

## RESEARCH

# Knowledge, perception and prevention of cholera among students in selected secondary schools in Okigwe Local Government Area, Imo State, Nigeria

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Cholera mainly spreads when people eat food or drink water that is contaminated with the *Vibrio cholerae* bacteria. This study looked into what secondary school students in the Okigwe Local Government Area, Imo State, Nigeria, know about cholera, how they view it, and the preventive steps they take. Researchers used a survey method, handing out structured questionnaires to 371 students from eight different schools. Data from the study shows that most students linked cholera spread mainly to poor hygiene, around 82% of them. Handwashing came up too as a big preventive method; about 58% saw it that way. But about half of the students didn't think that eating street food could make them sick with cholera. A lot of students knew the basics about cholera, but there are still big gaps in their knowledge, especially when it comes to how food can spread the disease. The study suggests that schools should improve their sanitation systems and start health education programs that are specific to certain groups. It also calls for more campaigns to raise awareness about how to stay safe, such as avoiding unsafe water and knowing the risks of eating street food. By addressing these knowledge gaps through focused information sessions on safe eating practices and hands-on demonstrations of water purification, cholera cases could be greatly reduced and overall students' health enhanced.

**Keywords:** cholera, knowledge, perception, prevention, hygiene, school students, Okigwe, public health

## Introduction

*Vibrio cholerae* is the bacterium that causes cholera (1). Vomiting and excessive watery diarrhea are the disease's primary symptoms (2). The main way that the disease is spread is by consuming tainted food and drinking water (1, 3). Furthermore, rapid dehydration and electrolyte imbalance can result from cholera-related vomiting and diarrhea (2). An estimated 1.3 million to 4.0 million cases of cholera and 21,000–1,43,000 fatalities from the disease

occur globally each year (1). The illness has a brief incubation period of hours to a few days (commonly up to 5 days), which increases the likelihood of an explosive epidemic pattern (2, 4). The fecal-oral route is how cholera is transmitted, either directly or indirectly, through contaminated food and water from environmental reservoirs; other routes (food, fomites, flies) have also been documented or discussed in the recent literature as possible contributors to transmission under particular circumstances (2, 5).

Cholera is still a major global public health concern and, more importantly, a signal of inadequate social infrastructure: lack of safe water, sanitation, and hygiene (1). The growing number of vulnerable groups living in unhygienic settings has been linked to the resurgence and persistence of cholera in many regions (6). Additionally, without timely and effective treatment, case fatality can be substantial; with prompt rehydration and appropriate care, the CFR falls to very low levels, but untreated severe cholera can be rapidly fatal (2, 4). Because of its epidemic potential and the ease with which food and water supplies can be contaminated, *V. cholerae* is also discussed in the public health and biodefense literature as a pathogen of concern for food and water safety and emergency preparedness (2).

The WHO reported very large numbers during the Yemen humanitarian crisis and subsequent epidemic waves (7, 8). However, global surveillance data substantially understate total incidence because many countries lack robust surveillance and laboratory confirmation capacity and because political/economic disincentives can reduce reporting (7, 9). Robust burden analyses and multi-country surveillance work have therefore been used to produce broader estimates and to underscore the need for better surveillance and targeted prevention (1, 6).

Although cholera has long been prevalent in parts of Asia, it is now firmly established (endemic) in many parts of Africa and has persisted in Haiti since the re-emergence in 2010 (6, 10). Endemicity in African sites has been shown by prospective multi-country surveillance and culture confirmation in several sentinel sites (6).

Outbreaks are common in Nigeria, where the bacterium regularly causes large, recurrent epidemics. National analyses and outbreak reports document major waves in 2010 and 2018 (and others since), with tens of thousands of cases and substantial mortality in some years; poor water and sanitation, seasonal rainfall/flooding, and use of surface water (ponds/hand-dug wells) are recurrent drivers (9, 11). In particular, the 2010 and subsequent epidemics illustrated how rainfall and flooding can carry sewage into wells and ponds used for drinking water, sharply increasing exposure risk among vulnerable populations (9, 11).

Since the 1970s, Nigeria has experienced repeated cholera waves, and multi-sectoral control measures (surveillance, case management, WASH activities, emergency response, and more recently, targeted oral cholera vaccine campaigns) have reduced case fatality in many settings; nevertheless, recurrence shows that sustained structural improvements and more targeted interventions are still needed (1, 9, 11).

Despite longstanding control efforts, gaps in epidemiological understanding (strain diversity, eco-epidemiology, and local transmission routes), surveillance, and community knowledge and practices continue to contribute to persistence and recurrence. Therefore, this study aims to highlight knowledge gaps related to cholera infection and control to inform more effective and targeted

prevention strategies among high-risk groups, for example, assessing cholera knowledge, perception, and prevention practices among secondary school students in Okigwe, Imo State, to better tailor health education and WASH interventions (9, 11).

Regarding knowledge and information access, disparities between better-resourced and less-resourced groups (the “haves” and “have-nots”) affect how well cholera prevention messages are received and acted upon; closing those gaps is an essential component of cholera control strategies that rely on behavior change and community engagement (1, 9).

## Objectives of the study

The specific objectives of the study are as follows:

1. To determine the level of knowledge of cholera among secondary school students in some selected secondary schools in Okigwe Local Government Area, Imo State.
2. To investigate the secondary school students' perception of transmission of cholera in some selected secondary schools in Okigwe Local Government Area, Imo State.
3. To examine the practices of preventive measures of cholera among secondary school students in some selected secondary schools in Okigwe Local Government Area, Imo State.

## Research questions

The research questions of the study are as follows:

1. What is the level of knowledge of cholera among secondary school students in some selected secondary schools in Okigwe Local Government Area, Imo State?
2. What are the perceptions of secondary school students regarding the transmission of cholera in some selected secondary schools in Okigwe Local Government Area, Imo State?
3. What are the practices of preventive measures for cholera among secondary school students in Okigwe Local Government Area, Imo State?

