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Effect of Biology and Health Science Education on Hygiene Practices and Waterborne Disease Prevention among Secondary School Students in Oyo East Local Government Area, Oyo State

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Abstract
Water born diseases are a constant challenge to the population health among the secondary school students in Nigeria and especially in the rural regions with lack of water and sanitation facilities. This research investigated how the education of senior secondary students in Oyo East Local Government Area, Oyo State in Biology and other Health Science subjects affects hygiene practices and the prevention of waterborne diseases among students in the subject areas. Based on the Health Belief Model and Neo-Functionalist theory, the study sample was a descriptive survey of 510 students who were selected based on a multistage sampling technique in three randomly selected public secondary schools. Data were gathered through a validated researcher-created questionnaire (Cronbach 0.83) and analyzed using descriptive statistics, multiple linear regression and one-way ANOVA with a significance level of 0.05. Results showed that there was high level of hygiene practices among students (Grand Mean = 2.92), showing that Biology and Health Science instruction has a positive influence on health behavior. The multiple linear regression revealed statistically significant relationship between education quality, hygiene practices, and prevalence of waterborne diseases [F (2, 507) = 3.66, p = 0.027], with the education quality being a statistically significant independent predictor of lower disease rates (= -0.116, p = 0.009). Nevertheless, one-way ANOVA did not find a significant difference in academic absenteeism between disease burden levels [F (2, 507) = 0.008, p = 0.992], which suggested a uniform perceived academic impact across disease burden levels. The report finds that enhancement of science education quality is a feasible option of lessening the burden of waterborne diseases. It suggests the incorporation of realistic WASH literacy into the curriculum and the remediation of the infrastructural gaps in the school water and sanitation infrastructure.

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Keywords: Biology education, Health Science, hygiene practices, waterborne diseases, wash, secondary schools, Oyo State

Introduction

Economic growth, education and health are indivisible components of the national development. A country's ability to diversify its economy and sustain high productivity hinges on its human capital workers who are well educated, healthy, and driven to innovate (Hanushek & Woessmann, 2021; World Bank, 2020; Psacharopoulos & Patrinos, 2018) [13, 20]. In this landscape, STEAM education is pivotal empowering people with the problem-solving skills and health knowledge that fuel societal progress

