



Efficacy of Conventional School-Based WASH Sensitisation on common NTDs among Schoolchildren in Bunyala Sub-county, Kenya

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Abstract

Conventional school-based Water, Sanitation, and Hygiene (WASH) sensitisation traditionally relies on a linear, cognitive-driven model which assumes that passive, didactic information delivery through lectures and pamphlets will translate into sustained behavioural modifications. The study was conducted in Bunyala sub-county among pupils in public, day primary schools. A one group pretest-post-test quasi-experimental study design was adopted. A sample size of 125 pupils was arrived at using power formula. Purposive sampling, proportionate sampling and quota sampling techniques were used to select the sub-county and schools, number of pupils in schools and number of pupils by grade and gender respectively. Following the conventional WASH sensitisation, pupils achieved varying knowledge scores. Awareness regarding the causes of Schistosomiasis (SCH) increased by a mean of 0.568 ($t(124) = -4.676, p < .001$) and Soil-Transmitted Helminthes (STH) by 0.384 ($t(124) = -3.038, p = .003$), yielding a combined causal knowledge gain of 0.952 ($p < .001$). For transmission, understanding of SCH improved by a mean of 0.616 ($t(124) = -4.416, p < .001$), while STH remained stagnant ($p = 1.000$). Nonetheless, combined transmission knowledge increased significantly (mean of 0.616 ($t(124) = -3.137, p = .002$)). Finally, individual prevention scores and overall knowledge on prevention remained static ($p = 1.000$); this suggests that conventional WASH sensitisation is not effective in disease prevention as it did not result in measurable changes in knowledge on disease prevention. Therefore, public health strategies should move beyond passive information dissemination and invest in active campaigns that are supported by WASH infrastructure.

Introduction

Water, Sanitation, and Hygiene (WASH) interventions are foundational pillars of global public health, as they play a critical role in mitigating the burden of enteric pathogens, child mortality, and infectious diseases (Headey & Palloni, 2019). It is the basis for preventing infectious diseases and is essential for school health (Sugita, 2022). Effective WASH programmes in schools can significantly reduce the



transmission of common illnesses, leading to fewer cases of student absenteeism (Sugita, 2022). This, in turn, fosters a more consistent and productive learning environment.

Public health frameworks operating in resource-limited settings have relied extensively on conventional WASH sensitisation to drive health improvements. This traditional paradigm focuses primarily on structured information dissemination, public educational campaigns, and raising community awareness regarding the health risks associated with unhygienic practices and faecal-oral disease transmission vectors (Ginja et al., 2019; Plans, 2014). This has predominantly been implemented through traditional didactic approaches, in which practitioners deploy passive educational formats such as structured lectures and pamphlets distributed in schools (Malik et al., 2019; Nuraida, 2015). The foundational logic of conventional sensitisation rests on the cognitive assumption that individuals engage in risky behaviours due to a lack of knowledge. Consequently, it suggests that providing comprehensive information on correct sanitation practices will logically translate into sustained behavioural modifications (Ginja et al., 2019). While this model has dictated global health for years, literature evaluates its efficacy with mixed findings, revealing tensions between knowledge acquisition and behavioural execution.

In many endemic regions, pupils present low baseline knowledge of the transmission cycles of WASH-related Neglected Tropical Diseases (NTDs). For instance, in a study conducted in Nigeria, it was reported that only 2% of pupils were partially correct regarding knowledge, attitudes, and practices for urogenital schistosomiasis, with no one understanding the transmission cycle (Balogun et al., 2022). This highlights a critical need for direct school-based education, as knowledge is rarely imparted effectively from parents to children (Balogun et al., 2022). Traditional lecture-based methods focus primarily on information provision through conveying messages on risk factors, symptoms, and the importance of preventive practices (Torres-Vitolas et al., 2023). The systematic reviews indicated that these health education interventions can lead to significant improvements in individual-level knowledge. Studies indicated that the impact of health education intervention is frequently limited by structural barriers such as inadequate school infrastructure and socio-cultural traditions (Torres-Vitolas et al., 2023).

