



Hand hygiene compliance and its association with communicable disease-related health outcomes among students of selected colleges of health sciences and technology in Nigeria

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Abstract

Hand hygiene is a fundamental infection-prevention practice, yet knowledge does not always translate into consistent behaviour among students in health-related training. This analytical cross-sectional study assessed hand hygiene knowledge and practices, estimated the prevalence of self-reported hygiene-related illness, and examined the association between hand hygiene compliance and physical health among 266 students of selected Colleges of Health Sciences and Technology in Rivers, Lagos, Enugu, Kano, Oyo and the Federal Capital Territory, Nigeria. Data covered sociodemographic characteristics, hand hygiene knowledge, daily handwashing frequency, soap and sanitizer use, water adequacy, illness episodes, gastrointestinal, respiratory and skin symptoms, illness-related absenteeism, self-rated health and a composite hygiene score. Descriptive statistics, chi-square tests, Spearman rank correlations and Kruskal-Wallis tests were used at a 5% significance level. Poor, moderate and good hand hygiene knowledge were reported by 88 (33.1%), 89 (33.5%) and 89 (33.5%) respondents, respectively; the corresponding low, moderate and high compliance categories were 88 (33.1%), 89 (33.5%) and 89 (33.5%). Mean handwashing frequency was approximately 5.17 ± 2.35 times daily. Of the 266 respondents, 199 (74.8%) reported at least one illness episode during the preceding three months, while 198 (74.4%) reported at least one illness-related absence day during the previous semester. Gastrointestinal, respiratory and skin symptoms were reported by 49.6%, 41.7% and 16.9%, respectively. Mean illness episodes declined from 4.77 among low-compliance students to 2.01 among moderate-compliance students and 0.25 among high-compliance students (Kruskal-Wallis $H=235.79$, $p<0.001$). Compliance correlated positively with health status (Spearman $\rho=0.962$, $p<0.001$) and negatively with illness episodes ($\rho=-0.943$, $p<0.001$). Significant associations were observed between compliance and health status ($\chi^2=460.32$, $df=6$, $p<0.001$), gastrointestinal symptoms ($\chi^2=177.01$, $df=2$, $p<0.001$), respiratory symptoms ($\chi^2=195.86$, $df=2$, $p<0.001$) and skin infection ($\chi^2=109.56$, $df=2$, $p<0.001$). Higher hand hygiene compliance was therefore strongly associated with more favourable self-reported health outcomes. Because the study was cross-sectional and outcomes were self-reported, the findings establish association rather than causation and the exceptionally strong relationships should be verified against original field records before publication.

Keywords: Hand hygiene, handwashing compliance, communicable disease symptoms, student health, absenteeism, WASH, Nigeria

Introduction

Hand hygiene is one of the most basic and widely applicable measures for interrupting the transmission of infectious agents. Hands frequently serve as vehicles through which microorganisms are transferred from contaminated surfaces, body fluids, food, other persons and the environment to susceptible sites such as the mouth, nose and eyes. Handwashing with soap and water, together with appropriate use of alcohol-based hand rub where indicated, therefore occupies a central place in infection prevention and control. The World Health Organization (WHO) and United Nations Children's Fund (UNICEF) emphasize that effective community hand hygiene requires not only individual knowledge but also reliable access to water, soap or suitable hand rub, appropriate facilities, clear information and supportive social environments (WHO, 2025).

The public-health relevance of hand hygiene extends beyond healthcare facilities. Educational institutions bring large numbers of people into repeated close contact through classrooms, laboratories, hostels, cafeterias, transport systems and shared sanitation facilities. These environments create opportunities for transmission of gastrointestinal, respiratory and skin-related infections when hand hygiene is inadequate. WHO and UNICEF have reported that effective

hand hygiene interventions can substantially reduce diarrhoeal disease and acute respiratory infections, underscoring the importance of sustained hygiene behaviour in community settings (WHO, 2025).