(Belbase et al., 2022; Chisom et al., 2024) [7, 10]. In Nigeria, two obstinate hurdles stand on the path to these goals: mediocre STEAM education and incessant challenges to public health that particularly besiege school children in the rural and semi urban areas (WHO &UNICEF, 2019). These twin deficits create conditions in which preventable diseases, particularly waterborne illnesses, continue to thrive among school-aged populations. This intertwining of learning gaps and health burdens provides an interesting framework against which science instruction in schools can be explored as a way to prevent disease. Among the most severe outcomes of these public health crises are water-borne illnesses diarrhoea, typhoid fever, cholera, and other gastrointestinal infections that remain top killers of school-aged children across Nigeria (Adamu *et al*., 2022; Mike-Ogburia *et al*., 2024; Ugboko *et al*., 2021) [1, 17, 27]. The statistics given by WHO and UNICEF in 2019 are quite chilling: about 60 % of deaths attributed to diarrhea are due to the lack of adequate sanitation, unsafe water and lack of good hygiene habits. These drastic figures serve to highlight the urgency of the crisis, and to emphasize education based prevention as the most potent weapon to change the tide. Despite the wide recognition of schools as a central venue of influence over behavior (Wada *et al*., 2022; Shapu *et al*., 2021) [29, 24], the role of Biology and Health Science curricula in equipping students with hands on hygiene practices and disease prevention skills has received surprisingly little focus especially in the rural local government areas of Oyo State. In schools in Oyo State, researchers identified a disturbing trilogy of issues: limited access to safe water, weak sanitation facilities, and poor hygiene practices (Wada *et al*., 2022; Balogun-Adeleye *et al*., 2021) [29, 5]. Oyo East Local Government Area is a predominantly rural region in southwestern Nigeria's Oyo State. It struggles with sparse infrastructure, widespread low-income households, and limited access to essential water and sanitation services challenges that are especially severe in its rural and peri-urban communities. This is confirmed by Addie (2025) [2], who found that less than one in five public primary schools in Oyo State have adequate sanitation facilities, with student-to-toilet ratios exceeding 963:1 across local governments a finding that is deeply troubling. These desperate conditions foster spreading water-borne diseases, increasing absenteeism, losing classroom attention, and, ultimately, deteriorating learning outcomes. These realities, documented extensively across sub-Saharan African school settings (Bishoge *et al*., 2023; Sang *et al*., 2023) [8, 22], underscore the urgent need to examine whether the Biology and Health Science curriculum is truly equipping students with the knowledge and hygiene habits essential to manage and reduce waterborne disease burdens. Amidst these challenges, there is a conspicuous gap in empirical investigation of the effect of secondary school biology and health science curriculum on development of hygiene behavior and disease prevention outcomes among adolescents in this region. The majority of the research focuses on water and the availability of sanitation, and little has been done to explore the behavioral impact of formal science education (Amadu *et al*., 2023; Chirgwin *et al*., 2021) [4, 9]. Bridging this knowledge-to-practice gap is essential to unlock the potential of how learning can become real action, particularly in low-resource settings (Moemeke, 2023) [18]. This study thus investigates the role of the quality of Biology and Health Science instruction in determining the hygiene practices of students and how this helps in curbing water-borne diseases that relate better health outcomes with the growth of human capital and the overall push of Nigeria towards economic diversification (Federal Government of Nigeria, 2017) [11]. The study's theoretical backbone is the Health Belief Model (HBM), initially developed by Irwin M. Rosenstock in 1974 and later refined by Becker and colleagues, as the basis of the study inquiry. The HBM elucidates how individuals' beliefs and perceptions shape, explain, and predict health-related behaviors (Alsulaiman & Rentner, 2021; Jo et al., 2023) [3]. The model argues that people's chances of adopting preventive habits such as washing hands regularly or drinking treated water depend on how vulnerable they feel to illness, how severe they think the disease could be, the perceived benefits of taking action, and the barriers they see to changing their behavior (Rosenstock, 1974; Tareke & Tesfaye, 2022) [21, 25]. Biology and Health Science education is one of the most powerful catalysts found to be a key cue to action that sits at the core of the Health Belief Model and triggers health-protective behavior (Alsulaiman and Rentner, 2021; Tareke and Tesfaye, 2022) [3, 25]. By providing students with a clear comprehension of the water-borne illnesses and how to avoid them, one will empower students to gain a clear understanding of their own vulnerability, the benefits of proper hygiene, and the ability to change their habits accordingly (Bishoge *et al*., 2023; Shapu *et al*., 2021) [8, 24]. Through this, the Health Belief Model can be utilized to show how science education on the individual level can trigger behavioral change and result in improved health outcomes among secondary school students in Oyo East L.G.A. Although the Health Belief Model clarifies individual behavior shifts, this research also leverages Neo Functionalism to illuminate the wider systemic impacts of investing in science education. Neo Functionalism revolves around the concept of spillover, as coined by Ernst B. Haas in 1958 [12] and extended by the works of scholars, including Philippe Schmitter (1970) [23] and Leon Lindberg (1963) [15]. It contends that changes in one area would lead to growth in the related areas, which will create a chain of changes throughout the entire system. Using neo functionalism to apply to Nigeria, investing in biology and health science education will produce powerful spill-over benefits, such as better hygiene practices, reduced incidence of diseases, and enhanced human capital. These are reminiscent of multi sector research of Mamudu and Studlar (2009) [16] and are supported by the education returns research of Psacharopoulos & Patrinos (2018) [20] and Hanushek & Woessmann (2021) [13]. Across the globe, WASH initiatives have become a powerful answer to the relentless toll of waterborne illnesses, uniting national and international efforts to expand water access, improve sanitation, and spread hygiene education. The WHO/UNICEF Joint Monitoring Programme and UN-Water's Global Analysis and Assessment of Sanitation and Drinking Water (WHO, 2023b) continue to track progress and drive momentum in this vital arena. Enhancing science instruction in schools is widely acknowledged as a cornerstone of the global push toward Sustainable Development Goal 6 Clean Water and Sanitation (United Nations, 2023) [28]. In Nigeria, that global mandate becomes a pressing local call to action. In underserved districts such as Oyo East LGA, the lack of reliable WASH infrastructure and the shortfall in health science curricula together fuel a vicious cycle of water-borne illnesses that keeps school aged adolescents at risk. Examining how Biology and Health Science instruction