Literature on conventional WASH sensitisation highlights several logistical and foundational advantages within public health frameworks. The most prominent advantage of these approaches is their documented capacity to correct knowledge deficits and improve baseline knowledge, attitudes, and practices scores regarding disease transmission (Sen, 2025). Empirical studies evaluating didactic educational interventions consistently demonstrated an increase in participants' post-test scores regarding basic hygiene mechanics (Malik et al., 2019; Sen, 2025). In a quasi-experimental study assessing the impact of structured, classroom lectures and standard instruction packages among municipal sanitation workers, students and healthcare trainees recorded improvement in knowledge, attitudes, and practices (Malik et al., 2019; Nuraida, 2015). Intuitive pedagogical tools which track visually the faecal-oral route across fingers, flies, fields, fluids, and food successfully interpret the mechanism of contamination for lay audiences (Plans, 2014). Furthermore, when evaluated through pre- and post-test designs, these didactic delivery systems proved to be effective at shifting health literacy, such as clarifying critical contamination points (Malik et al., 2019). Educating communities on the direct linkages between contaminated water resources and endemic illnesses like diarrhoea effectively heightens personal health risk perceptions. This elevation in risk perception has been shown to positively correlate with an increased willingness to adopt and utilise basic water and sanitation services (Anthonj et al., 2018). Ultimately, although education alone is not sufficient to eliminate disease burden, a baseline understanding of environmental hygiene is essential for



technology adoption, generating community support that prompts households to anticipate, demand, and utilise structural WASH infrastructure when it is eventually delivered (Chidziwisano, 2025).

Additionally, literature revealed that traditional classroom learning has been shown to change health-related knowledge and behaviours more effectively when integrated into the school curriculum and delivered by teachers, who are viewed as trustworthy sources (Mindu et al., 2020; Torres-Vitolas et al., 2023). A study carried out in South Africa demonstrated that combining health education with infographics or edutainment significantly improved knowledge uptake compared to baseline (Mindu et al., 2020); suggesting that the lecture method is most potent when supplemented with culturally appropriate visual tools. Even though pupils' knowledge improves through school-based lectures, the absence of adequate WASH infrastructure hinders the practice of the very behaviour learned (Poague et al., 2022). Traditional lecture-based WASH sensitisation is effective at bridging the initial knowledge gap for pupils on NTDs (Balogun et al., 2022). However, for these gains to be sustainable and result in disease reduction, there's a need for an integrated approach that combines information provision with infrastructure investment and community participation (Madon et al., 2018; Torres-Vitolas et al., 2023).

The efficacy of school-based WASH sensitisation in combating NTDs remains a central theme in public health discourse. Studies underscore that while traditional lecture-based methods are foundational for improving knowledge, their success in reducing the prevalence of Soil-Transmitted Helminths (STH) and Schistosomiasis (SCH) depends heavily on how they address specific transmission mechanisms (Torres-Vitolas et al., 2023). In endemic regions, baseline knowledge among pupils is often low; for instance, a study revealed that 63.4% of basic education students were not aware of SCH prior to school-based activities (Batista et al., 2024). Many pupils lack a basic understanding of disease cycles without formal school-based sensitisation; this makes the teachers' role as a source of information for bridging this initial knowledge gap (Person et al., 2016).

In the context of STH, traditional lectures focus on the faecal-oral route and the importance of hand hygiene (Torres-Vitolas et al., 2023). Studies highlight that pupils may successfully memorise hygiene rules during a lecture but fail to practice them if the school environment lacks functional latrines or soap (Torres-Vitolas et al., 2023). While these methods are effective at helping pupils recall basic preventive facts, studies highlight a significant gap in knowledge-action (Torres-Vitolas et al., 2023). Furthermore, traditional teaching failed to convey the persistence of helminth eggs in the soil, leading to superficial learning where pupils understand that dirt is unhygienic but do not perceive the specific risk of playing in contaminated areas (Person et al., 2016).

The traditional lecture method poses greater challenges for SCH due to its complex transmission cycle involving an intermediate snail host, as it struggles to explain how seemingly clear water bodies can harbour infectious cercariae (Person et al., 2016). Unlike the more intuitive concepts of STH prevention, SCH sensitisation requires pupils to grasp a multistage biological process (Person et al., 2016). Systematic reviews indicated that traditional lecture instruction is significantly less effective than visual methods (Mindu et al., 2020). Interventions that incorporate visual mapping of local water contact sites or posters of the transmission cycle have shown much higher retention rates, with post-intervention knowledge scores increasing (Mindu et al., 2020). These tools help pupils identify specific high-risk environmental factors that a standard classroom lecture might overlook.