Global access to adequate hand hygiene remains unequal. WHO and UNICEF monitoring continues to identify substantial populations without basic hand hygiene services, while many schools lack functional handwashing facilities with soap and water. These infrastructure gaps are particularly important in low- and middle-income countries, where intermittent water supply, inadequate sanitation, overcrowding and limited institutional resources may constrain hygiene behaviour even when individuals understand its importance (UNICEF & WHO, 2024; WHO & UNICEF, 2025).

Students of Colleges of Health Sciences and Technology constitute a particularly important population for hand hygiene research. They are future health workers and allied health professionals whose training is expected to include principles of infection prevention, environmental sanitation, disease control and professional hygiene. Their personal practices may influence their own health during training and may also shape the behavioural standards they carry into clinical, laboratory, pharmacy and community-health

settings. Consequently, inadequate hand hygiene among such students has implications both for current student welfare and for future professional practice.

Knowledge alone, however, does not guarantee compliance. Hand hygiene behaviour is influenced by perceived susceptibility to disease, perceived benefits of washing, inconvenience, access to water and soap, social norms, habit, time pressure and perceived behavioural control. Studies among students and healthcare populations have repeatedly demonstrated gaps between awareness and actual practice. In Nigeria, Onyedibe *et al.* (2020) [5] documented limited overall hand hygiene compliance in a tertiary healthcare facility, while also showing variation across professional groups. Such evidence indicates that assessment of hand hygiene should include actual reported or observed behaviour rather than knowledge alone.

The physical-health consequences potentially associated with poor hand hygiene include diarrhoea and vomiting, respiratory symptoms, skin infections and other communicable disease manifestations. These illnesses may also affect educational participation. Recurrent morbidity can result in missed lectures, practical sessions, laboratory work and clinical activities. Illness-related absenteeism is therefore an important functional outcome alongside symptom prevalence and self-rated health.

In Nigeria, evidence on hand hygiene is more frequently derived from hospitals, healthcare workers, schoolchildren or general community populations than from students of Colleges of Health Sciences and Technology across multiple regions. This leaves an important evidence gap. Students in these institutions may possess comparatively high health knowledge but still experience infrastructural and behavioural barriers to consistent hand hygiene. Multi-location evidence can help determine whether compliance is associated with meaningful differences in self-reported morbidity and physical health.

The present study therefore assessed hand hygiene knowledge and practice among students of selected Colleges of Health Sciences and Technology in Rivers, Lagos, Enugu, Kano and Oyo States and the Federal Capital Territory. It also estimated the prevalence of self-reported illness and examined the relationship between hand hygiene compliance and physical health outcomes. Because the design is cross-sectional, the study interprets observed relationships as associations and does not infer that hand hygiene alone caused the measured health outcomes.

1. Statement of the Problem

Despite the central role of hand hygiene in infection prevention, inadequate compliance remains a persistent challenge in educational and healthcare environments. Students may know when and why hands should be cleaned but fail to practice appropriate hygiene consistently because of limited water supply, lack of soap, poor access to handwashing points, weak institutional reinforcement or behavioural factors. In health-sciences training institutions, this gap is particularly concerning because students are expected to model infection-prevention practices and may encounter laboratory materials, patients, shared equipment and crowded learning environments.

The burden of self-reported gastrointestinal, respiratory and skin-related illness among students can translate into reduced well-being and loss of instructional time. However, evidence linking hand hygiene compliance with these health

outcomes among students of Colleges of Health Sciences and Technology in Nigeria remains limited. The present study addresses this gap by simultaneously examining knowledge, compliance, hygiene resources, illness episodes, symptom prevalence, absenteeism and self-rated health across a multi-location Nigerian sample.

2. Aim of the Study

The aim of the study was to assess hand hygiene practices and examine their association with physical health outcomes among students of selected Colleges of Health Sciences and Technology in Nigeria.

3. Specific Objectives

1. Assess the level of hand hygiene knowledge and practice among the students.
2. Determine the prevalence of self-reported hygiene-related illnesses among the students.
3. Examine the relationship between hand hygiene compliance and physical health status among the students.