influences hygiene habits and disease outcomes in this setting is not only locally relevant it also aligns with Nigeria's national strategy to diversify its economy through human capital development (Federal Government of Nigeria, 2017) [11].

Statement of the Problem

Although Biology and Health Science are currently included in the secondary school curriculum in Nigeria, students in Oyo East Local Government Area remain at high risk of waterborne diseases. This chronic threat is attributed to ineffective water and sanitation facilities, low WASH literacy, and longstanding poor hygiene practices. Frequent sick leaves, poor academic achievement, and stunted human capital development are all byproducts of the conditions plaguing Nigerian schools factors that directly threaten the country's aspirations for economic diversification. Though studies have revealed that education in health can significantly increase the levels of hygiene awareness and preventive behavior, and other research has documented crippling gaps in infrastructure in rural schools, there is a dearth of information that integrates these strands. Specifically, there is a lack of strong evidence on whether the Biology and Health Science curriculum actually translates into improved hygiene behaviors and actual decreases in disease among the secondary school students in this context. The disconnect between intended curriculum content, actual student behavior, and the realities of their surroundings creates a critical knowledge gap. The proposed research is set to close that gap by examining the role played by Biology and Health Science teaching in shaping hygiene practices and assisting in reducing the burden of water-borne diseases among adolescents in Oyo East LGA.

Objectives of the Study

The specific objectives of this study were to:

1. Examine students' level of hygiene practices as an outcome of science education;
2. Determine the prevalence of waterborne diseases among secondary school students in Oyo East LGA;
3. Determine the relationship between science education quality, hygiene practices, and waterborne disease prevalence; and
4. Assess the effect of waterborne disease burden on student academic absenteeism as a human capital indicator.

Research Questions

The following research questions guided the study:

1. What is the level of hygiene practices among secondary school students in Oyo East LGA?
2. What is the effect of waterborne disease burden on student absenteeism and academic productivity?

Hypotheses

The following null hypotheses were tested at a 0.05 significance level:

H_{01}: There is no significant relationship between the quality of Biology and Health Science education, students' hygiene practices, and the prevalence of waterborne diseases among secondary school students in Oyo East Local Government Area.

H_{02}: Waterborne disease burden has no significant effect on student academic absenteeism among secondary school students in Oyo East Local Government Area.

Methodology

This study used a descriptive survey design, which collects snapshots of data of a representative grouping at one point in time. Through this, it essentially tested the relationship between the quality of education, the practice of hygiene and the rate of diseases without necessarily having to manipulate the experiments. The authors based their study on the whole sample of senior secondary (SSS1-SSS3) students in public schools in Oyo East LGA approximately 6,280 learners spread over nine schools. Using a multi-stage sampling approach, the schools were stratified and then three of them were randomly selected. Each selected school was sampled to come up with 170 students, which resulted in a strong sample of 510 students. These data were collected by a researcher devised questionnaire which was strictly tested by experts in the field. Participants responded on a four-point Likert scale Strongly Agree, Agree, Disagree, and Strongly Disagree and a mean score of 2.50 or higher signaled an adequate level of agreement. The instrument was validated by three experts in the field of Health and Science Education and reached a good level of Cronbachs alpha of 0.83 which is satisfactory. The research questions were addressed by performing a series of descriptive statistics frequencies, percentages, means and standard deviations to break down the data. In Section C, the prevalence of waterborne diseases was laid out, using it as the dependent variable that underpins the hypothesis testing framework. To test hypothesis H 0 1 a multiple linear regression was conducted and a one-way ANOVA was used to test hypothesis Ho_2. All inferential analyses were carried out at the conventional 0.05 significance level.