## Hypothesis

**H<sub>0</sub>:** There is no significant difference in the level of knowledge about cholera among students from different classes in selected secondary schools in Okigwe Local Government Area, Imo State, Nigeria.

## Literature review

Cholera is a serious diarrheal disease caused by the bacterium *Vibrio cholerae*. It is still a major threat to public health around the world (1). The World Health Organization (WHO) says that cholera is “a global threat to public health” and that it is a clear sign of poor sanitation and lack of development (1). In Nigeria, ongoing outbreaks are largely fueled by poverty and inadequate water, sanitation, and hygiene (WASH) conditions (12). For example, Eneh et al. (12) say that about 1.7 billion people in Sub-Saharan Africa, especially Nigeria, still get their water from sources that are contaminated with feces. This makes cholera spread more easily (12). The recent spike in cases in Nigeria (over 43,000 cases and 836 deaths in 2018) was linked to unsanitary living conditions and limited access to WASH facilities (9, 12). These insights emphasize the need for education and preventive measures to go hand in hand with improvements in infrastructure, like providing safe water and sanitation (1, 12).

## Knowledge of cholera

Surveys conducted in Nigeria and similar regions show a mixed understanding of cholera's causes, symptoms, and prevention methods. For instance, Okeke (13) discovered that out of 238 college students in Nigeria, only 20.2% were aware of how cholera is transmitted, and just 23.7% could identify key symptoms like diarrhea and vomiting. Alarmingly, 14% of these students, even though cholera was a spiritual illness, highlighted a significant level of misunderstanding (13). Okeke concluded that the overall knowledge and awareness of cholera prevention among students were quite lacking (13). On the other hand, a community survey in Ibadan revealed a more positive picture, with many respondents accurately identifying cholera as a disease and recognizing its symptoms (9). This indicates that knowledge levels can differ based on the population and their previous experiences. In a similar vein, Bekhit et al. (14) discovered that only roughly half of the respondents in six MENA countries knew enough about cholera, highlighting the fact that knowledge gaps continue even after major outbreaks. According to Amaechi et al. (15), 58.1% of pharmacists in Nigeria's healthcare sector demonstrated a good understanding of cholera, indicating that professionals with training typically have a higher level of awareness. Though there are still gaps, these studies generally indicate that exposure to outbreaks and formal education can improve knowledge. Importantly, having better knowledge about cholera often leads to improved hygiene practices; for example, Blankson and Ashie-Nikoi (16) found a strong positive link between students' understanding of cholera and their hygiene behaviors (16).

## Perception of cholera risk

Perception of personal risk and disease severity strongly influences preventive action. Recent Nigerian studies suggest that although many respondents view cholera as severe, personal susceptibility may be underestimated (9, 12). Following outbreaks, for instance, community surveys revealed that while perceived personal risk varied, perceived severity was high (9). People who don't feel at risk might not take precautions, so this mismatch—high perceived severity but low perceived susceptibility—is crucial. The necessity of targeted risk communication is further supported by other studies. For example, Eneh et al. (12) observe that control efforts in Nigeria have been hindered by a lack of basic knowledge about the causes of cholera, suggesting that a better understanding could change attitudes. Nigerian pharmacists' willingness to assist with outbreak response was demonstrated by their generally positive attitudes toward cholera management (15). Even among professionals, however, there are gaps: despite a positive general perception of the illness, Amaechi et al. (15) pointed out obstacles like a lack of formal training. In conclusion, research indicates that although cholera is dangerous to many Nigerians, personal risk is frequently underestimated, highlighting the need to increase community perception of vulnerability in addition to factual knowledge.

## Prevention and control practices

Cholera prevention hinges on a few key elements: safe water, sanitation, hygiene (often referred to as WASH), and education. Research indicates that many people lack sufficient knowledge about prevention methods, and their practices often fall short. For instance, in Okeke's college survey, while a significant number of students treated (69.6%) or covered (93.3%) their drinking water, the overall preventive practices were still deemed “unsatisfactory” (13), likely because of inconsistent behaviors. A similar study in Delta State found that schoolchildren also exhibited poor cholera prevention habits (11). In Imo State, Bosede et al. (17) compared WASH adherence in schools and discovered that even though public-school students had a solid understanding of WASH (87.1% awareness), only 55.7% practiced good hygiene. Alarmingly, more than half admitted to using open defecation due to insufficient school facilities (17). These findings clearly show the gap that often exists between what people know and what they do. International guidelines stress the importance of a comprehensive prevention strategy: organizations like UNICEF and WHO highlight that effective cholera control requires better water and sanitation infrastructure, hygiene promotion, surveillance, treatment, oral cholera vaccines, and community involvement (18). In Nigeria, control programs have attempted to tackle this issue by

combining media campaigns, hygiene education, and even mass vaccination with oral cholera vaccines in high-risk areas (9, 11). However, despite these initiatives, Usman (19) and Eneh et al. (12) point out that cholera prevention in Nigeria is still hampered by inadequate community education and WASH shortcomings (12, 19). These studies highlight how important it is for communities and schools to educate their students about prevention strategies, such as vaccination, safe water, handwashing, and ORS use. According to Blankson and Ashie-Nikoi (16), students' hygiene practices were considerably improved by having more knowledge about cholera. The literature that is currently available shows that although cholera awareness tends to increase following outbreaks or among more educated populations, many misconceptions and a low risk perception persist, especially among young people. Most KAP studies in Nigeria have focused on adults or the general population, which leaves out school-age kids. There are notable knowledge gaps as well as substantial knowledge potential, according to a few studies done in Nigerian schools (13, 17). Nevertheless, no studies have been conducted expressly to examine secondary school pupils' knowledge, attitudes, and preventative measures regarding cholera in Okigwe LGA, Imo State. Considering the ongoing cholera issues in Nigeria and the WASH challenges faced by schools in Imo (17), this study aims to fill that gap by exploring these important factors within a vulnerable youth demographic. Understanding what students know and how they feel about cholera will be essential for creating effective education and prevention programs in this community.

