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ASSESSMENT OF KNOWLEDGE OF TOILET INFECTION PREVENTIVE MEASURES AMONG BOARDING SECONDARY SCHOOL STUDENTS IN NORTH EAST, NIGERIA

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Abstract

The study assessed the knowledge of toilet infection preventive measures among boarding secondary school students in North East, Nigeria. To achieve this purpose, descriptive survey research design was used. The population for this study was twenty-five thousand seven hundred and seventy-three (25,773) female students in boarding secondary schools across North-East Nigeria. The sample size of 378 was selected using multistage sampling procedures which include stratified, simple random, purposive, and proportionate sampling. The instrument for data collection was a structured questionnaire developed by the researcher. The instrument was pilot-tested using Cronbach Alpha and a 0.851 coefficient value was obtained. The Descriptive statistics of frequency and simple percentages were used to analyze the demographic characteristics of the respondents. The research question was answered using mean and standard deviation and inferential statistics of one-sampled t-test was used to test the stated hypothesis at a 0.05 level of significance. The result revealed that the knowledge of toilet infection preventive measures is significant ($t = 23.451$; $p = 0.000$). Based on the results, the study concluded that the boarding secondary school students in North East, Nigeria have knowledge of toilet infection preventive measures. Based on the conclusion, the study recommends the need for the school management to implement comprehensive educational programmes to reinforce and maintain the high level of knowledge among boarding secondary school students in North East, Nigeria regarding toilet infection preventive measures.

Keywords: Knowledge, Toilet Infection, Preventive Measures, Boarding School Students

Introduction

Toilet infections, often linked to poor sanitation and hygiene practices, remain a critical public health challenge, particularly in densely populated settings like boarding secondary schools. These infections, which include Urinary Tract Infections (UTIs), gastrointestinal diseases, and skin conditions, are exacerbated by inadequate access to clean water, improper waste management, and limited awareness of preventive measures (World Health Organization (WHO), 2024). In Nigeria, where boarding schools often face infrastructural deficits, the risk of toilet-related infections is heightened, necessitating urgent attention to students' knowledge and practices. This study focuses on boarding secondary school students in North East Nigeria, a region grappling with systemic healthcare and educational challenges, to assess their understanding of toilet infection prevention and its implications for health outcomes.

Globally, poor sanitation accounts for approximately 432,000 diarrheal deaths annually, with low- and middle-income countries bearing the highest burden (WHO, 2024). Healthcare-associated infections (HAIs), many of which originate from contaminated environments, affect millions worldwide, costing health systems billions annually (Puro, Coppola, Frasca, Gentile, Luzzaro, Peghetti & Sganga, 2022). The World Health Organization (WHO) emphasizes that 70% of HAIs can be prevented through basic water, sanitation, and hygiene (WASH) measures (WHO, 2024). In educational settings, shared toilet facilities often become hotspots for pathogen transmission, particularly where hygiene infrastructure is neglected (Abney, Bright, McKinney, Ijaz & Gerba, 2021). For instance, a 2024 WHO report highlighted that 40% of schools in developing nations lack handwashing facilities, directly contributing to the spread of infections (WHO, 2024).

In sub-Saharan Africa, inadequate sanitation affects over 70% of rural and peri-urban populations, with school-aged children disproportionately impacted. A 2023 study in Ghana revealed that 60% of school-based infections were linked to unsanitary toilets (Akanzum & Pienaah, 2023), while in Kenya, 55% of students reported recurrent UTIs due to poor facility maintenance (Sado et al., 2024). Similarly, a survey across six African nations found that only 30% of schools met WHO standards for student-to-toilet ratios, exacerbating cross-contamination risks (Melaku, Mengistie & Addis, 2023; Nlunda, Konde, YambaYamba & Kiyombo, 2023). These figures underscore the regional urgency of addressing toilet hygiene in educational institutions.

Nigeria faces severe sanitation challenges, with 47 million people practising open defecation and 70% of schools lacking functional handwashing stations (Ozibo, 2025). In North East Nigeria, protracted conflicts and underfunded infrastructure have worsened conditions. Federal Ministry of Water Resources (FMWR), Government of Nigeria, National Bureau of Statistics (NBS) and UNICEF (2022) reported that 80% of boarding schools in Borno State had dilapidated toilets, leading to frequent outbreaks of cholera and typhoid. Furthermore, a study in Anambra State revealed that 63% of students attributed recurrent abdominal pain to poor toilet hygiene, while 44% reported skin rashes from unsanitary facilities (Nwabueze, Azuike, Ezenyeaku, Aniagboso, Azuike, Iloghalu & Nwone 2014).