While literature documents both the immediate benefits of conventional sensitisation and its failure to spark long-term knowledge retention, a significant gap remains regarding pedagogical alternatives. Specifically, there is a lack of evidence on how to shift from passive, lecture-based models toward age-



appropriate, visual, and environmentally mapped educational frameworks in schools. Crucially, evidence is missing on how these actionable, visually demonstrative frameworks can be operationalised to move past factual memorisation and instead foster deep internalisation of hidden environmental transmission risks.

Neglected Tropical Diseases affect more than 1.7 billion people globally (Semahegn et al., 2023); they are responsible for 500,000 deaths annually and 19 million DALYs lost annually (Semahegn et al., 2023). In Kenya, more than 25 million people are infected with at least one NTD (Nyerere, 2026). While not directly fatal, NTDs cause immense suffering and lifelong disabilities, impacting populations in poverty, in rural settings, without adequate sanitation and those in close contact with disease vectors (Ochola et al., 2021). Among children, NTDs lead to anaemia, malnutrition, impairment of both physical and cognitive development, school absenteeism (Ochola et al., 2021; Rithaa, 2025) and can affect learning capabilities (Rees et al., 2019). Bunyala Sub-County remains a high-burden area for WASH-related NTDs, particularly SCH and STH, with prevalence exceeding 40% among school-aged children in the Lake Victoria basin, significantly higher than the national average (MoH, 2023). Pupils in the sub-county face a severe public health threat from these WASH-related NTDs. This is linked to Bunyala's unique geographic landscape, which is characterised by its close proximity to Lake Victoria, the River Nzoia basin, and recurrent seasonal flooding (Odiere *et al.*, 2026). To combat this endemic challenge, the Kenyan government regularly implements MDA through the National School-Based Deworming Programme (NSBDP), successfully treating thousands of pupils each year (Mwandawiro *et al.*, 2013). However, the MDA strategy serves only as a temporary, reactive mechanism rather than a permanent remedy.

The purpose of the study was to assess the knowledge level of primary school pupils on the common WASH-related NTDs following conventional WASH sensitisation initiatives in the sub-county. While traditional WASH interventions are widely implemented to promote hygiene practices, their efficacy in successfully translating general hygiene awareness into specific knowledge about endemic NTDs remains understudied. By evaluating post-sensitisation knowledge gaps among pupils, the study aims to determine the strengths and limitations of current health education strategies. The findings intend to provide actionable insights for stakeholders, educators, and policymakers to design and tailor future health interventions, to ensure they are more effective in mitigating the burden of WASH-related NTDs within vulnerable school-aged populations

Methodology

The study was conducted in Bunyala sub-county, in rural primary day schools, among the pupils in selected schools. The sub-county consists of four administrative wards: Bunyala West, Bunyala Central, Bunyala South, and Bunyala North. It borders Samia Sub-County to the North, Siaya County to the East, Lake Vitoria to the West, and the Republic of Uganda, a proximity that facilitates cross-border diseases. The sub-county is partly covered by Yala Swamp, Kenya's largest freshwater wetland, which covers approximately 175 km² (Odero & Odenyo 2021). While it serves as a vital ecological filter for Lake Victoria, it also harbours snails (*genus Bulinus* and *Biomphalaria*) that act as intermediate hosts for schistosomiasis (Odero & Odenyo 2021). Bunyala sub-county's morbidity profile is heavily influenced by its geography, including its proximity to Lake Victoria, the Yala Swamp, and a high water table. It is dominated by Schistosomiasis and Soil-Transmitted Helminths (Amref Health Africa, 2025). Children frequently engage in high-risk water contact through recreational swimming, crossing flooded waters barefoot to reach school, and assisting with domestic chores, which are the primary transmission routes for Schistosomiasis.