## Theoretical framework

Social psychologists Irwin M. Rosenstock, Godfrey M. Hochbaum, S. Stephen Kegeles, and Howard Leventhal of the U.S. Public Health Institute created the Health Belief Model (HBM). According to Rosenstock (20), it is a psychological paradigm that explains and forecasts people's potentially detrimental behaviors, attitudes, and beliefs toward their health. The HBM investigates how secondary school students in Okigwe, Imo State, perceive cholera, how much they know about it, and how to prevent it. It also looks at how the disease impacts their activities in the classroom and how they take preventative measures. Perceived susceptibility, which measures and analyzes the chance of developing a health issue, is one of the essential elements. The pupils' evaluation of the seriousness of cholera and its possible health effects is known as perceived severity. Students' evaluation of the worth or effectiveness of adopting health-promoting behaviors to lower their risk of cholera is known as perceived benefits. Conversely, perceived barriers characterize the obstacles to pupils' changes in behavior. Barriers may keep students from engaging in health-promoting behaviors, even if they feel that a certain activity will successfully

lessen the threat posed by a health condition. To put it another way, for behavior to change, the perceived advantages must exceed the perceived obstacles. Teachers and researchers may use these findings to create focused interventions that improve community cholera by addressing students' knowledge, attitudes, and preventative behaviors. Through the use of the HBM, this study advances culturally appropriate and evidence-based cholera prevention strategies in the community.

## Methodology

**Study Design:** The research employed a cross-sectional design, which involves gathering data from a sample of individuals, in this case, secondary school students from the Okigwe Local Government Area in Imo State, Nigeria, at a single point in time.

**Organization of the Study:** After Owerri and Orlu, Okigwe is the third-biggest city in Nigeria's Imo state. Nigeria's Okigwe Local Government Area (LGA) is where Okigwe is situated. The city is the closest to Nigeria's largest cattle market, which is situated in the Umu Nneochi Area of Abia State, and is situated between the Port Harcourt-Enugu-Maiduguri rail route. As a result, the city has developed into a significant cattle transit hub for Nigeria's Southeast and South subregions. According to the 2005 census, Okigwe has 1,32,237 residents. Immigrant laborers from other states make up the majority of the population. The former Imo State University (now Abia State University) was mostly located in Okigwe City. There are several historical and tourism attractions in Okigwe. Terrace agriculture is still practiced on Okigwe's mountainous farmlands, making it one of Nigeria's breadbaskets. The Roman Catholic Diocese of Okigwe is headquartered at St. Mary's Cathedral. In contrast to the former cattle market, which was moved to Abia, the Imo state government reopened a new one in the city in 2016.

The city is divided into six autonomous communities: Ezinachi, Ikigwu, Otanzu, Umulolo, Ihube, and Otan-Chara, each comprising several villages. The region's soil is a mix of red clay and dark brown soil, suitable for growing crops such as palm trees, cassava, and various vegetables. Okigwe experiences a warm climate throughout the year, with temperatures generally ranging between 58°F and 90°F. The wet season introduces increased humidity and occasional gloominess. Okigwe Local Government Area is home to approximately 20 secondary schools.

**Population of the Study:** The population of the study comprised all students of the various secondary schools involved in the study; the respondents were also willing to participate in the study as volunteers. According to the school secretaries, the total number of students in the selected secondary schools in the Okigwe Local Government Area is **6,405**.

**Sample Size:** The sample size for this study was calculated using the Slovin formula. When the total population of the research is known, the formula is used to calculate an acceptable sample size for the inquiry. The formula is as follows:

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

Where:

$n$  = the desired sample size

$N$  = the population size

$e$  = the acceptable sampling error (0.05)

1 = Constant

$$n = \frac{6,405}{1 + 6,405 (0.05)^2}$$

$$n = \frac{6,405}{1 + 16.0125}$$

$$n = \frac{6,405}{17.0125}$$

$$n = 376.48$$

As a result, this research involved around 377 students in total.

**Sampling Technique:** The study used a quota sampling method to choose participants. Specifically, it involved selecting 50% of the 15 secondary schools, equating to about 8 schools. The selected schools are Okwelle Secondary School, Holy Family Secondary School, Mercy Girls High School, Okigwe, Wesley College, Christ the King Grammar School, Okigwe, Federal Government College Okigwe, Bethany (Day) Secondary School, Iowa, Anglican Diocese of Okigwe South, and Queen of Apostles Girls Technical School. The total student population of 377 was distributed among these 8 schools, averaging around 47 students per school. Within each school, the number of students was further allocated across 6 classes, resulting in approximately 8 students per class. Stratified sampling was employed to divide the population into more homogeneous subgroups, or “strata,” based on specific characteristics. Random samples were then drawn from each stratum to ensure broad representation and reduce bias, enhancing the overall accuracy and reliability of the research outcomes.

**Instrument of Data Collection:** The data collection tool used in the study was a pre-tested questionnaire, comprising both open-ended and closed-ended questions. Administered by the researcher, this instrument ensured consistent data collection, as it was tailored for literate respondents. The closed-ended questions provided quantifiable data for definitive conclusions, while the open-ended questions offered insights into respondents’ genuine opinions on the subject. The questionnaire was designed with the study’s specific, measurable objectives in mind, aligning closely with the goals of the survey.

**Method of Data Analysis:** Quantitative data was processed using SPSS version 20.0. Descriptive statistics, including frequency distributions and percentages, were employed to summarize respondents’ socio-demographic characteristics and responses to substantive questions. Inferential statistics were subsequently applied to test the study’s null hypothesis using SPSS version 20.0.