Result

Research Question 1: What is the level of hygiene practices among secondary school students in Oyo East LGA?

Table 1: Descriptive Statistics of Hygiene Practices among Secondary School Students (Section A)

S/N	Item	SA (4)	A (3)	D (2)	SD (1)	Mean	SD	% Agree	Decision
1	I wash my hands with soap and water before eating.	175	170	85	80	2.86	1.06	67.6%	High
2	I drink only treated or clean water while in school.	185	145	100	80	2.85	1.08	64.7%	High
3	I always use school toilet rather than open spaces.	165	155	120	70	2.81	1.04	62.7%	High
4	I properly dispose of waste during school activities.	205	125	90	90	2.87	1.13	64.7%	High
5	I maintain personal cleanliness as a daily hygiene habit.	265	125	80	40	3.21	0.97	76.5%	High
Section A Grand Mean						2.92	—		High

Source: Fieldwork 2026

Table 1 indicates that the level of hygiene practices among secondary school students in Oyo East LGA is remarkably high, with an average score of 2.92 (SD = 0.14) comfortably exceeding the mark of 2.50. The highest rated practice was maintenance of personal hygiene as a daily routine (Mean=3.21, 76.5 percent of agreement). Conversely, selection of school toilet facilities as opposed to open spaces received the lowest average score (Mean = 2.81). Board-wide, 67.2% of students reported they had adopted good hygiene practices indicating that Biology and Health Science courses are successfully increasing hygiene awareness, even in resource constrained environments.

Research Question 2: What is the effect of waterborne disease burden on student absenteeism and academic productivity?

Table 2: Descriptive Statistics of Waterborne Disease Effect on Absenteeism and Academic Productivity (Section D)

S/N	Item	SA (4)	A (3)	D (2)	SD (1)	Mean	SD	% Agree	Decision
15	I missed school days due to waterborne illness.	165	125	110	110	2.68	1.14	56.9%	High
16	Illness negatively affected my concentration.	205	145	90	70	2.95	1.06	68.6%	High
17	Students with waterborne diseases perform poorly.	265	125	70	50	3.19	1.01	76.5%	High
18	My academic performance declined due to illness.	225	145	80	60	3.05	1.03	72.5%	High
19	Absenteeism makes it hard to keep up with schoolwork.	185	165	110	50	2.95	0.98	68.6%	High
20	Improving water/sanitation would reduce absenteeism.	275	135	60	40	3.26	0.95	80.4%	High
Section D Grand Mean						3.01	—		High

Source: Fieldwork 2026

Table 2 reveals that students see a strong link between water-borne disease and both school absenteeism and productivity (Grand Mean = 3.01, SD = 0.19). The most rated point was the belief that improved water and sanitation facilities would reduce absenteeism (Mean = 3.26, 80.4% agreement), and it is essential to note that they were fully aware of how environmental conditions influenced the level of academic engagement. Notably, the scale of direct school day absenteeism caused by waterborne illness (Item 15) had the lowest average 2.68 (56.9%) but, nonetheless, exceeded the decision threshold, which underscores a perceived negative influence of waterborne disease on student attendance.

Test for Hypothesis

H_{01}: There is no significant relationship between the quality of Biology and Health Science education, students' hygiene practices, and the prevalence of waterborne diseases among secondary school students in Oyo East Local Government Area.