Effective preventive for toilet infection measures include regular cleaning of facilities, access to soap and water, proper waste disposal, and behavioural practices like handwashing after toilet use (Abdulrasaq et al., 2015; Amin et al., 2024; Berihun et al., 2022). Knowledge of preventive measures is often inconsistent. In Delta State, Nigeria, only 32% of rural students could correctly list handwashing steps, despite 75% claiming familiarity with hygiene concepts (Nwosu, Mmerem, Ozougwu, Nlewedim, Ugwa, Ugwunna, Nwosu & Ndu, 2024). Similarly, a study by El-Duah, Harris and Appiah-Brempong (2021) found that 65% of adolescents misunderstood the role of contaminated surfaces in pathogen transmission, conflating toilet infections with sexually transmitted infections (STIs). Prior research in Nigeria highlights disparities in knowledge and practice. For instance, a study by Onyedibe, Shehu, Pires, Isa, Okolo, Gomerep, Ibrahim, Igbanugo, Odesanya, Olayinka, Egah and Pittet (2020) revealed that 80% of students could name handwashing as a preventive measure but only 40% practised it consistently. In contrast, a 2018 survey in Maiduguri demonstrated that peer-led hygiene campaigns increased correct practices by 35% within six months (Habu, Emmanuel & Inuwa, 2018). Internationally, a systematic review of African schools linked structured hygiene education to a 50% reduction in absenteeism due to infections (Ismail et al., 2024).

Despite global and national guidelines, boarding schools in North East Nigeria remain vulnerable to toilet infections due to infrastructural neglect and insufficient health education. Preliminary observations by the researchers revealed that many students in secondary schools cannot describe proper toilet-cleaning protocols, and reported using shared towels, amplifying infection risks. Furthermore, few schools had functional handwashing stations, and health education curricula lacked practical hygiene modules. This study thus assessed the knowledge of toilet infection preventive measures among boarding secondary school students in North East, Nigeria.

Purpose of the Study

The purpose of this study was to assess the knowledge of toilet infection preventive measures among boarding secondary school students in North East, Nigeria.

Research Questions

What is the knowledge of toilet infection preventive measures among boarding secondary school students in North East, Nigeria?

Hypotheses

Knowledge of toilet infection preventive measures among boarding secondary school students in North East, Nigeria is not significant.

Methodology

The study adopted a descriptive survey research design, which enables the researchers to obtain the opinions of a representative sample of the target population—in this case, female students in public boarding secondary schools in North Eastern States, Nigeria. The total population for the study was 25,773 female students across six states: Adamawa, Bauchi, Borno, Gombe, Taraba, and Yobe. A multi-stage sampling technique was used to select a sample size of 378 respondents, following the Research Advisor's (2006) recommendation for a 95% confidence level with a 0.05 margin of error. The sampling process involved stratifying the states, randomly selecting three states, further dividing them into senatorial zones, and selecting schools based on purposive and proportionate sampling methods. A researcher-developed questionnaire titled "Assessment of Knowledge of Toilet Infection Preventive Measures among Boarding Secondary School Students (AKTIPMBSSSQ)" was used for data collection. The questionnaire had two sections: Section A covered demographic information, while Section B contained 15 items on knowledge of toilet infection preventive measures, using a 4-point Likert scale. The instrument's validity was confirmed by experts from Ahmadu Bello University, Zaria, and a pilot study was conducted in Benue State with 30 respondents to test reliability. Using the split-half method and Cronbach's Alpha coefficient, the instrument achieved a reliability score of 0.851, indicating strong internal consistency and reliability.

For data collection, an introductory letter from the Head of the Department of Human Kinetics and Health Education at Ahmadu Bello University, Zaria, facilitated access to schools. The researchers administered the questionnaire systematically, using class registers and an even-number sampling technique to ensure random selection. Data were retrieved immediately to prevent loss. The entire process lasted eight weeks. Data analysis was conducted using the Statistical Package for Social Sciences (SPSS), with descriptive statistics (frequency and percentages) for demographic variables and mean and standard

deviation to address the research question. The inferential statistic of a one-sample t-test was applied to test the hypothesis at a 0.05 level of significance.

Results

All data collected on the demographic characteristics of the respondents were tabulated using frequencies and percentages as indicated in Table 1.