## Results or findings

A total of 377 questionnaires were distributed to participants, with all were successfully delivered. The response rate was high, with 371 questionnaires returned, representing 98.4% of the total. Only six questionnaires were not returned, mainly due to non-response or irregular completion. The returned sample size of 371 is considered sufficient for drawing reliable and valid conclusions.

The sociodemographic details of the respondents utilized in this investigation are shown in [Table 1](#). The great majority of students in all schools are between the ages of 10 and 12, with the highest frequency occurring in Okwelle Secondary School and Federal Government College, where 24 students and 51.1% of the total population are in this age group. The age group over 18 years old had no frequency at all in the distribution.

In terms of ethnicity, the majority of students in all schools are Igbo, with 44 (93.6) attending Okwelle Secondary School, 45 (95.7) attending Holy Family Secondary School, 45 (95.7) attending Mercy Girls High School, 44 (93.6) attending Wesley College, 43 (91.5) attending Christ the King Grammar School, 42 (89.4) attending Federal Government College, 43 (93.6) attending Bethany (day) Secondary School, and 40 (95.2) attending Queen of Apostle Technical Schools. Yoruba and Hausa students were not as prevalent in the distribution.

47 individuals were randomly chosen for this study, and their class distribution was evenly spread throughout the schools to reach the 377-student sample size. Following the distribution of the 47 students across the 6 courses, the sample size of 47 students per class was divided by the number of classes, resulting in an approximate number of 8 students per class across all schools.

## Analyses of research questions

**Research question 1:** What is the level of knowledge of cholera among secondary school students in some selected secondary schools in Okigwe Local Government Area, Imo State?

[Table 2](#) sheds light on the knowledge of cholera among the students used for the study. Across the schools, it was observed that most of the students knew about cholera, but a significant portion admitted to lacking knowledge about it.

**TABLE 1** | Data on sociodemographic characteristics of respondents (*N* = 371).

Variables	Okwelle secondary school ( <i>N</i> = 47) (%)	Holy family secondary school ( <i>N</i> = 47) (%)	Mercy girls high school ( <i>N</i> = 47) (%)	Wesley college ( <i>N</i> = 47) (%)	Christ the king grammar school ( <i>N</i> = 47) (%)	Federal government college ( <i>N</i> = 47) (%)	Bethany (day) secondary school, Iowa ( <i>N</i> = 47) (%)	Queen of apostles girls technical ( <i>N</i> = 42) (%)
<b>Age</b>								
<i>Less than 10 years</i>	2 (4.3)	3 (6.4)	2 (4.3)	3 (6.4)	2 (4.3)	2 (4.3)	2 (4.3)	2 (4.8)
<i>10–12 years</i>	24 (51.1)	20 (42.6)	23 (48.9)	22 (46.8)	21 (44.7)	24 (51.1)	23 (48.9)	20 (47.6)
<i>13–15 years</i>	17 (36.2)	19 (40.4)	17 (36.2)	18 (38.3)	20 (42.6)	18 (38.3)	18 (38.3)	18 (42.9)
<i>16–18 years</i>	4 (8.5)	5 (10.6)	5 (10.6)	4 (8.5)	4 (8.5)	3 (6.4)	4 (8.5)	2 (4.8)
<i>Above 18 years</i>	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)
<b>Ethnicity</b>								
<i>Igbo</i>	44 (93.6)	45 (95.7)	45 (95.7)	44 (93.6)	43 (91.5)	42 (89.4)	43 (91.5)	40 (95.2)
<i>Yoruba</i>	3 (6.4)	2 (4.3)	2 (4.3)	3 (6.4)	4 (8.5)	5 (10.6)	4 (8.5)	2 (4.8)
<i>Hausa</i>	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)
<b>Class</b>								
<i>Js.1</i>	7 (14.9)	8 (17.0)	8 (17.0)	7 (14.9)	8 (17.0)	7 (14.9)	8 (17.0)	7 (14.9)
<i>Js.2</i>	8 (17.0)	7 (14.9)	8 (17.0)	7 (14.9)	8 (17.0)	8 (17.0)	7 (14.9)	7 (14.9)
<i>Js.3</i>	8 (17.0)	8 (17.0)	8 (17.0)	8 (17.0)	8 (17.0)	8 (17.0)	8 (17.0)	7 (14.9)
<i>Ss.1</i>	8 (17.0)	8 (17.0)	8 (17.0)	9 (19.1)	8 (17.0)	8 (17.0)	8 (17.0)	7 (14.9)
<i>Ss.2</i>	8 (17.0)	8 (17.0)	7 (14.9)	8 (17.0)	8 (17.0)	8 (17.0)	8 (17.0)	7 (14.9)
<i>Ss.3</i>	8 (17.0)	8 (17.0)	8 (17.0)	8 (17.0)	7 (14.9)	8 (17.0)	8 (17.0)	7 (14.9)