The researcher adopted a one-group pretest-posttest quasi-experimental study design to evaluate the baseline and post-intervention status of pupils' health literacy. Pretest data were collected from pupils using a structured questionnaire administered by trained research assistants, followed by exposure to conventional school-based WASH sensitisation. The conventional lecture-based WASH sensitisation was carried out by the trained research assistants (Teachers). The study participants (pupils) were trained on the common WASH-related NTDs prevalent in Bunyala sub-county; their causes and mode of transmission; and prevention. The training took place once per week (Friday from 3:30 pm to 5 pm) for 4 weeks. Finally, post-test data were collected three months after the intervention. The questionnaire was developed with various sections to assess knowledge of the causes, mode of transmission, and prevention of both SCH and STH. To assess the reliability of the study, forty (40) questionnaires were administered to pupils in Teso South sub-county in a pilot study. The analysis of the data collected by the questionnaires revealed a Cronbach's alpha coefficient of 0.78, which was acceptable since it was higher than 0.70. The questionnaire was subjected to validity rating during the pilot study. It was validated with assistance from a specialist in Early Childhood Education and the County Public Health Officer in charge of the school health programme.

The researcher adopted a power formula to calculate the sample size for the comparison groups (Wang, 2020). The power analysis ensures that the study has an adequate statistical power to detect meaningful effects or differences, if they exist.

Assumptions made were as follows:

- Significance Level (α): 0.05 (2-tailed) (95% Confidence Interval). It corresponds to $Z_{\alpha/2}$ of 1.96 (on the table)
- Statistical Power ($1 - \beta$): 0.80 (80% power to detect an effect). It corresponds to $Z_{\beta/2}$ of 0.84 (Ryan, 2013).
- Effect Size (d): 0.40. [In studies assessing knowledge shifts in school pupils, a medium effect size (d of 0.40) is the standard expectation] (Cohen, 1988).

The researcher calculated the sample size and thereafter made some adjustments to cater for school absenteeism (expected attrition)

Using the formula, simplified using Cohen's d :

$$n = \frac{2 (Z_{\alpha/2} + Z_{\beta/2})^2}{d^2}$$
$$n = \frac{2 (1.96 + 0.84)^2}{0.40^2}$$
$$= 98 \text{ (Approximately 100 study participants)}$$

Adjustments were made to cater for school absenteeism (expected attrition) using the following formulae:

$$n_{adj} = n / (1-R)$$
$$n_{adj} = 100 / (1-0.2)$$
$$= 125 \text{ study participants}$$



The researcher employed a purposive sampling strategy to select Bunyala Central Ward out of the 4 wards in the sub-county, from which 2 primary schools were purposively selected. The purposive selection of Bunyala Central Ward was justified by its unique ecological and epidemiological profile, characterised by low-lying topography within the River Nzoia delta. The ward experiences seasonal flooding and waterlogging, which foster breeding conditions for aquatic snails, the intermediate hosts for SCH. The selection targeted schools that had no prior or ongoing exposure to health education interventions on the common NTDs. This safeguards the study's internal validity by ensuring an uncontaminated baseline for evaluating the intervention's efficacy.

A proportionate sampling method was used to determine the number of pupils in the selected schools based on their enrolment. Thereafter, the quota sampling technique was employed to select the number of pupils by grade and gender to ensure equal representation of study participants. Lastly, the simple random sampling method was employed to select pupils who participated in the study. The data collected using structured questionnaires were processed with the Statistical Package for the Social Sciences (SPSS) version 26.0 and analysed using a paired-samples t-test to assess the mean differences between the pre-test and post-test data.

The researcher sought clearance from Masinde Muliro University of Science and Technology, Directorate of Postgraduate Studies (DPS) and Institutional Scientific and Ethics Research Committee (ISERC). Later, the researcher applied for a research licence from the National Commission for Science, Technology and Innovation (NACOSTI). Thereafter, the researcher sought clearance from the Busia County Commissioner's office, the County Education Office, the Sub-County Education Office, and the school head teachers before carrying out the study. Copies of the authorisation letters from the County Commissioner's office and the County Education office were provided to the head teachers for their records. The researcher then sought consent from the caregivers (Parents/guardians and teachers). A consent form was provided to the caregivers detailing the purpose of the study, the procedure, voluntary participation, right to withdraw, confidentiality and anonymity, risk and benefit, contact information and the estimated duration. With assistance from the trained research assistants, the assent form was explained to the study participants (pupils) verbally in simple terms, and they were given the opportunity to ask questions. Assent was sought from the pupils themselves. The researcher adhered to the principles of research ethics while carrying out the study.