4. Research Questions

1. What is the level of hand hygiene knowledge and practice among the students?
2. What is the prevalence of self-reported hygiene-related illness among the students?
3. What relationship exists between hand hygiene compliance and physical health status among the students?

5. Research Hypotheses

H01: There is no significant relationship between hand hygiene compliance and physical health status.

H02: There is no significant association between hand hygiene compliance and gastrointestinal symptoms.

H03: There is no significant association between hand hygiene compliance and respiratory symptoms.

H04: There is no significant association between hand hygiene compliance and skin infection.

H05: There is no significant difference in the number of illness episodes across low, moderate and high hand hygiene compliance groups.

6. Significance of the Study

The study provides evidence for college administrators, public-health practitioners, educators and students on the relationship between hand hygiene behaviour and student health. It can support institutional WASH planning, infection-prevention education, student-health surveillance and future research. For health-sciences students, the findings also reinforce hand hygiene as a professional competency rather than merely a personal habit.

7. Scope of the Study

The study covered 266 students drawn from selected Colleges of Health Sciences and Technology in Rivers, Lagos, Enugu, Kano and Oyo States and the FCT. It examined hand hygiene knowledge, handwashing frequency and compliance, soap and sanitizer use, water adequacy, recent illness episodes, gastrointestinal and respiratory symptoms, skin infection, illness-related absenteeism, self-rated health and a composite hygiene score.

Review of related literature

1. Conceptual Review

1.1 Concept of Hand Hygiene

Hand hygiene refers to practices intended to remove or reduce microorganisms on the hands, principally handwashing with soap and water and, where appropriate, use of alcohol-based hand rub. In community settings, WHO emphasizes hand hygiene at critical moments such as after toilet use, before preparing or eating food, after contact with potentially contaminated material and when hands are visibly soiled. Effective practice depends on technique, timing, materials and an enabling environment rather than frequency alone (WHO, 2025).

2. Hand Hygiene Knowledge

Hand hygiene knowledge encompasses understanding of disease transmission, critical moments for hand cleaning, appropriate washing technique, the role of soap, and circumstances in which alcohol-based hand rub is appropriate. Knowledge is a prerequisite for informed behaviour but is not sufficient by itself. Students may possess correct information while failing to act consistently because of environmental barriers, low perceived risk or weak habits.

3. Handwashing Practice and Compliance

Compliance refers to the extent to which actual hand hygiene behaviour corresponds with expected practice. In this study, compliance was operationalized using reported daily handwashing frequency: low at three or fewer times daily, moderate at four to six times, and high at seven or more times. These categories are study-specific and should not be interpreted as universal WHO thresholds, because international guidance emphasizes critical moments and correct technique rather than a fixed number of daily events.

4. Soap, Sanitizer and Water Availability

Soap improves removal of dirt, organic material and microorganisms compared with water alone. Alcohol-based hand rub provides a practical alternative in many situations when hands are not visibly dirty, although it does not replace soap and water in all circumstances. Reliable water availability is a structural determinant of handwashing behaviour. The Social Ecological perspective therefore suggests that individual motivation must be supported by institutional infrastructure.

5. Communicable Disease-Related Health Outcomes

Hands can participate in transmission of enteric, respiratory and skin-associated pathogens. Gastrointestinal symptoms such as diarrhoea and vomiting, respiratory symptoms and skin infections are therefore relevant outcomes in hand hygiene research. Nevertheless, these symptoms are nonspecific and may arise from multiple causes. In the present study they are treated as self-reported health outcomes rather than laboratory-confirmed diagnoses.

6. Physical Health and Absenteeism

Physical health status represents the respondent's overall perception of current health, while absenteeism captures the educational consequence of illness. The present study distinguishes recent illness episodes during the preceding three months from illness-related absence during the previous semester. The variables have different recall

periods and should not be matched on an episode-by-episode basis.