Table 3: Descriptive Statistics of Perceived Waterborne Disease Prevalence Dependent Variable Context for H_{01} (Section C)

S/N	Item	SA (4)	A (3)	D (2)	SD (1)	Mean	SD	% Agree	Decision
11	I experienced waterborne disease symptoms this term.	205	155	100	50	3.01	1.00	70.6%	High
12	Many students fall ill from water-related diseases.	185	125	120	80	2.81	1.09	60.8%	High
13	Water sources in my school are clean and safe.	125	155	150	80	2.64	1.02	54.9%	High
14	Poor sanitation contributes to disease spread.	245	145	80	40	3.17	0.96	76.5%	High
Section C Grand Mean						2.91	—		High

Source: Fieldwork 2026

Table 3 presents the descriptive profile of the dependent variable of hypothesis H 0 1 in students of hypothesis H 0 1 in perceived prevalence of waterborne diseases (Section C, grand mean = 2.91). The data show a very high degree of perceived risk: 70.6 % of the respondents confirmed that they experienced the symptoms of waterborne diseases themselves during the period of the study (Item 11, mean = 3.01). The lowest scoring question in the survey, which highlights the ongoing water-quality concerns in the face of strong hygiene awareness, is: Only 54.9- percent of respondents felt that the water supplies in the school were clean and safe (Item -13, Mean -2.64). This result justifies using the Section C composite scores as the dependent variable in the following regression analysis.

Table 4: Model Summary — Multiple Linear Regression of Education Quality and Hygiene Practices on Disease Prevalence

R	R^2	Adjusted R^2	Std. Error of Estimate
0.1192	0.0142	0.0103	0.5096

Source: Fieldwork 2026

Table 5: ANOVA Summary Table for Regression Model (H_{01})

Source	Sum of Squares	Df	Mean Square	F	p-value
Regression	1.8995	2	0.9497	3.6568	0.0265*
Residual	131.6765	507	0.2597	—	—
Total	133.5760	509	—	—	—

** p <.05*

Source: Fieldwork 2026

Table 6: Regression Coefficients — Predictors of Waterborne Disease Prevalence

Predictor	B (Unstd.)	Std. Error	Beta (β)	T	p-value	Sig.
Constant	3.2098	0.2046	—	15.69	0.0000	***
Education Quality (IV1)	-0.1306	0.0497	-0.1157	-2.6270	0.0089	**
Hygiene Practices (IV2)	0.0307	0.0473	0.0285	0.6478	0.5174	Ns

**** p <.001 | ** p <.01 | * p <.05 | ns = not significant*
Source: Fieldwork 2026

Tables 4-6 are a combination of all the results of the multiple linear regression analysis. Overall model was statistically significant (F (2, 507) = 3.66, p = 0.027), indicating that the predictors collectively accounted a significant portion of the variance. The combination of the two predictors explained 1.4 0.014 of the variation in the prevalence of the disease (R 2 0.014=0.010, Adjusted R 2 0.010=0.009), and hence the null hypothesis H 0 1 is rejected. Interestingly, Quality of Education was also a statistically significant variable (= -0.116, t= -2.63, p=0.009). Put simply, higher standards of Biology and Health Science education are associated with the decreased level of disease. Though the hygiene practices in isolation did not significantly predict the prevalence of water-borne diseases among secondary school students, the findings clearly highlighted a strong message; that the quality of formal health education is a much greater predictor of the curbing of water-borne diseases among students of secondary school than when the self reported hygiene practices are considered as individual predictors of the prevalence of water-borne diseases among secondary school students.

H_{02}: Waterborne disease burden has no significant effect on student academic absenteeism among secondary school students in Oyo East Local Government Area.