Results

Demographic Characteristics of Study Participants

The researcher collected demographic data to characterise the study participants. The study participants comprised a total of 125 pupils, distributed relatively evenly between School 1 (51.2%) and School 2 (48.8%). In terms of gender composition, female pupils represented a slight majority at 52.0%, while male pupils accounted for 48.0%; and the majority of the participants were Christian (96.0%). Grade distribution across the sample was well-balanced, with grade 5 accounting for 36.0%, grade 6 at 32.8% and grade 4 at 31.2%. Over half of the pupils fell within the age bracket of 11 to 12 years (51.2%), while 33.6% were aged 13 years and above, and 15.2% were between 9 and 10 years old. Table 1 shows the results



Table 1: Demographic Characteristics of Study Participants

| Variable | Description | Frequency (%) |
|----------|--------------|---------------|
| School | School 1 | 64 (51.2) |
| | School 2 | 61 (48.8) |
| Gender | Female | 65 (52.0) |
| | Male | 60 (48.0) |
| Religion | Christian | 120 (96.0) |
| | Muslim | 5 (4.0) |
| Grade | Grade 4 | 39 (31.2) |
| | Grade 5 | 45 (36.0) |
| | Grade 6 | 41 (32.8) |
| Age | 9 - 10 | 19 (15.2) |
| | 11 - 12 | 64 (51.2) |
| | 13 and above | 42 (33.6) |

Descriptive Statistics

Descriptive statistics were conducted; the results demonstrated an upward shift in pupils’ knowledge levels from pre-test to post-test across various categories, particularly on the causes and mode of transmission of the diseases. For instance, regarding the cause of Schistosomiasis (SCH), the most frequent score shifted from 3 in the pre-test (41.6%) to 4 in the post-test (37.6%). A similar positive trend was evident in the overall knowledge of the causes of the diseases, where the proportion of participants achieving higher marks (scores 8 through 10) noticeably increased (21.6% and 16.0%) after the intervention. Furthermore, overall knowledge of the mode of transmission showed clear improvements, with a distinct shift toward higher knowledge brackets, including the emergence of a higher score of 17 (2.4%) that was absent during the pre-test. Interestingly, the results revealed that pupils’ knowledge of the mode of transmission of Soil-Transmitted Helminths (STH), prevention of SCH, prevention of STH and overall prevention of the diseases remained static between the pre-test and post-test, indicating no measurable change. The results are shown in Table 2:

Table 2: Descriptive Statistics

| Knowledge | Scores | Pre-test | Post-test |
|---------------|--------|---------------|---------------|
| | | Frequency (%) | Frequency (%) |
| Cause of SCH | 0 | 2 (1.6) | 0 (0) |
| | 1 | 12 (9.6) | 2 (1.6) |
| | 2 | 33 (26.4) | 29 (23.2) |
| | 3 | 52 (41.6) | 34 (27.2) |
| | 4 | 20 (16.0) | 47 (37.6) |
| | 5 | 6 (4.8) | 13 (10.4) |
| Cause of STH | 1 | 3 (2.4) | 0 (0) |
| | 2 | 22 (17.6) | 8 (6.4) |
| | 3 | 39 (31.2) | 38 (30.4) |
| | 4 | 39 (31.2) | 47 (37.6) |
| | 5 | 22 (17.6) | 32 (25.6) |
| Overall Cause | 2 | 1 (0.8) | 0 (0) |
| | 3 | 3 (2.4) | 0 (0) |
| | 4 | 15 (12.0) | 4 (3.2) |
| | 5 | 24 (19.2) | 13 (10.4) |
| | 6 | 26 (20.8) | 23 (18.4) |
| | 7 | 30 (24.0) | 34 (27.2) |