2. Theoretical Evidence

2.1 Health Belief Model

The Health Belief Model (HBM) explains preventive behaviour through perceived susceptibility, perceived severity, perceived benefits, perceived barriers, cues to action and self-efficacy. Applied to hand hygiene, students are more likely to clean their hands consistently when they believe they are susceptible to infection, consider infection consequential, believe hand hygiene is effective, encounter few barriers, receive reminders and feel capable of performing the behaviour correctly. The model is particularly useful for explaining why knowledge may not translate automatically into practice.

2.2 Theory of Planned Behavior

The Theory of Planned Behavior proposes that behaviour is shaped by behavioural intentions, which in turn are influenced by attitudes, subjective norms and perceived behavioural control. A student may view handwashing positively but still demonstrate low compliance when peers do not reinforce the behaviour or when water and soap are inaccessible. The theory therefore complements the HBM by emphasizing intention, social expectations and control over behaviour.

2.3 Social Ecological Model

The Social Ecological Model situates health behaviour within interacting levels of influence. Individual knowledge and attitudes operate alongside interpersonal norms, institutional facilities, organizational policies and broader environmental conditions. In Colleges of Health Sciences and Technology, hand hygiene may therefore depend simultaneously on student knowledge, peer behaviour, lecturer expectations, availability of water and soap, placement of handwashing facilities and institutional infection-prevention policies.

2.4 Theoretical Synthesis

Taken together, the three perspectives suggest a pathway in which knowledge and risk perception influence motivation, social norms and perceived control shape intention, and the institutional environment enables or constrains actual compliance. Compliance can then influence exposure to infectious agents and, consequently, health outcomes. The HBM serves as the principal behavioural framework, while the Theory of Planned Behavior and Social Ecological Model provide complementary explanations of social and environmental influences.

3. Empirical Evidence

3.1 Global Evidence on Hand Hygiene and Disease Prevention

International evidence consistently identifies hand hygiene as an important measure for reducing transmission of infectious disease. WHO's 2025 community hand hygiene guidance synthesizes evidence showing meaningful reductions in diarrhoeal disease and acute respiratory infection when effective hand hygiene interventions are implemented. The guidance also stresses that sustained behaviour requires access to materials, facilities and supportive environments rather than information alone (WHO, 2025).

3.2 Hand Hygiene Among Students

Mbouthieu Teumta *et al.* (2019) ^[3] assessed handwashing behaviour among university students and documented a substantial gap between knowledge and practice. The study demonstrated that frequent handwashing was associated with better knowledge, but adequate practice was not universal. This supports the need to measure behaviour separately from knowledge in student populations.

3.3 Nigerian Evidence

Onyedibe *et al.* (2020) ^[5] assessed hand hygiene facilities and compliance in a large tertiary healthcare facility in northern Nigeria. Overall compliance was low, although compliance differed across professional categories, including medical students. The findings highlighted the combined importance of behavioural and facility-level determinants. Nigerian intervention evidence has likewise emphasized the role of water, soap, towels, awareness and institutional guidance in compliance.

More recent evidence among biomedical-science students at Rivers State University showed that preventive behaviours such as handwashing and sanitizer use were associated with COVID-19 outcomes in bivariate analyses, although they did not remain independent predictors in the final multivariable model (Mike-Ogburia *et al.*, 2025) ^[4]. This illustrates the importance of controlling for confounding and avoiding causal conclusions from unadjusted associations.

3.4 WASH Availability in Educational Institutions

WHO/UNICEF monitoring indicates that many educational institutions globally still lack basic hygiene services. Inadequate water supply and absence of soap can prevent students from translating knowledge into practice. This empirical pattern is consistent with ecological models of health behaviour and justifies inclusion of water adequacy, soap use and sanitizer use in the present study (UNICEF & WHO, 2024).

3.5 Empirical Gap

Existing studies provide strong evidence that hand hygiene is important, but several gaps remain relevant to the present research. Much Nigerian evidence focuses on hospitals, healthcare workers or general school populations rather than students of Colleges of Health Sciences and Technology across multiple regions. Few studies simultaneously examine knowledge, compliance, hygiene resources, symptom prevalence, absenteeism and self-rated physical health. The present study addresses these gaps using a multi-location sample and multiple health outcomes.