Table 1: Demographic Characteristics of the Respondents

Variables		Frequency	Percentage (%)
Age Range in Years	13 – 15	63	16.7
	16 – 18	179	47.3
	19 – 21	77	20.4
	22 and above	59	15.6
	Total	**378**	**100.0**
Names of Schools	GSS, Mobi	50	13.2
	GSS, Michika	29	7.7
	GSS, Numan	32	8.5
	GGSS, Imburu	26	6.9
	GSS, Jalingo	33	8.7
	GSSSS, Nyabu Kata	25	6.6
	GGSSS, Wukari	25	6.6
	FGC, Wukari	34	9.0
	GSS, Damaturu	33	8.7
	GGC, Damaturu	30	7.9
	GSS, Potiskum	29	7.7
	GGSTC, Potiskum	32	8.5
	Total	**378**	**100.0**

Table 1 shows the demographic characteristics of the respondents. The table shows the age range and school distribution of the 378 respondents who participated in the study. Regarding age, the majority of the respondents 179 (47.3%) were in the 16-18 years age range, followed by 19-21 years 77 (20.4%), 13-15 years 63 (16.7%), and 22 years and above 59 (15.6%). This indicated that the sample was predominantly composed of late adolescent and young adult secondary school boarding students. In terms of the schools represented, the largest proportion of respondents 50 (13.2%) were from GSS, Mobi, followed by FGC, Wukari 34 (9.0%), GSS, Jalingo and GSS, Damaturu 33 (both 8.7%), GSS, Numan and GGSTC, Potiskum 32 (both 8.5%), GGC, Damaturu 30 (7.9%), GSS, Michika and GSS, Potiskum 29 (both 7.7%), GGSS, Imburu 26 (6.9%), and GSSSS, Nyabu Kata and GGSSS, Wukari 25 (both 6.6%). This diverse school representation allows for a more comprehensive understanding of the knowledge, attitudes, and practices related to toilet infection prevention among secondary school boarding students in the North East, Nigeria.

Research Question: What is the knowledge of toilet infection preventive measures among boarding secondary school students in North East, Nigeria?

Table 2: Mean Scores of Responses on Knowledge of Toilet Infection Preventive Measures among Boarding Secondary School Students in North East, Nigeria

S/N	Item	Mean	Std Dev
1.	I am aware that handwashing with soap after using the toilet helps prevent infections	3.63	0.72
2.	I know that it is important to clean the toilet seat before use to prevent infections	3.52	0.76
3.	I understand that using a toilet disinfectant can help reduce the risk of infections	3.23	0.72
4.	I am aware that flushing the toilet with the lid closed helps prevent the spread of germs	3.10	0.74
5.	I know that regular cleaning of the toilet bowl is essential for preventing infections	3.21	0.68
6.	I believe that it is important to use separate cleaning tools for the toilet and other hostel areas.	3.32	0.94
7.	I am aware that sharing towels used in the bathroom can spread infections	3.29	0.75
8.	I know that using toilet paper or wipes effectively helps in maintaining hygiene and preventing infections	3.04	0.80
9.	I understand that disposing of sanitary products properly is crucial for infection prevention	3.20	0.81
10.	I am aware that regular hand sanitizing after using public restrooms helps prevent infections	3.09	0.69
11.	I know that avoiding direct contact with public restroom surfaces can help reduce infection risks	3.22	0.59
12.	I understand the importance of not touching my face after using the toilet until I wash my hands.	3.04	0.69
13.	I am aware that using a toilet seat cover or paper lining can help prevent infections.	3.08	0.74
14.	I know that it is important to regularly clean and disinfect the flush handle or button	2.91	0.76
15.	I believe that educating other students about proper toilet hygiene can help prevent infections	3.30	0.73
	Aggregate	**3.21**	

(Decision Mean – 2.50)

Table 2 revealed the mean scores of responses on the knowledge of toilet infection preventive measures among boarding secondary school students in North East, Nigeria. The decision mean was set at 2.50, which indicated that any mean score

above 2.50 suggests a good level of knowledge among the respondents. The aggregate mean score across all 15 items is 3.21, which is above the decision mean of 2.50. This affirmed that the boarding secondary school students in the North East, Nigeria have a good overall knowledge regarding toilet infection preventive measures. Specifically, the highest mean score is 3.63 for the statement "I am aware that handwashing with soap after using the toilet helps prevent infections." This indicated that the respondents have a strong understanding of the importance of handwashing in preventing toilet-related infections.

Other items with high mean scores include "I know that it is important to clean the toilet seat before use to prevent infections" (3.52), "I believe that it is important to use separate cleaning tools for the toilet and other hostel areas" (3.32), and "I am aware that sharing towels used in the bathroom can spread infections" (3.29). These results suggest that the respondents have a good grasp of various preventive measures, such as cleaning the toilet seat, using dedicated cleaning tools, and avoiding sharing personal items. The items with relatively lower mean scores, but still above the decision mean, include "I know that it is important to regularly clean and disinfect the flush handle or button" (2.91) and "I am aware that using a toilet seat cover or paper lining can help prevent infections" (3.08). This indicated that the respondents' knowledge of these specific preventive measures, while still at an acceptable level, may need further reinforcement.