| | | | |
|----------------------|----|-----------|-----------|
| | 8 | 18 (14.4) | 27 (21.6) |
| | 9 | 7 (5.6) | 20 (16.0) |
| | 10 | 1 (0.8) | 4 (3.2) |
| SCH Transmission | 1 | 2 (1.6) | 0 (0) |
| | 2 | 9 (7.2) | 0 (0) |
| | 3 | 21 (16.8) | 13 (10.4) |
| | 4 | 51 (40.8) | 39 (31.2) |
| | 5 | 29 (23.2) | 53 (42.4) |
| | 6 | 10 (8.0) | 11 (8.8) |
| | 7 | 2 (1.6) | 7 (5.6) |
| | 8 | 1 (0.8) | 2 (1.6) |
| STH Transmission | 4 | 1 (0.8) | 1 (0.8) |
| | 5 | 3 (2.4) | 3 (2.4) |
| | 6 | 14 (11.2) | 14 (11.2) |
| | 7 | 16 (12.8) | 16 (12.8) |
| | 8 | 26 (20.8) | 26 (20.8) |
| | 9 | 42 (33.6) | 42 (33.6) |
| | 10 | 23 (18.4) | 23 (18.4) |
| Overall Transmission | 7 | 2 (1.6) | 0 (0) |
| | 8 | 4 (3.2) | 0 (0) |
| | 9 | 1 (0.8) | 0 (0) |
| | 10 | 9 (7.2) | 7 (5.6) |
| | 11 | 25 (20.0) | 14 (11.2) |
| | 12 | 13 (10.4) | 20 (16.0) |
| | 13 | 42 (33.6) | 31 (24.8) |
| | 14 | 16 (12.8) | 31 (24.8) |
| | 15 | 9 (7.2) | 11 (8.8) |
| | 16 | 4 (3.2) | 5 (4.0) |
| | 17 | 0 (0) | 3 (2.4) |
| SCH Prevention | 1 | 13 (10.4) | 13 (10.4) |
| | 2 | 4 (3.2) | 4 (3.2) |
| | 3 | 13 (10.4) | 13 (10.4) |
| | 4 | 28 (22.4) | 28 (22.4) |
| | 5 | 67 (53.6) | 67 (53.6) |
| STH Prevention | 1 | 10 (8.0) | 10 (8.0) |
| | 2 | 6 (4.8) | 6 (4.8) |
| | 3 | 8 (6.4) | 8 (6.4) |
| | 4 | 16 (12.8) | 16 (12.8) |
| | 5 | 30 (24.0) | 30 (24.0) |
| | 6 | 55 (44.0) | 55 (44.0) |
| Overall Prevention | 2 | 5 (4.0) | 5 (4.0) |
| | 3 | 3 (2.4) | 3 (2.4) |
| | 4 | 4 (3.2) | 4 (3.2) |
| | 5 | 7 (5.6) | 7 (5.6) |
| | 6 | 7 (5.6) | 7 (5.6) |
| | 7 | 5 (4.0) | 5 (4.0) |
| | 8 | 10 (8.0) | 10 (8.0) |
| | 9 | 15 (12.0) | 15 (12.0) |
| | 10 | 24 (19.2) | 24 (19.2) |
| | 11 | 45 (36.0) | 45 (36.0) |



Assessment of Conventional WASH sensitisation

To evaluate the effectiveness of the conventional WASH sensitisation, a paired-samples *t*-test was conducted to compare the pretest and post-test scores on knowledge of disease causation, transmission modes, and prevention for Schistosomiasis (SCH) and Soil-Transmitted Helminths (STH).

The statistical analysis revealed significant positive shifts in pupils' understanding of disease causation. Knowledge regarding the causes of SCH increased significantly from pretest to post-test, showing a mean gain of 0.57 points ($t(124) = -4.68, p < .001, 95\% \text{ CI } [-0.81, -0.33]$). Similarly, a statistically significant improvement was observed in knowledge on the causes of STH, with a mean score increase of 0.38 points ($t(124) = -3.04, p = .003, 95\% \text{ CI } [-0.63, -0.13]$). The overall cumulative knowledge score on the cause of NTD demonstrated a highly significant, robust improvement, with a mean increase of 0.95 points ($t(124) = -5.45, p < .001, 95\% \text{ CI } [-1.30, -0.61]$).