4. Summary of Literature Review

The literature demonstrates that hand hygiene is shaped by knowledge, beliefs, social norms, perceived behavioural control and environmental resources. Empirical evidence supports its role in reducing infectious-disease transmission, but also reveals persistent knowledge-practice gaps and infrastructural barriers. The reviewed theories and evidence provide the basis for examining whether higher hand hygiene compliance is associated with more favourable health outcomes among Nigerian health-sciences students.

Methodology

1. Research Design

The study adopted an analytical cross-sectional design. Information on hand hygiene exposures and health outcomes was obtained within a defined study period without experimental manipulation. The principal exposure was hand hygiene compliance, while outcomes included recent illness episodes, gastrointestinal symptoms, respiratory symptoms, skin infection, illness-related absenteeism and self-rated physical health. Because exposure and outcome were assessed cross-sectionally, relationships were interpreted as associations rather than proof of causation.

2. Study Area and Population

The study involved students of selected Colleges of Health Sciences and Technology in Rivers, Lagos, Enugu, Kano and Oyo States and the Federal Capital Territory. Participants were drawn from Community Health, Environmental Health, Medical Laboratory Science and Pharmacy Technology programmes at ND1, ND2, HND1 and HND2 levels.

3. Sample Size and Sampling

The analytical sample comprised 266 students. All valid unique records identified by IDs 1-266 were included. Because the supplied dataset did not contain an institution-level sampling frame or respondent-selection probabilities, the sample is described conservatively as students from selected colleges and is not presented as a nationally representative probability sample.

4. Study Variables and Operational Definitions

Hand hygiene knowledge was categorized as poor, moderate or good. Daily handwashing frequency was recorded as a count and used to define study-specific compliance categories: low (≤ 3 times/day), moderate (4-6 times/day) and high (≥ 7 times/day). Soap use was coded as water only, sometimes with soap or always with soap; sanitizer use as no/yes; and water source as inadequate/adequate. The composite hygiene score ranged from 0 to 10, with higher scores indicating better overall hygiene performance.

Physical health outcomes included number of illness episodes during the preceding three months; gastrointestinal symptoms (diarrhoea/vomiting); respiratory symptoms; skin infection; number of days absent because of illness during the previous semester; and self-rated health status coded from 1=poor to 4=excellent.

5. Clarification of Illness and Absence Measures

ILLNESS_LAST_3M measured the number of illness episodes experienced during the preceding three months. For prevalence estimation, 0 represented no recent illness and ≥ 1 represented any recent illness. ABSENT_DUE_ILLNESS measured the number of days absent from academic activities because of illness during the previous semester; 0 represented no illness-related absence and ≥ 1 represented any illness-related absence. Both prevalence estimates used $N=266$ as the denominator where no values were missing. The two variables were analysed separately because they measure different constructs and have different recall periods. An illness episode may not result in absence, one illness episode may cause several days of absence, and an absence recorded for the previous

semester need not correspond to an illness episode within the preceding three months.

6. Instrument and Data Collection

Data were obtained using a structured questionnaire/data collection instrument covering sociodemographic characteristics, hand hygiene knowledge, handwashing behaviour, soap and sanitizer use, water adequacy, recent morbidity, absenteeism and self-rated health. Each respondent was assigned a unique identification number. Any actual validation, pilot testing and reliability coefficients should be reported from the original field documentation; no coefficient was fabricated for the present manuscript.

7. Data Quality Management

The dataset was checked for completeness, duplicate records, coding consistency and values outside predefined ranges. Analysis was restricted to the 266 unique respondent IDs. An out-of-range SANITIZER_USE value coded 2, despite a binary 0/1 codebook, and an apparently incomplete hygiene-score field should be reconciled against the original questionnaires before final publication. Duplicated copies introduced during data transfer should not be treated as independent observations.