Hypothesis: Knowledge of toilet infection preventive measures among boarding secondary school students in North East, Nigeria is not significant.

Table 3: One-Sample t-test Analysis of Knowledge of Toilet Infection Preventive Measures among Boarding Secondary School Students in North East, Nigeria

Variable	N	Mean	Std. Dev.	df	t-value	p-value
Knowledge	378	3.21	0.78	377	23.451	0.000
Test Mean	378	2.50	0.00			

Calculated p < 0.05, calculated t-value > 1.972 at df 377

The result of the one-sample t-test statistics in Table 3 revealed that the knowledge of toilet infection preventive measures among boarding secondary school students in North East, Nigeria is significant because the calculated p-value of 0.000 is less than the 0.05 level of significance and the calculated t-value of 23.451 is higher than the 1.972 critical t-value at 377 degrees of freedom (df). Therefore, the null hypothesis which stated that the knowledge of toilet infection preventive measures among boarding secondary school students in North East, Nigeria is not significant is hereby rejected. This means that boarding secondary school students in North East, Nigeria have knowledge of toilet infection preventive measures.

Discussion of Finding

The finding revealed that knowledge of toilet infection preventive measures among boarding secondary school students in North East, Nigeria is significant ($t = 23.451$; $p = 0.000$). This finding aligns with several previous studies while also contrasting with others. Ahmed and Ibrahim (2018) conducted a study on the knowledge and practice of toilet hygiene among secondary school students in Bauchi State, Nigeria and found that 75% of secondary school students possessed adequate knowledge of toilet infection prevention, although only half of them consistently practised proper hygiene. This suggests that while knowledge levels may be high, translating that knowledge into practice remains a challenge. Similarly, Musa and Dogo (2019) examined the attitudes towards toilet infection prevention among students from three secondary schools in Maiduguri, Nigeria and reported that 85% of secondary school students acknowledged the importance of hygiene practices in preventing toilet infections, yet there was a gap between knowledge and consistent implementation. This supports the argument that while knowledge levels may be significant, practical adherence to preventive measures requires further intervention.

On the other hand, studies conducted in other Nigerian states and regions present mixed findings. Yusuf and Aminu (2020) examined the practices of toilet hygiene among secondary school students in Yobe State and found that 60% of students demonstrated adequate toilet hygiene practices, with environmental factors and peer behaviour influencing their compliance. This study highlighted that despite relatively high knowledge levels, external factors such as facility availability played a crucial role in determining students' hygiene behaviours. Furthermore, In Adamawa State, Muhammad and Lawal (2017) assessed the knowledge and attitude of toilet infection prevention in secondary schools and found that 80% of students had good knowledge of toilet infection prevention, and 70% had positive attitudes towards these measures. However, like other studies, they emphasized the need for continuous hygiene education to translate knowledge into action.

Contrastingly, studies conducted in different regions of Africa and beyond have shown variations in knowledge levels. Bokolia (2016) in India assessed the knowledge of urinary tract infections among adolescent girls and found that a significant portion (65.79%) did not know about UTIs, highlighting major gaps in awareness compared to the findings in North East Nigeria. Similarly, Sherpa, Rai, Giri, Dhakal, Lepcha, Subba, Bhutia, Timisina, Lama, Thapa, Dey, Chettri, Chettri, Singh, Bhutia and Bhutia (2022) assessed the knowledge, attitude, and hygienic practice towards preventive measures of urinary tract infection among adolescent girls of selected rural areas Sikkim and found that only 12% of adolescent girls had high knowledge of UTI

prevention measures, suggesting that cultural, educational, and healthcare differences may contribute to varying levels of awareness across different populations.

In Saudi Arabia, Almaghlouth, Alkhalaf, Alshamrani, Alibrahim, Alhulibi, Al-Yousef, Alamer, Alsuabie, Almuhanna and Alshehri (2023) examined the awareness, knowledge, and attitude towards urinary tract infections and found that 70.1% of participants were aware of UTIs, but misconceptions about risk factors and prevention strategies were widespread. This suggests that while knowledge might be significant, it does not always translate to accurate understanding or effective prevention. The current study's findings reinforce the notion that knowledge of toilet infection preventive measures among students in North East Nigeria is relatively high, which is in line with findings from other Nigerian studies. However, as observed in previous research, knowledge alone does not always guarantee adherence to preventive practices.

Conclusions

Based on the findings of the study, the study concluded that boarding secondary school students in North East, Nigeria know toilet infection preventive measures.

Recommendations

Based on the conclusions, the study recommended that the school management should implement comprehensive educational programmes to reinforce and maintain the high level of knowledge among boarding secondary school students in North East, Nigeria regarding toilet infection preventive measures.

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