper toilet use, and waste disposal on the part of students.

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The following recommendations are proposed for consideration. Firstly, school-based WASH Programmes should integrate structured hygiene education alongside facility provision to ensure that students not only have access to functional sanitation infrastructure but also understand and practice appropriate hygiene behaviors. Secondly, school administrators should establish mechanisms for ongoing monitoring and maintenance of sanitation facilities, engaging students as active participants in promoting cleanliness and environmental hygiene. Also, teacher training programmes should include modules on WASH education to build capacities for effective programme delivery and reinforcement of positive hygiene practices. More so, collaboration with local health authorities, NGOs, and community stakeholders should be encouraged to sustain sanitation interventions, provide resources, and reinforce behavioral change beyond the classroom. Finally, while this study focused on SHS students across programmes, future research could explore several complementary areas. Longitudinal studies could examine the durability of behavioral changes over multiple academic terms or years to assess the long-term impact of sanitation education programmes.

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