8. Data Analysis

Categorical variables were summarized using frequencies and percentages, while continuous/count variables were summarized using means and standard deviations where appropriate. Chi-square tests assessed associations between compliance and categorical health outcomes. Spearman's rank correlation assessed ordinal/monotonic relationships, and the Kruskal-Wallis H test compared illness episodes across compliance groups. Statistical significance was set at two-sided $p < 0.05$. Effect sizes and confidence intervals should accompany p-values in a final journal submission where estimable.

9. Ethical Considerations

Participation should be voluntary and based on informed consent, with confidentiality, anonymity and the right to withdraw protected. Respondent IDs rather than names were used in the analytical dataset. The final submission should state the actual ethics committee, approval number and approval date from the original study documentation; these details were not invented in this manuscript.

Results and discussion

1. Hand Hygiene Knowledge and Compliance

Table 1: Distribution of Respondents by Hand Hygiene Knowledge and Compliance (N=266)

Variable	Category	Frequency	Percentage (%)
Hand hygiene knowledge	Poor	88	33.1
	Moderate	89	33.5
	Good	89	33.5
Handwashing compliance	Low	88	33.1
	Moderate	89	33.5
	High	89	33.5

Poor hand hygiene knowledge was recorded among 88 respondents (33.1%), while 89 (33.5%) had moderate knowledge and 89 (33.5%) had good knowledge. Handwashing compliance showed the same broad distribution: 88 (33.1%) low, 89 (33.5%) moderate and 89 (33.5%) high. Mean reported handwashing frequency was approximately 5.17 times daily (SD=2.35), placing the average respondent within the study-defined moderate-compliance range.

The findings indicate that adequate practice was not universal despite the health-related educational background of participants. This is consistent with the broader evidence that knowledge does not automatically translate into practice. Mbouthieu Teumta *et al.* (2019) [3] reported a substantial knowledge-practice gap among university students, while Onyedibe *et al.* (2020) [5] documented limited overall hand hygiene compliance in a Nigerian tertiary healthcare facility. Together, these findings support interventions that combine education with enabling infrastructure and behavioural reinforcement.

2. Prevalence of Illness and Illness-Related Absenteeism

Table 2: Distribution of Recent Illness and Illness-Related Absenteeism (N=266)

Outcome	Category	n	%
Illness episodes in preceding 3 months	≥1 episode	199	74.8
	0 episodes	67	25.2
Illness-related absence during previous semester	≥1 day	198	74.4
	0 days	68	25.6

Among the 266 respondents, 199 (74.8%) reported at least one illness episode during the preceding three months, while 67 (25.2%) reported none. Separately, 198 (74.4%) reported at least one day of illness-related absence during the previous semester, while 68 (25.6%) reported no illness-related absence. The numbers 199 and 198 are therefore numerators; the denominator for both prevalence estimates is 266.

The two measures should not be directly matched. Recent illness and absenteeism use different recall periods and represent different constructs. A student may experience illness without missing class, while a single illness may result in several absence days. Therefore, the difference between 199 students reporting illness and 198 reporting absence does not mean that exactly one ill student remained in school.

Table 3: Prevalence of Selected Self-Reported Health Outcomes (N=266)

Health outcome	Frequency	Percentage (%)
At least one illness episode in preceding 3 months	199	74.8
Gastrointestinal symptoms	132	49.6
Respiratory symptoms	111	41.7
Skin infection	45	16.9
At least one illness-related absence day in previous semester	198	74.4

Gastrointestinal symptoms were reported by 132 students (49.6%), respiratory symptoms by 111 (41.7%) and skin

infection by 45 (16.9%). These findings indicate a substantial burden of self-reported morbidity. They are biologically consistent with the infection-prevention rationale for hand hygiene, although the outcomes were symptom-based rather than laboratory-confirmed and should not be interpreted as diagnosed communicable diseases.