**TABLE 2** | Responses on knowledge of cholera among secondary school students.

Variables	Okwelle secondary school ( <i>N</i> = 47) (%)	Holy family secondary school ( <i>N</i> = 47) (%)	Mercy girls high school ( <i>N</i> = 47) (%)	Wesley college ( <i>N</i> = 47) (%)	Christ the king grammar school ( <i>N</i> = 47) (%)	Federal government college ( <i>N</i> = 47) (%)	Bethany (day) secondary school, Iowa ( <i>N</i> = 47) (%)	Queen of apostles girls technical ( <i>N</i> = 42) (%)
<b>Knowledge of cholera</b>								
<i>Yes</i>	30 (63.8)	25 (53.2)	28 (59.6)	32 (68.1)	27 (57.4)	29 (61.7)	26 (55.3)	23 (54.8)
<i>No</i>	17 (36.2)	22 (46.8)	19 (40.4)	15 (31.9)	20 (42.6)	18 (38.3)	21 (44.7)	19 (45.2)
<b>Cholera transmission</b>								
<i>Through the air</i>	5 (10.6)	4 (8.5)	6 (12.8)	3 (6.4)	7 (14.9)	5 (10.6)	4 (8.5)	6 (14.3)
<i>By touching contaminated surfaces</i>	15 (31.9)	12 (25.5)	14 (29.8)	10 (21.3)	16 (34.0)	13 (27.7)	15 (31.9)	12 (28.6)
<i>By consuming contaminated food and water</i>	40 (85.1)	39 (83.0)	43 (91.5)	44 (93.6)	38 (80.9)	42 (89.4)	40 (85.1)	38 (90.5)
<i>I don't know</i>	7 (14.9)	6 (12.8)	5 (10.6)	4 (8.5)	8 (17.0)	7 (14.9)	7 (14.9)	4 (9.5)
<i>Physical touch</i>	10 (21.3)	8 (17.0)	9 (19.1)	7 (14.9)	8 (17.0)	6 (12.8)	7 (14.9)	7 (16.7)
<b>Cholera symptoms</b>								
<i>Cholera</i>	45 (95.7)	44 (93.6)	45 (95.7)	46 (97.9)	43 (91.5)	44 (93.6)	42 (89.4)	40 (95.2)
<i>Fever</i>	20 (42.6)	18 (38.3)	19 (40.4)	21 (44.7)	22 (46.8)	20 (42.6)	19 (40.4)	18 (42.9)
<i>Cough</i>	8 (17.0)	10 (21.3)	9 (19.1)	7 (14.9)	8 (17.0)	6 (12.8)	10 (21.3)	7 (16.7)
<i>Vomiting</i>	40 (85.1)	41 (87.2)	42 (89.4)	44 (93.6)	41 (87.2)	40 (85.1)	40 (85.1)	39 (92.9)
<i>Dehydration</i>	43 (91.5)	42 (89.4)	44 (93.6)	46 (97.9)	42 (89.4)	43 (91.5)	41 (87.2)	41 (97.6)

Most of the students identified contaminated food and water as the primary mode of transmission. But some of the students believed that cholera could be contracted through the air, physical touch, or by touching contaminated surfaces.

As regards the symptoms, the majority of the students identify cholera, vomiting, and dehydration as symptoms of cholera. Other symptoms, like fever and cough, were not considered symptoms, with only a few students stating that it is.

**Research question 2:** What are the perceptions of secondary school students regarding the transmission of cholera in some selected secondary schools in Okigwe Local Government Area, Imo State?

The data from **Table 3** sheds light on the perceptions of cholera among students in the Okigwe Local Government Area, Imo State. A high number of students (40.4%–53.2%) believed that cholera can be contracted through person-to-person contact, while a lesser percentage (17%–23.4%) were not sure, and a percentage of 31.9%–38.3% did not agree. A large number of students (53.2%–68.1%) recognized eating street food as a mode of transmission, although 12.8%–21.3% were not sure, and 19.1%–29.8% did not agree.

The vast majority of students identified poor sanitation as a reason for contributing to the spread of cholera, with a small number not certain about it and about 14.9% disagreeing. To throw more light, 74.5%–87.2% believed proper handwashing can prevent cholera, while 6.4%–12.8% were not sure or did not agree.

**Research question 3:** What are the practices of preventive measures of cholera among secondary school students in Okigwe Local Government Area, Imo State?

The study examined the preventive measures used by secondary school pupils in Imo State's Okigwe Local Government Area. According to the results, between 38.3% and 47.6% of pupils knew that washing your hands is an important preventative measure. In contrast, between 27.7% and 34.0% of respondents stated that avoiding raw seafood is the main way to prevent cholera, whereas 5.5%–34.0% answered that vaccination was the cause. 38.3%–46.8% of respondents cited access to clean water as a preventative strategy, while 53.2%–63.8% agreed that a mix of these tactics was effective.

38.3%–47.6% of respondents reported regularly washing their hands, 53.2%–63.8% reported practicing effective sanitization, 21.3%–33.3% engaged in sari-filtration, and 40.4%–47.6% reported receiving immunizations.

## Test of hypothesis

**H<sub>0</sub>:** There is no significant difference in the level of knowledge about cholera among students from different classes in selected secondary schools in Okigwe Local Government Area, Imo State, Nigeria.

Analysis of Variance (ANOVA) results show no significant variation in cholera knowledge levels between different student classes in the secondary schools of the Okigwe Local Government Area, Imo State. The *F*-statistic yielded a value

