Knowledge and Practices of Liquid Waste (Domestic Wastewater) Management among Hostel Residents in a Nigerian Health Training Institution: A Cross-Sectional Study

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ABSTRACT

Background: Improper liquid waste disposal in areas where people live and other settings such as institutions of higher learning can promote pollution in the environment thereby making it unconducive for residents as well as encourage disease transmission. Health-training institutions have the obligation to ensure safe environmental practices among health trainees. This study assessed knowledge and self-reported practices of liquid waste (domestic wastewater) management among students residing in hostels of the College of Health Sciences, Management and Technology, Calabar, Nigeria. **Methodology:** A descriptive cross-sectional study was conducted among 109 hostel-resident students selected by simple random sampling from an estimated hostel population of 150 students. Data were collected using a structured questionnaire and summarized using frequencies and percentages. **Results:** The results revealed that Seventy respondents (64.2%) knew the meaning of liquid waste, 53 (48.6%) recognized that improper disposal could cause environmental pollution, 44 (40.4%) knew the correct disposal methods, and 60 (55.0%) knew that some liquid waste could be hazardous to human health. Reported practices were poor: only 12 (11.0%) disposed of liquid waste in designated areas, 20 (18.3%) avoided indiscriminate pouring in the hostel environment, and 29 (26.6%) followed recommended handling procedures. However, 62 (56.9%) reported participating in activities that promote proper waste management. **Conclusion:** The findings demonstrate a substantial knowledge-to-practice gap among hostel residents. Improving liquid waste management in health-training institutions requires practical environmental health education alongside functional drainage and disposal infrastructure, routine monitoring and institutional enforcement.

Keywords: wastewater management; environmental health; sanitation; knowledge; practices

INTRODUCTION

Liquid waste comprises unwanted liquid materials generated through human activities and biological processes, including human excreta, domestic wastewater from kitchens and bathrooms, and surface runoff such as rainwater and street washings (Amoako et al., 2023; Hashim et al., 2020). In institutional residential environments, inadequate management of such waste may contribute to environmental contamination and create conditions that support the transmission of infectious diseases. Knowledge of liquid waste management includes understanding the nature of liquid waste, appropriate disposal pathways, and the environmental and health

consequences of unsafe disposal (Ajieh et al., 2024; Nassour et al., 2023). Although general awareness of waste management may be widespread, specific knowledge about liquid waste and safe disposal practices can remain inadequate. Previous studies have reported gaps in knowledge concerning correct disposal procedures and the handling of potentially hazardous liquid waste among students and health-related workers (Ganapathy et al., 2020; Nnaji et al., 2025). In Nigerian settings, indiscriminate disposal may also be influenced by inadequate infrastructure, limited drainage systems, and weak institutional enforcement (Ajieh et al., 2024; Muhammad et al., 2025).

Aneesa et al. (2021) opined that improper disposal of wastewater can contaminate soil and water and create environmental conditions associated with disease transmission. Evidence from community and institutional settings suggests that people may recognize some health risks while still engaging in unsafe disposal practices (Amoako et al., 2023; Hashim et al., 2020). This disconnect between knowledge and behaviour is important in health-training institutions, where students are expected to acquire and model practices that support environmental health. Liquid waste management is also shaped by the physical systems available for disposal. In many settings, limited sewerage coverage results in dependence on septic tanks, soakaway pits, drains, and other decentralized systems that require appropriate maintenance and oversight (Hashim et al., 2020; Nwadi et al., 2023). According to Ezeudu et al. (2022), where disposal infrastructure is inadequate, health education alone may not be sufficient to produce sustained behavioural change towards liquid waste management. Regular training, clearly defined institutional responsibilities, adequate drainage and disposal facilities, and routine environmental monitoring are therefore important components of effective wastes management (Karunasena et al., 2025; Nassour et al., 2023).

Despite the relevance of environmental sanitation to health-training institutions with a clear target at preventing outbreak of infectious diseases through wastewater, empirical evidence on liquid waste(wastewater) management among hostel-resident students in Nigerian Colleges of Health Technology remains limited. Therefore, the present study assessed the knowledge and self-reported practices of domestic wastewater management among students residing in the hostels of the College of Health Sciences, Management and Technology, Calabar, Nigeria.

STUDY OBJECTIVE

The objective of the study was to assess the knowledge and self-reported practices of domestic wastewater management among students residing in the hostels of the College of Health Sciences, Management and Technology, Calabar.

METHODOLOGY`

Study design and setting

A descriptive cross-sectional design was used. The study was conducted at the College of Health Sciences, Management and Technology, Calabar, Cross River State, Nigeria. The institution provides for primary healthcare workers and accommodates some students in the hostels.