3. Compliance and Illness Burden

Table 4: Mean Illness Episodes by Handwashing Compliance Level

Compliance level	N	Mean illness episodes
Low	88	4.77
Moderate	89	2.01
High	89	0.25

A pronounced gradient was observed. Mean illness episodes declined from 4.77 among students with low compliance to 2.01 among those with moderate compliance and 0.25 among those with high compliance. The difference across the three groups was statistically significant (Kruskal-Wallis $H=235.79$, $p<0.001$). Handwashing compliance also had a very strong inverse correlation with illness episodes (Spearman $\rho=-0.943$, $p<0.001$).

The direction of the association is consistent with the established role of hand hygiene in reducing exposure to infectious agents. However, the magnitude is exceptionally large for an observational public-health dataset. The result should therefore be verified against original field records and interpreted as an association rather than a causal effect.

4. Compliance and Illness-Related Absenteeism

Table 5: Mean Days Absent Due to Illness by Handwashing Compliance

Compliance level	N	Mean days absent
Low	88	7.06
Moderate	89	2.52
High	89	0.25

Mean illness-related absence declined from 7.06 days among low-compliance students to 2.52 days among moderate-compliance students and 0.25 days among high-compliance students. The gradient suggests that students with better hand hygiene also reported less disruption to academic participation. Because absenteeism covered the previous semester, it should not be directly equated with illness episodes measured over the preceding three months.

5. Compliance and Physical Health Status

Table 6: Mean Physical Health Status by Handwashing Compliance

Compliance level	N	Mean health-status score
Low	88	1.01
Moderate	89	2.25
High	89	3.75

On the 1=poor to 4=excellent scale, mean health status increased from 1.01 among low-compliance students to 2.25 among moderate-compliance students and 3.75 among high-compliance students. Compliance correlated very strongly and positively with physical health status (Spearman

$\rho=0.962$, $p<0.001$). The chi-square association between compliance category and health-status category was also significant ($\chi^2=460.32$, $df=6$, $p<0.001$).

6. Compliance and Specific Symptoms

Table 7: Chi-Square Tests of Handwashing Compliance and Specific Health Outcomes

Outcome	χ^2	df	p-value	Decision
Gastrointestinal symptoms	177.01	2	<0.001	Significant
Respiratory symptoms	195.86	2	<0.001	Significant
Skin infection	109.56	2	<0.001	Significant

Handwashing compliance was significantly associated with gastrointestinal, respiratory and skin symptoms. These findings are directionally consistent with infection-prevention evidence and current WHO community hand hygiene guidance. Nevertheless, gastrointestinal, respiratory and skin symptoms have multiple determinants, and the present symptom measures do not establish specific infectious aetiologies.

7. Composite Hygiene Score and Health

The composite hygiene score was very strongly positively associated with physical health status (Spearman $\rho\approx0.971$, $p<0.001$). This suggests that broader hygiene performance tracked with more favourable self-rated health. The exceptionally high coefficient again warrants careful verification that the hygiene score and health-status measure were constructed independently and that overlapping components did not mechanically inflate the association.

8. Summary of Hypothesis Testing

Table 8: Summary of Inferential Findings

Relationship	Test statistic	p-value	Decision
Compliance $\times$ physical health status	$\chi^2=460.32$, $df=6$	<0.001	Significant
Compliance $\leftrightarrow$ physical health status	$\rho=0.962$	<0.001	Significant
Compliance $\leftrightarrow$ illness episodes	$\rho=-0.943$	<0.001	Significant
Compliance $\times$ gastrointestinal symptoms	$\chi^2=177.01$, $df=2$	<0.001	Significant
Compliance $\times$ respiratory symptoms	$\chi^2=195.86$, $df=2$	<0.001	Significant
Compliance $\times$ skin infection	$\chi^2=109.56$, $df=2$	<0.001	Significant
Illness episodes across compliance groups	$H=235.79$	<0.001	Significant
Hygiene score $\leftrightarrow$ physical health	$\rho\approx0.971$	<0.001	Significant

9. Overall Discussion

The study produced a consistent pattern in which higher hand hygiene compliance was associated with fewer illness episodes, fewer illness-related absence days, lower occurrence of gastrointestinal, respiratory and skin symptoms, and better self-rated physical health. The pattern is compatible with the Health Belief Model, Theory of Planned Behavior and Social Ecological Model: knowledge and risk perception may motivate hygiene, while social and environmental conditions determine whether intended behaviour can be sustained.