Table 7: Group Descriptive Statistics Absenteeism by Disease Burden Level

Disease Burden Group	N	Mean	Std. Deviation	Minimum	Maximum
Low	236	3.0134	0.4038	1.8333	3.8333
Medium	176	3.0104	0.4290	1.6667	4.0000
High	98	3.0170	0.3945	2.1667	4.0000
Total	510	3.0130	0.4116	1.6667	4.0000

Source: Fieldwork 2026

Table 8: One-Way ANOVA Summary Table — Effect of Disease Burden on Academic Absenteeism (H_{02})

Source of Variation	Sum of Squares	df	Mean Square	F	p-value	η^2
Between Groups	0.0028	2	0.0014	0.0082	0.9918	0.0000
Within Groups	86.1323	507	0.1699	—	—	—
Total	86.1351	509	—	—	—	—

Source: Fieldwork 2026

Table 9: Post-Hoc Tukey HSD Test — Pairwise Comparisons of Disease Burden Groups

Comparison	Mean Difference	Lower CI (95%)	Upper CI (95%)	p-adj
High vs Low	-0.0036	-0.1200	0.1128	0.9971
High vs Medium	-0.0066	-0.1287	0.1155	0.9912
Low vs Medium	-0.0030	-0.0995	0.0935	0.9971

All pair wise comparisons non-significant (p >.05)
Source: Fieldwork 2026

Tables 7–9 showcases the one-way ANOVA results that investigated whether the burden of waterborne disease influences academic absenteeism. There were no statistically significant differences between the low (n = 236), medium (n = 176), and high (n = 98) disease burden groups in either absenteeism rates [F(2, 507) = 0.008, p = 0.992; p > 0.05] or academic productivity scores. There was virtually no effect size ($\eta^2 = 0.000$), meaning that membership in a disease burden group accounted for almost none of the variation in scores for academic absenteeism. For this reason, we kept our null hypothesis H_{02}. Post-hoc Tukey HSD analyses showed that no combination of groups was significantly different from all other combinations. Interestingly, all of the groups reported an average score for absenteeism (around 3.01) and thus water borne disease was seen as a significant barrier to students' academic performance in general, irrespective of the degree of impact.

This finding implies that learners with waterborne diseases are not the only ones affected, but that this disorder equally affects the whole lot of learners irrespective of the severity of the illness.

Discussion of The Findings

The results of Research Question 1 show that secondary school students in Oyo East LGA are very committed to hygiene, as indicated by the grand mean of 2.92. This indicates that the teaching and learning of Biology and Health Science is helping to improve the knowledge and routine practice in the area of personal cleanliness of learners. Among all items, one on personal cleanliness maintenance received the highest score (Mean = 3.21), highlighting the extent to which formal science education teaches students how to maintain their personal cleanliness in the real world. The results are consistent with those of Bishoge et al. (2023)