**TABLE 3 |** Distribution of responses on perception of cholera transmission among secondary students.

Variables	Okwelle secondary school (N = 47) (%)	Holy family secondary school (N = 47) (%)	Mercy girls high school (N = 47) (%)	Wesley college (N = 47) (%)	Christ the king grammar school (N = 47) (%)	Federal government college (N = 47) (%)	Bethany (day) secondary school, Iowa (N = 47) (%)	Queen of apostles girls technical (N = 42) (%)
<b>Cholera transmission through person-to-person contact</b>								
Yes	23 (48.9)	19 (40.4)	20 (42.6)	25 (53.2)	22 (46.8)	20 (42.6)	21 (44.7)	18 (42.9)
No	15 (31.9)	18 (38.3)	16 (34)	14 (29.8)	15 (31.9)	17 (36.2)	16 (34)	15 (35.7)
Not sure	9 (19.1)	10 (21.3)	11 (23.4)	8 (17)	10 (21.3)	10 (21.3)	10 (21.3)	9 (21.4)
<b>Cholera transmission through eating street food</b>								
Yes	30 (63.8)	25 (53.2)	28 (59.6)	32 (68.1)	29 (61.7)	26 (55.3)	27 (57.4)	23 (54.8)
No	10 (21.3)	14 (29.8)	12 (25.5)	9 (19.1)	11 (23.4)	13 (27.7)	12 (25.5)	11 (26.2)
Not sure	7 (14.9)	8 (17)	7 (14.9)	6 (12.8)	7 (14.9)	8 (17)	8 (17)	8 (19)
<b>Poor sanitation contributes to cholera spread</b>								
Yes	35 (74.5)	30 (63.8)	33 (70.2)	36 (76.6)	34 (72.3)	31 (66)	32 (68.1)	28 (66.7)
No	8 (17)	10 (21.3)	9 (19.1)	7 (14.9)	8 (17)	10 (21.3)	9 (19.1)	9 (21.4)
Not sure	4 (8.5)	7 (14.9)	5 (10.6)	4 (8.5)	5 (10.6)	6 (12.8)	6 (12.8)	5 (11.9)
<b>Proper handwashing prevention of cholera transmission</b>								
Yes	40 (85.1)	35 (74.5)	38 (80.9)	41 (87.2)	39 (83)	36 (76.6)	37 (78.7)	33 (78.6)
No	4 (8.5)	6 (12.8)	5 (10.6)	3 (6.4)	4 (8.5)	5 (10.6)	5 (10.6)	5 (11.9)
Not sure	3 (6.4)	6 (12.8)	4 (8.5)	3 (6.4)	4 (8.5)	6 (12.8)	5 (10.6)	4 (9.5)

of 0.00.00.0, while the  $p$ -value was recorded at 1.01.01.0, both of which exceed the typical significance threshold of 0.050.050.05. The variations found in cholera knowledge between different class groups probably result from random chance rather than real differences in knowledge levels.

The mean knowledge score for all class groups based on “Yes” responses stood at 28.528.528.5. The small variance between groups at 5.95.95.9 confirms that knowledge levels remain constant among various classes.

The research shows consistent cholera knowledge among all class groups, which suggests that health education efforts achieved similar results for each group. The consistency in knowledge may indicate that schools used a uniform approach for health education.

## Discussions

The socio-demographic features of students in specific secondary schools within the Okigwe Local Government Area differ in terms of age distribution, ethnicity, and class levels against the backdrop of findings from other community-based cholera knowledge studies (21, 22). Among the Okigwe schools, there is a preponderance of students within the ages of 10–12 years (42.6%–51.1% across schools), with smaller proportions of students aged 13–15 years (36.2%–42.9%) and 16–18 years (4.8%–10.6%). In some community assessments elsewhere, respondents were older and had broader life responsibilities, which affect health responsibility and awareness (21). The ethnic structure in Okigwe schools appears to be predominantly Igbo (89.4%–95.7%) with a minority of Yoruba students (4.3%–10.6%) and no Hausa students at all. This trend contrasts with demographic compositions reported in other Nigerian community studies and illustrates the local demographic contexts (22).

The class parallel shift across Okigwe schools suggests an even distribution, with 14.9%–19.1% of students enrolled at each class level from JSS1 to SS3. In contrast, some adult community surveys show a wider range of educational attainment, underscoring that the Okigwe sample is relatively younger and more homogeneous (21, 22). These differences in socio-demographic contexts highlight differing factors that affect cholera knowledge and perceptions for each group.

The assessment examines the level of knowledge of cholera among secondary school students in some selected secondary schools of the Okigwe Local Government Area, Imo State. With students from Holy Family Secondary School and Wesley College recording 53.2% and 68.1% awareness, respectively, the study findings point out that over half of the students in each school have some knowledge of cholera. This awareness level indicates the benefits of health education but also shows that knowledge gaps exist, considering that between 31.9% and 46.8% of the students indicated ignorance about the disease (22). Most students correctly identified

the consumption of contaminated food and water as the primary method of transmission, with the figure from Christ the King Grammar School being 80.9% and at Wesley College, 93.6%. Regardless of this awareness, airborne and surface contact pathways were still a concern, with 6.4%–34.0% misunderstanding the primary transmission route; such misperceptions about how cholera spreads have been observed in other community KAP studies (23, 24). Most of the schoolchildren grasped the disease as well as the symptoms, cholera, vomiting, and dehydration, with nearly all subjects estimating recognition of cholera to be between 89.4% and 97.9%. Nonetheless, fewer students identified fever or cough as symptoms, suggesting knowledge gaps in the broader symptomatology of cholera; clinical overviews note that acute watery diarrhea with profuse vomiting and rapid dehydration are the cardinal features of cholera and that fever may be absent, which can explain why fever is less consistently linked to cholera by respondents (2, 25).

Similar findings have been documented in other settings, including East Africa, where high recognition of core manifestations is sometimes paired with local misconceptions and inconsistent prevention behaviors (22, 23). Prevalent knowledge in Okigwe is not surprising given periodic health education and outbreak-response activities in endemic settings; however, the persistence of misperceptions even after messaging suggests that standard information alone may not fully correct entrenched beliefs and that educational materials must be tailored, repeated, and reinforced (24). Systematic reviews and program evaluations show that WASH and education activities can improve knowledge and reduce risk when they are contextually adapted and sustained, but a knowledge–practice gap often remains (22, 24).