Study population and sampling

The study population comprised students residing in the three institutional hostels. The estimated number of hostel residents was 150. Sample size was determined using the Taro Yamane formula for a finite population: $n = N / [1 + N(e^2)]$

where n is the required sample size, N is the population size (150), and e is the level of precision (0.05). Substitution yielded $n = 150 / [1 + 150(0.05^2)] = 109.09$; therefore, 109 students were recruited for the study. Simple random sampling was used so that eligible hostel residents had an equal chance of selection.

Data collection instrument

Data were collected using a structured questionnaire. The instrument underwent face and content validation. For pretesting, 10% of the calculated sample (10 students) from the College of Nursing Science, Calabar were

selected. The pretest responses were reviewed for consistency and clarity before the main data collection.

Data collection procedure

The researcher trained two research assistants who assisted in administering the questionnaires directly to students in their hostels. The purpose of the study was explained before participation. Completed questionnaires were collected immediately after completion to minimize loss and improve the response rate.

Ethical considerations

Institutional permission was obtained from the appropriate authorities of the College before data collection. Participation was voluntary and respondents were informed of their right to withdraw without penalty; confidentiality and anonymity were maintained. Information obtained was used solely for academic purposes.

Data analysis

Questionnaires were checked for completeness, coded, and analyzed using descriptive statistics. Frequencies and percentages were calculated and presented in tables. However, because the available dataset contained item-level responses, the results are reported at item level rather than assigning an unsupported overall numerical KAP score.

RESULTS

Sociodemographic characteristics

Table 1. Sociodemographic characteristics of respondents (n = 109).

Characteristic	Frequency(n)	Percentages(%)
Gender		
Male	40	36.7
Female	69	63.3
Age		
15–20 years	23	21.1
21–25 years	56	51.4
26 years and above	30	27.5
Class level		
ND I	22	20.2
ND II	39	35.8
HND I	23	21.1
HND II	25	22.9

A total of 109 students participated in the study, more than half 69(63.3%) constituted females; 56 (51.4%) were aged 21–25 years. The largest proportion of respondents 39(35.8%) were in National Diploma (NDII) – the lower class category. Meanwhile, in the higher class category, Higher National Diploma (HNDII), only 25(22.9%) participated in the study.

Knowledge and practices of liquid waste management

Table 2. Item-level knowledge and self-reported practices of liquid waste management (n = 109).

	Participants' Response	
Questionnaire item	**Yes (%)**	**No (%)**
Knowledge items		
I know what domestic wastewater is.	70 (64.2%)	39 (35.8%)
I am aware that improper disposal of domestic wastewater can cause environmental pollution and disease outbreak.	53 (48.6%)	56 (51.4%)
I know the correct methods of disposing domestic wastewater in the hostel	44 (40.4%)	65 (59.6%)
I am aware that some domestic wastewater can be hazardous to human health	60 (55.0%)	49 (45.0%)
Practice items		
I properly dispose of domestic wastewater in designated areas within the hostel	12 (11.0%)	97 (89.0%)
I avoid pouring domestic wastewater indiscriminately in the hostel environment.	20 (18.3%)	89 (81.7%)
I follow recommended procedures when handling domestic wastewater in the hostel.	29 (26.6%)	80 (73.4%)
I participate in activities that promote proper domestic wastewater management	62 (56.9%)	47 (43.1%)

Knowledge was inconsistent across the assessed items. Most respondents 70 (64.2%) could define domestic wastewater; however, less than half 44 (40.4%) reported knowing the correct methods of disposing domestic wastewater. Awareness that improper disposal of domestic wastewater can cause environmental pollution was reported by 53 (48.6%) respondents, while 60 (55.0%) respondents recognized that some domestic wastewater can be hazardous to human health. Reported practices were substantially poorer than the corresponding knowledge indicators. Only 12 (11.0%) reported disposing of domestic wastewater in designated areas, 20 (18.3%) avoided indiscriminate pouring of wastewater generated from the kitchen and laundry in the hostel environment and 29(26.6%) followed recommended handling procedures. Participation in activities promoting proper waste management such as wastewater was higher among 62 (56.9%) participants.