The WASH sensitisation yielded divergent results on the mode of transmission of the diseases. Pupils' knowledge of SCH transmission pathways increased significantly, with a mean score improvement of 0.62 points ($t(124) = -4.42, p < .001, 95\% \text{ CI } [-0.89, -0.34]$). Conversely, there was no measurable change in knowledge on STH transmission pathways; pretest and post-test scores were identical, yielding a mean difference of 0.00. Despite this static, the overall composite score for general modes of transmission showed a statistically significant mean increase of 0.62 points ($\square, \square, \square$), an effect driven largely by gains in SCH-specific transmission knowledge.

In contrast to the cognitive improvements observed in the knowledge of the cause and mode of transmission, the WASH sensitisation had no immediate statistical effect on knowledge of the prevention of the diseases. The paired-samples *tt*-tests indicated static knowledge of parameters for SCH prevention practices ($t(124) = 0.00, p = 1.000, 95\% \text{ CI } [-0.34, 0.34]$) and STH prevention practices ($t(124) = 0.00, p = 1.000, 95\% \text{ CI } [-0.38, 0.38]$). Consequently, the overall cumulative prevention practices score across both conditions remained unchanged between pretest and post-test scores ($t(124) = 0.00, p = 1.000, 95\% \text{ CI } [-0.65, 0.65]$). The results are shown in Table 3:

Table 3: Paired t-test Results on Conventional WASH Sensitisation

| Variable (Knowledge) | Mean | Std. Deviation | 95% CI of the Difference | | t | P-Value |
|-------------------------|------|----------------|--------------------------|-------|--------|---------|
| | | | Lower | Upper | | |
| Cause of SCH | .568 | 1.358 | -.808 | -.328 | -4.676 | <.001 |
| Cause of STH | .384 | 1.413 | -.634 | -.134 | -3.038 | .003 |
| Overall on Cause | .952 | 1.955 | -1.298 | -.606 | -5.446 | <.001 |
| Transmission of SCH | .616 | 1.559 | -.892 | -.340 | -4.416 | <.001 |
| Transmission of STH | .000 | 1.636 | -.290 | .290 | .000 | 1.000 |
| Overall on Transmission | .616 | 2.195 | -1.005 | -.227 | -3.137 | .002 |
| Prevention SCH | .000 | 1.909 | -.338 | .338 | .000 | 1.000 |
| Prevention STH | .000 | 2.136 | -.378 | .378 | .000 | 1.000 |
| Overall Prevention | .000 | 3.646 | -.645 | -.645 | .000 | 1.000 |

Discussion

The post-test descriptive statistics indicated a clear improvement in pupils' knowledge of the causes and modes of transmission of both SCH and STH. This gain in knowledge aligns with the literature on NTDs, which demonstrates that structured health education campaigns, utilising tools such as pamphlets, infographics, or interactive lectures, are effective in reducing baseline misconceptions



about how these diseases are acquired (Bhelebana & Dube, 2020). Similar cluster-randomised and quasi-experimental trials globally mirror these findings, noting that targeted educational intervals successfully drive shifts in community understanding of disease lifecycles and vector exposure (Ojo et al., 2024). The rise in high scores on the overall knowledge of the cause and mode of transmission indicates that the educational material was successfully absorbed. However, the static results observed in the knowledge on prevention of both SCH and STH, and the mode of transmission of STH, highlight a persistent barrier known to public health researchers: the disconnect between disease recognition and actionable knowledge on disease prevention. In many endemic regions, individuals can readily identify the biological cause of an illness yet remain entirely unaware of the practical prevention protocols due to deeply ingrained cultural habits. This exactly mirrors findings of a study which noted that despite extensive school curricula, children frequently struggle to reconcile theoretical transmission knowledge with behavioural prevention (Okoyo et al., 2019).

The paired t-test statistical analysis of knowledge on SCH and STH demonstrates prominent deficits and instances of complete structural stagnation among the participants. The results indicated highly statistically significant deficits regarding knowledge of the cause of SCH, the cause of STH, and the transmission pathways of SCH. Most remarkably, the results revealed an absolute lack of change in knowledge on transmission of STH, prevention of SCH, prevention of STH, and overall prevention scores. These results reflect a combination of baseline patterns observed in poorly supported endemic regions alongside a distinct lack of empirical progress that contradicts successful modern integrated interventions.