Data in **Table 4** reflect opinions on cholera among secondary pupils from the Okigwe Local Government Area. Cholera is known by many students in different educational institutions; levels of knowledge range from 53.2% to 68.1%. Still, a worrying proportion of pupils, between 31.9% and 46.8%, lack a good knowledge of the disease, implying health-education gaps. This finding is consistent with broader KAP work that reports variable knowledge levels across semiurban and rural populations and highlights the role of education level and access to credible information in shaping correct understanding (21, 22). Awareness of how cholera spreads varied from 80.9% to 93.6% in different schools, but many students correctly recognized contaminated food and water as the major causes. Yet, there are still significant misunderstandings; for instance, some students mistakenly think cholera can be spread through the air (10.6%–14.9%), by physical contact (up to 21.3%), or by touching contaminated surfaces (up to 34.0%). These misconceptions highlight knowledge gaps that could lead to poor prevention practices; reviews of perceptions and myths around cholera in endemic areas document similar false beliefs (22). As symptoms of cholera, pupils generally

**TABLE 4** | Distribution of responses on practices of preventive measures of cholera among secondary school students.

Variables	Okwelle secondary school (N = 47) (%)	Holy family secondary school (N = 47) (%)	Mercy girls high school (N = 47) (%)	Wesley college (N = 47) (%)	Christ the king grammar school (N = 47) (%)	Federal government college (N = 47) (%)	Bethany (day) secondary school, Iowa (N = 47) (%)	Queen of apostles girls technical (N = 42) (%)
<b>Perceptions on preventing cholera</b>								
Access to clean and safe drinking water	22 (46.8)	18 (38.3)	19 (40.4)	21 (44.7)	22 (46.8)	20 (42.6)	19 (40.4)	18 (42.9)
Washing hands properly	20 (42.6)	18 (38.3)	22 (46.8)	19 (40.4)	20 (42.6)	21 (44.7)	22 (46.8)	21 (47.6)
Immunization	12 (25.5)	14 (29.8)	10 (21.3)	12 (25.5)	23 (34.0)	13 (27.7)	12 (25.5)	10 (23.8)
Avoiding uncooked seafoods	15 (31.9)	13 (27.7)	16 (34.0)	14 (29.8)	12 (25.5)	14 (29.8)	15 (31.9)	14 (33.3)
All of the above	25 (53.2)	27 (57.4)	30 (63.8)	28 (59.6)	30 (63.8)	27 (57.4)	28 (59.6)	25 (59.5)
<b>Practices in preventing cholera</b>								
Handwashing	20 (42.6)	18 (38.3)	22 (46.8)	19 (40.4)	20 (42.6)	21 (44.7)	22 (46.8)	21 (47.6)
Good sanitation	25 (53.2)	27 (57.4)	30 (63.8)	28 (59.6)	30 (63.8)	27 (57.4)	28 (59.6)	26 (61.9)
Sari-filtration	15 (31.9)	13 (27.7)	10 (21.3)	12 (25.5)	14 (29.8)	13 (27.7)	12 (25.5)	14 (33.3)
Immunization	20 (42.6)	21 (44.7)	19 (40.4)	20 (42.6)	22 (46.8)	19 (40.4)	20 (42.6)	21 (47.6)

identified cholera (91.5%–97.9%), vomiting (85.1%–93.6%), and dehydration (87.2%–97.9%) as significant signs, showing strong recognition of the clinical features that warrant urgent rehydration and referral (2).

The high levels of acceptance among students for early identification are encouraging and indicate readiness to seek help or adopt prevention behaviors when the messaging is clear. Although some knowledge of the core symptom spectrum is assumed, it is troubling that fewer students linked cholera with other, less typical or secondary complaints, such as joint pain (38.3%–46.8%) and cough (12.8%–21.3%), which implies some confusion or limited understanding of the full symptom range. This pattern of conflating syndromes has been observed in regional reviews and outbreak analyses, which emphasize the importance of clear, syndrome-based education (22, 23). Even though Okigwe's students exhibit good knowledge of the main cholera signs, their understanding, particularly concerning secondary symptoms and finer points of transmission, remains deficient.

These results highlight the need for better targeted health education. When we look at the understanding of cholera symptoms among secondary school students in the Okigwe Local Government Area, we see both awareness and knowledge gaps, as illustrated in Table 5. A significant number of students identified cholera, vomiting, and dehydration as the main symptoms. Clinical and public health guidance describe cholera as an acute diarrheal disease caused by *Vibrio cholerae* and emphasize dehydration and vomiting as primary clinical concerns; this concordance between clinical descriptions and student recognition supports early referral and rehydration efforts (2, 24). Over 90% of pupils at Mercy Girls High School (95.7%),

**TABLE 5** | ANOVA results table.

Metric	Value
F-statistic	0.0
p-value	1.0
Group mean	28.5
Group variance	5.9

Wesley College (97.9%), and Federal Government College (93.6%) recognized cholera, indicating pockets of especially high awareness. Vomiting was widely acknowledged, and dehydration was recognized by more than 87% of students at some schools, indicating solid awareness of the dangers posed by cholera (24, 25).

While some symptoms were recognized less frequently, such as fever, only about 42.6% of students at Okwelle Secondary School and 38.3% at Holy Family Secondary School were aware of it; this aligns with clinical literature noting that fever is not a cardinal feature of cholera and may therefore be omitted by respondents when asked what constitutes cholera (2). Cough was also noted by some pupils, even though it is not usually linked to cholera; these observations suggest occasional conflation of symptoms from other endemic illnesses with cholera, underscoring the need for clearer syndrome-based education (22, 23). The differences in how signs were identified among schools could indicate differential access to information, variation in the content and quality of health education, or differing intensity of prior outreach during outbreaks. For instance, students at Mercy Girls High School and Wesley College who showed higher recognition may have benefited from more

effective school-based or community outreach initiatives; program guidance and evaluations indicate that school-based communication and coordinated WASH activities can be instrumental during outbreaks and for prevention overall, though the impact on sustained behavior change is mixed and requires reinforcement (24).

Limitations are clear and firm. The sample is not representative of all adolescents in Okigwe LGA because only selected schools and classes were included, so findings are not generalizable beyond the sampled schools. The study used only self-reported responses, which introduced recall bias and social desirability bias that inflated reported awareness and recommended behaviors. The cross-sectional design prevents any causal inference and does not measure the durability of knowledge after interventions. The survey omitted objective behavioral and environmental measures (for example, direct observation of handwashing and water quality testing), so reported practices cannot be validated. Key confounders, household socioeconomic status, recent exposure to outbreak messaging, and prior school-based health programs, were not controlled for and influenced the observed differences between schools. The timing of data collection (season and concurrent local events) affected responses and limits temporal generalizability.