[8] who found that school-based hygiene programmes have a dramatic effect on hand washing and sanitation practices in sub Saharan Africa. Similarly, targeted health education programs for adolescents in northern Nigeria was shown to significantly increase hygiene practice scores by Shapu et al. (2021) [24]. The low score for toilet use (Mean = 2.81) is reflective of the poor toilet infrastructure observed in Addie's 2025 [2] report on toilet use in Oyo State schools, which found less than 20 % of public schools had adequate toilet facilities; even the best behavior can not take root without the evidence of the best environment. The findings of Research Question 2 indicated that students were generally aware of the threat of waterborne diseases to their school attendance and academic performance with a high grand mean of 3.01. Interestingly, the endorsement of the highest magnitude "Enhancing water and sanitation will lower absenteeism" (Mean = 3.26, 80.4 % agreement) highlighted a high recognition of the direct link between water and sanitation and learning outcomes from students. The results corroborate the findings of Sang et al. (2023) [22] and Bishoge et al. (2023) [8] which indicated that poor sanitation and water-borne diseases are responsible for increase in school absenteeism in sub Saharan Africa. What was even more remarkable was that 72.5 % of learners stated that their performance was impacted directly by illness as a result of water related disease (Item 18), highlighting the significant human capital burden of water related disease in this context. There was a statistically significant relationship between the quality of instruction in Biology and Health Science, students' hygiene practices and the occurrence of water-borne diseases (H01 rejected; $F(2, 507) = 3.66$, $p = 0.027$). This effect was tested against a high baseline level of disease prevalence, reflected in the descriptive profile of disease prevalence (Section C Grand Mean = 2.91). Interestingly, the study revealed that the quality of higher education, in itself, was found to predict a lower disease prevalence ($\beta = -0.116$, $p = 0.009$). This indicates that the quality of biology and health sciences education not only helps bring about better hygiene but, also, lowers the burden of disease among students. The findings support the concept of the Health Belief Model, which states that knowledge provided as "cues to action" can motivate disease preventative behaviors (Rosenstock, 1974; Alsulaiman & Rentner, 2021) [21, 3]. The analysis indicates that the majority of the variation in disease prevalence is not captured by the model, implying a multi factorial nature of public health outcomes as explained by other factors like physical infrastructure, socioeconomic status, household hygiene etc. with R^2 value of only 0.014 (Tseole et al., 2022; Okesanya et al., 2024) [26, 19]. Indeed, no differences in absenteeism were observed between the disease burden categories (H_2: retained, $F(2, 507) = 0.008$, $p = 0.992$). On the face of it, this is a surprising finding and yet the data show that the students in the low, medium and high disease burden groups all report absentee rates around 3.01 on the scale. This uniformity implies that the sense of disease disruption of the academic process is an experience that is shared among students, even if their own health problems are more or less serious. This finding is consistent with Wada et al. (2022) [29] finding that being aware, or even just suspecting, the risk of a health condition in under resourced schools lowers academic engagement, even when the health condition is not actually present. Furthermore, the disease burden was estimated based on tertile cut-off values on a self reported scale and not on clinical diagnosis, which could account for the lack in significant difference between groups.

Conclusion

The present study aimed at investigating the impact of teaching and learning of Biology and Health Science on students' hygiene practices and protection against water-borne diseases in secondary schools in Oyo East Local Government Area of Oyo State. The findings showed excellent hygiene practices among students indicating the positive effect of systematic science education on behavior regarding health. Most importantly, a significant relationship was found: better quality education led to a decrease in the prevalence of water borne diseases. Students generally believed that water borne diseases affected attendance and performance in school, but the statistics did not show any significant difference between the groups with different disease burden indicating a uniform perception of the impact of health problems on school performance. These findings show that improving the quality of science education in schools is an important policy response to improve public health and adolescent human capital potential in a resource-limited context. The study therefore recommends curriculum planners, school leaders and health education partners to incorporate practical WASH literacy into the teaching of Biology and Health Science and at the same time, cater for the lack of infrastructure in water and sanitation in the school.

Recommendations

Based on the findings, the following recommendations are proposed:

1. Biology and Health Science teachers should adopt interactive, hands-on classroom practices including live demonstration, field projects and hygiene campaigns in Oyo East LGA and in Oyo State generally to reinforce the theory of WASH at school and make it come to life in the real world.
2. Curriculum planners and education policymakers should promote the water borne disease prevention and hygiene education in the lessons of Biology and Health science in secondary schools, which should be adapted to the realities of the rural environment of Oyo East L.G.A.
3. Improving WASH-levels in public secondary schools is both a behavioral and an infrastructural challenge; state and local governments should prioritize rebuilding and expanding WASH in public secondary schools since the behavioral benefits of health lessons are undermined by inadequate infrastructure and the students may already know what to do.
4. Future research should weave together objective clinical data on disease burden, observational checklists of hygiene practices, and self reported information. At the same time, investigators ought to probe how contextual factors such as the home environment, teacher training, and the school setting shape the link between the quality of science instruction and health outcomes.

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