The significant deficits observed in the baseline knowledge on the cause of diseases and mode of transmission echo a trend across several endemic regions globally. For instance, a cross-sectional study conducted in Kenya among vulnerable populations noted that while the participants had general knowledge of the disease, specific knowledge regarding the cause of urogenital schistosomiasis and biological transmission was scanty, often plagued by localised misconceptions (Lai et al., 2024). Similarly, a study evaluating health literacy on STH revealed that community health volunteers and local stakeholders exhibited poor baseline knowledge 70.47% regarding intestinal nematodes and their precise environmental transmission vectors (Narkkul et al., 2022). Furthermore, a study conducted in an endemic area of Alagoas, Brazil, on community perception of NTDs reported that knowledge of the causes of the diseases was low, with gaps persisting around preventive measures due to a lack of active public health programmes (Santos et al., 2023).

Conversely, the absolute flatlines and lack of variance in knowledge on the mode of transmission and prevention of the diseases strongly run counter to intervention studies where targeted health education has been deployed. A study conducted in Nigeria on schools linked to structural feeding and health programmes revealed that baseline knowledge was dynamic; when structured institutional platforms are present, high baseline knowledge and positive behavioural practices toward STH prevention are routinely observed (Obi et al., 2024). Additionally, a contemporary intervention assessment demonstrated that the deployment of innovative health education frameworks such as tailored edutainment and targeted visual infographics significantly altered student and caregiver knowledge profiles, yielding substantial post-intervention score increases ($p < .001$) across both transmission pathways and prevention techniques (Mindu et al., 2020). These findings demonstrate that metrics related to parasitic infection prevention are highly responsive and rarely exhibit absolute immobility under active public health strategies.



The convergence of severe knowledge deficits and total lack of statistical variance in knowledge on the prevention of both NTDs and knowledge on STH transmission points to several underlying environmental, programmatic, and methodological phenomena. In many endemic zones, public health strategies rely strictly on preventive chemotherapy, where albendazole and praziquantel drugs are distributed to individuals. While this successfully reduces the intensity of worm burdens, the lack of behavioural change communication (BCC) component leaves the population fundamentally unaware of how the infections are contracted and prevented, sustaining a permanent baseline effect in knowledge scores.

In addition, in highly marginalised settings, communities face a severe absence of WASH infrastructure. When individuals have no viable alternative to the infested open water bodies for domestic chores or lack proper sanitation facilities, theoretical prevention education is entirely disconnected from their lived realities. Consequently, standard surveys measuring knowledge on prevention encounter a localised dead end because the concepts cannot be rationalised.

The huge standard deviation values that exceeded the mean values indicate a high degree of data dispersion, variance, and sample heterogeneity (Fagerland, 2022; Field, 2024). Ultimately, these metrics indicate that knowledge on the cause of NTD, transmission and prevention is not uniform across the sample population, suggesting that a targeted educational approach may be required to bridge these individual knowledge gaps.

Conclusion

The findings of this study point to a significant gap between public health expectations and health literacy on SCH and STH. The analysis revealed statistically significant deficits in pupils' knowledge of the causes and modes of transmission of these parasitic infections. More critically, the absolute statistical stagnation on knowledge on prevention of both SCH and STH, and knowledge on STH transmission, underscores a complete flatline in localised health knowledge.

The severe deficits identified align closely with studies from other endemic regions where populations are left vulnerable due to inadequate local education, and the lack of variance in knowledge on prevention directly contradicts contemporary intervention literature, which demonstrates that targeted, visual, and engaging health strategies can rapidly transform community understanding.

Ultimately, these findings indicate that the current public health approach in the study area is inadequate. This provided empirical data on a single-group quasi-experimental study of lecture failures in a rural community. This strongly suggests that treating populations through mass drug administration campaigns without pairing them with interactive health education, or ignoring the structural sanitation limitations faced by the community, leaves the population unable to acquire or act on prevention literacy. The public health stakeholders should move beyond passive information dissemination and invest in active, community-tailored campaigns that are fundamentally supported by WASH infrastructure.

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