The findings are also consistent with international evidence supporting hand hygiene as a means of reducing infectious-

disease transmission. However, the near-deterministic strength of several relationships is unusual. Correlations exceeding 0.94 in absolute magnitude and very large chi-square values justify a source-data audit before journal submission. Potential duplication, coding errors, derived-variable overlap and data-entry patterns should be excluded. If the data are confirmed, multivariable modelling should be considered to determine whether associations remain after adjustment for age, sex, level, department, location and water adequacy.

Conclusion and recommendations

1. Conclusion

This study assessed hand hygiene knowledge and practices, the prevalence of self-reported hygiene-related illness, and the relationship between hand hygiene compliance and physical health among 266 students of selected Colleges of Health Sciences and Technology in Nigeria. Approximately one-third of respondents fell into each knowledge and compliance category, indicating substantial variation in behaviour despite health-related training.

Using the full denominator of 266, 199 students (74.8%) reported at least one illness episode during the preceding three months, while 198 (74.4%) reported at least one illness-related absence day during the previous semester. Gastrointestinal symptoms were reported by 49.6%, respiratory symptoms by 41.7% and skin infection by 16.9%. The illness and absenteeism measures were distinct and were not treated as corresponding events because their recall periods differed.

Higher hand hygiene compliance was strongly associated with fewer illness episodes and absence days and with better physical health. Mean illness episodes declined from 4.77 in the low-compliance group to 0.25 in the high-compliance group, while mean health-status scores increased from 1.01 to 3.75. All principal inferential tests were statistically significant at $p < 0.001$. The study therefore provides strong evidence of association within the sampled population, but the cross-sectional design, self-reported outcomes and unusually strong statistical relationships preclude definitive causal conclusions and warrant verification against original field records.

2. Recommendations

1. Colleges should strengthen practical hand hygiene education, emphasizing critical moments, correct technique, soap use and appropriate sanitizer use rather than relying solely on theoretical instruction.
2. College administrations should maintain reliable water supplies, functional handwashing stations and continuous availability of soap, with appropriate alcohol-based hand rub where soap and water are not immediately practical.
3. Hand hygiene should be integrated into routine institutional infection-prevention programmes through periodic assessments, reminders, demonstrations and student-led behaviour-change activities.
4. Community Health, Environmental Health, Medical Laboratory Science, Pharmacy Technology and related programmes should reinforce hand hygiene as a professional competency during laboratory, clinical and community-based training.
5. Student health services should monitor patterns of gastrointestinal, respiratory and skin symptoms and

illness-related absenteeism and encourage appropriate clinical assessment for recurrent illness rather than assuming that all symptoms are attributable to hygiene.

6. Future studies should employ longitudinal or intervention designs, objective measures of hand hygiene where feasible, clinically verified outcomes and multivariable analysis of potential confounders. National generalization should be based on appropriately representative sampling.

3. Implications for Policy and Practice

Institutional hand hygiene programmes should combine education, infrastructure, behavioural reinforcement and monitoring. WASH facilities should be treated as part of student-health and infection-prevention systems rather than as ancillary services. Greater integration between academic infection-prevention training, student health services and campus WASH management can improve the learning environment while preparing future health professionals to model appropriate hygiene behaviour.

4. Suggestions for Further Studies

Further studies should examine whether improvements in hand hygiene precede reductions in morbidity and absenteeism. Prospective cohort and intervention studies could evaluate improved water and soap provision, strategically placed hand rub, reminders and educational programmes. Research should also distinguish self-reported symptoms from clinically confirmed disease and explore institutional, behavioural and environmental determinants of compliance.

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