DISCUSSION

The study findings revealed that while nearly two-thirds 70(64.2%) of respondents knew the meaning of liquid waste such as domestic wastewater, less than half knew the appropriate disposal methods. This indicates that basic conceptual awareness did not necessarily extend to practical or technical knowledge. Thus, similar gaps between general awareness and specific waste-management knowledge have been reported among students and health-related workers (Ganapathy et al., 2020; Nnaji et al., 2025). Awareness of environmental and health consequences was also incomplete as less than half of respondents recognized that improper disposal could cause environmental pollution; meanwhile, slightly more than half 53(48.6%) knew that some liquid waste could be hazardous to human health as they are capable of attracting vectors to the hostels thereby inducing outbreak of vector-borne disease. These findings are important because environmental risk perception is one component of responsible waste-management behavior as opined by (Okechukwu et al., 2020; Oladapo et al., 2023). Existing evidence indicates that inadequate awareness of wastewater risks and disposal systems may constrain compliance with recommended practices (Amoako et al., 2023; Kabito et al., 2021; Olatunji et al., 2022). Apparently, students who are new on campus often demonstrate lack of awareness of wastewater management; this necessitates emphasis on proper training programmes organized by the institution with the view to reduce risks associated with indiscriminate disposal of wastewater.

The most important finding was the pronounced gap between knowledge and reported practice where large proportion of the respondents 97(89.0%) reported that they did not use designated disposal areas; 89(81.7%) did not avoid indiscriminate pouring and 80(73.4%) did not follow recommended handling procedures. This pattern

is consistent with previous studies showing that awareness alone may not translate into safe waste-management behaviour (Awodele et al., 2016; Lugga et al., 2023; Soyingbe et al., 2021). The finding suggests that behavioural outcomes may be constrained by structural and institutional conditions in addition to individual knowledge. Thus, the fact that students have basic knowledge about domestic wastewater will not guarantee reasonable practice except there are punitive measures to deter students. However, there are indications that the drainage and disposal facilities are inadequate; also, insufficient monitoring and weak enforcement promote students' frivolity about the dangers tied to wastewater disposal around the hostel vicinity. Also, limited opportunities for practical environmental health training encourages the complete lack of skills in handling proper handling of wastewater. In institutional environments, students may be expected to comply with safe disposal procedures but may not have convenient, functional or clearly designated facilities. Domestic wastewater-management interventions should therefore combine health education with improvements in infrastructure, supervision and institutional accountability (Hashim et al., 2020; Karunasena et al., 2025; Nassour et al., 2023).

The relatively high proportion of students 62(56.9%) who participated in domestic wastewater-management-promoting activities is encouraging; however, this did not correspond with similarly high levels of safe disposal behaviour. This reinforces the need to shift from information-only approaches toward repeated practical demonstrations, environmental audits, feedback and visible institutional enforcement.

Implications For Environmental and Public Health Practice

The findings have implications for students, institutional managers, environmental health officers as well as public health educators. Poor disposal practices in hostel environments can potentially trigger contamination in the environment and disease-inducing conditions. Also, health-training institutions such as College of Health Sciences, Management and Technology, Calabar and others have an obligation to model professional environmental health standards by integrating practical wastewater management into student orientation and routine training. At the level of the institution, management should monitoring approach as complementary to education instead of handling both as separate entities while environmental health officers and hostel supervisors act as compliance drivers through routine inspections, feedback and corrective action.

STRENGTHS AND LIMITATIONS

A strength of the study is its focus on hostel-resident students in a health-training institution, a population whose environmental health practices may influence future professional behaviour. The study also included students from the three hostels and used simple random sampling. However, the cross-sectional design prevents causal inference, the sample was drawn from a single institution, and the relatively small sample limits generalizability. In addition, the outcome measures were self-reported and may be affected by social desirability or recall bias.

CONCLUSION

Students demonstrated some basic knowledge of domestic wastewater management; however, important gaps remained in knowledge of correct disposal methods and environmental consequences. Consequently, reported safe practices were poor. The study therefore indicates a clear knowledge-to-practice gap. Sustainable improvement is unlikely to result from awareness campaigns alone and should involve practical environmental health education, functional disposal and drainage facilities, routine monitoring as well as institutional enforcement.

RECOMMENDATIONS

1. Provide adequate and functional drainage systems and clearly designated points for domestic wastewater disposal in all hostel areas.
2. Integrate practical domestic wastewater-management demonstrations, environmental sanitation sessions, and periodic refresher training into student orientation and health-related curricula.

3. Environmental health officers and hostel supervisors should conduct scheduled inspections and provide immediate feedback on unsafe disposal practices.
4. Develop simple, visible hostel waste-management protocols and signage specifying what types of liquid waste may be discharged through designated systems.
5. Future studies should use larger multi-institutional samples and validated KAP scales as well as consider observational measures of disposal behaviour and assessment of the availability and functionality of disposal infrastructure.

Conflict of Interest: there was no conflict of interest.

Data Availability Statement: The data for this study could not be shared because of the non-disclosure agreement that was signed by the researcher which encouraged the hostel residents to provide sincere response.

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