In conclusion, although secondary school students in Okigwe generally recognize cholera and its principal manifestations, important gaps remain in both recognition of less typical symptoms and in understanding transmission modes. These gaps could hinder timely care-seeking or the adoption of correct preventive actions. Strengthening school curricula to include clear, age-appropriate cholera education, sustaining community outreach, and coupling messaging with practical WASH improvements should help bridge the knowledge–practice gap and improve readiness to prevent and respond to cholera in this region (22, 24).

## Recommendations

The researcher would consequently provide the following recommendations in light of the findings:

### 1. **Boosting Health Education Programs in Schools:**

The objective of the school staff is to carry out their health education programs in such a way that the students are not only informed of the common symptoms of cholera but also the rare symptoms and by what ways the disease can be prevented. School leaders and teachers should include complete knowledge of cholera in the curriculum. Unlike before, the presenters should be holding workshops, seminars, or interactive sessions frequently because they are the venues that allow them to deal with the matter of prevention, the inside of the disease, and its control

in detail. The use of lively methods such as role-play, simulations, and quiz games is conducive to the students' acquisition of the new topics.

### 2. **Partnering with Health Authorities for Immunization Campaigns:**

Schools should make it a rule to extend their services by organizing local immunization campaigns regularly, not only to ensure the safety of children via vaccinations but also to carry the message through community involvement. They can share with stakeholders the data on these activities, the number of vaccines, health benefits, and the role of teachers in the process of immunization. They should see to it that the schools not only know the importance of vaccinating against cholera but that the schools are actually at the center of the campaign, with professionals being on-site as well as the vaccine to do this immediately.

### 3. **Improving Water and Sanitation Facilities:**

If schools can provide the students with clean and safe drinking water, proper sanitation facilities would also go a long way in averting cholera infection. In this regard, both school management and government agencies have indispensable roles to play. School management not only has to keep checking but also make sure that water and sanitation facilities are not contaminated and are in working order. On the other hand, the government has to involve its financial and technical resources to support building and maintenance of infrastructure in schools, which are so fundamental.

### 4. **Conduct Health Awareness Programs Regularly:**

Noyewa et al. argued that schools should join hands with non-governmental organizations (NGOs) and community leaders to hold health education campaigns against cholera regularly. It is a shared duty for the NGOs, community leaders, and the school administration. First, several gay activists need to write and share educational materials such as brochures, posters, and videos that enlighten people on the various ways of preventing cholera. Second, the community leaders are to engage the community members in the school health campaigns and thus support the public health programs. Third, the school principals must open channels through which the NGOs can easily access the schools, and at the same time, they should encourage the students to participate in the awareness campaigns.

### 5. **Promoting Personal Hygiene Practices:**

The schools must take a very proactive stance in actively bringing to the fore and in advocating good personal hygiene practices among essential students, especially in handwashing, to cut down the incidence of the spread of cholera. Both teachers and parents play very important roles in this direction. In the classroom, teachers must do more than just illustrate an effective

technique for washing hands properly; they should also create handwashing stations for students to use. Furthermore, parents have to make certain that the information on hygiene comes across and is being followed at home by their children. Parents reinforce the children's home practice of good personal hygiene by ensuring that they are doing it regularly and that they are (26).

## Conclusion

The study on cholera awareness in some secondary schools in the Okigwe Local Government Area, Nigeria, unveils a state of positive awareness mingled with some grey areas that require improvement. The survey results break the ice in several aspects. The students are quite well-versed with the major symptoms of cholera, e.g., cholera, vomiting, and dehydration, which are experienced by many people, especially those living in developing countries. Of paramount importance is that such a perception of the problem may likely result in the students' quick reaction to cholera outbreaks and thus constitute a significant reduction of the incidence and mortality rate of the disease. The data demonstrates that the health education programs of the schools are effectively communicating the main facts about cholera symptoms and their prevention. A good example of this is that most of the students successfully executed the necessary preventive measures. In other words, this tells us that not only are students aware of the symptoms, but also they understand the need to take precautions; it is a good indication of their complete awareness of the disease. However, the research also reveals some gaps in knowledge, with fever being the least known as a symptom and the misunderstanding regarding the manner and prevention methods of cholera transmission, e.g., immunization and sari-filtration. These gaps point to the evidence that while the basic knowledge is there, there's a need for much more comprehensive education in all aspects of cholera that includes hidden symptoms and a wider variety of preventive measures.

What stands out from all of these studies is that health education should be something that is done constantly and that is at a deeper level, especially in places where access to information is restricted. Perhaps that's the reason why pharmacist Kufre Uwa's research findings show that there is a good level of awareness of cholera among secondary school students in Okigwe, most of whom, although a few don't seem inclined to do so, can recognize the ailment and make efforts to prevent it. Nonetheless, in order for students to be provided with a high level of empowerment in the fight against cholera, there should be health education initiatives that are to identify the gaps that have been found.

This would be associated with the integration of more comprehensive and regular health education programs into

the school syllabus, involving the description of both frequent and rare symptoms and restating the basic knowledge about the full, not just basic, spectrum of preventive measures. In this way, a more complete and across-the-board awareness and preparedness of these students would be achieved, consequently offering an improved public health status of the region. The discussion suggests that future researchers explore these gaps in more schools, use conversations to uncover why they persist, and test whether regular, integrated health lessons improve long-term knowledge and behavior. It also urges looking beyond knowledge to actual practices and environmental conditions, since both beliefs and surroundings ultimately shape cholera prevention.

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## Conflicts of interest

The authors declare that the research was conducted in the absence of any commercial or financial relationships that could be construed as a potential conflict of interest.

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