NIGERIAN JOURNAL OF ENVIRONMENT AND HEALTH
Elucidating the Environment-Health Nexus in Nigeria
ISSN: 2616-0714 (print edition) eISSN: 2616-0706 (online, open access)

Nigerian Journal of Environment and Health, 5(2) 43-52.

Health Prevention Practices In Nigeria: An Empirical Analysis of Nurses' Compliance with Healthcare Associated Infections Control in Public Healthcare Facilities

Ogundare Janet F., Adewoye Solomon O., Opasola Olaniyi A., Adiama Babatunde Y.
Department of Environmental Health Science, Faculty of Basic Medical Science, Kwara State University, Malete, Ilorin.

Abstract
Healthcare-associated infections (HAIs) control remains a critical public health challenge, contributing significantly to patient morbidity, mortality, and increased healthcare costs in Nigeria. This study examined nurses' compliance with infection prevention and control measures in public healthcare facilities across Southwest Nigeria. A cross-sectional survey design was employed, targeting a population of 180,709 registered nurses and 126,863 midwife nurses. A total of 344 nurses were selected through stratified and quota sampling techniques to ensure representativeness. Data were collected using a structured, self-administered questionnaire validated through expert review and psychometric testing. The Kaiser–Meyer–Olkin (KMO) value of 0.912 and Bartlett's Test of Sphericity ($\chi^2 = 2820.76$, $p < 0.001$) confirmed the dataset's suitability for factor analysis. Exploratory Factor Analysis (EFA) revealed two underlying constructs—Prevention Strategies (TPPQ) and HAI Practices (HAIPsQ), with strong factor loadings (>0.5). Cronbach's alpha coefficients of 0.755 and 0.933 indicated acceptable to excellent internal reliability, confirming the robustness of the instrument. Descriptive and inferential analyses, including correlation, regression, and ANOVA, were conducted to explore relationships between prevention strategies and HAI outcomes. Results revealed a significant negative correlation ($r = –0.382$, $p < 0.001$), indicating that increased adherence to prevention practices reduced HAI incidence among nurses. Regression analysis further confirmed prevention strategies as a significant predictor of lower HAI outcomes ($\beta = –0.062$, $p < 0.001$). In conclusion, the study found that while nurses demonstrated strong awareness and positive attitudes toward HAI prevention, gaps persist in consistent practice adherence. Strengthening continuous professional training, supervision, and institutional compliance monitoring is therefore essential to enhance infection prevention outcomes in Nigerian public healthcare facilities.

© NJEH 2026 Published by Living Science Foundation.

Keywords: Health, Prevention Practices, Nurses, Compliance, HAIs Control.

1. Introduction

Healthcare-associated infections (HAIs) are infections that patients acquire during the course of receiving treatment for other conditions within a healthcare setting, and they remain one of the most significant threats to patient safety globally (World Health Organisation, 2022). These contribute to the prolonged hospital stays, increased antimicrobial resistance, higher healthcare costs, and avoidable morbidity and mortality (Allegranzi *et al.*, 2017). The burden of HAIs is disproportionately higher in low- and middle-income countries (LMICs), where the prevalence ranges from 15% to 20% of hospitalised patients compared to 5% to 7% in high-income countries (WHO, 2020).

In Nigeria, HAIs represent a major challenge to quality healthcare delivery due to limited infrastructure, insufficient infection prevention and control (IPC) training, inadequate supply of protective equipment, and weak monitoring systems (Ogunsola & Adesiji, 2008; Afolabi *et al.*, 2019). Nurses, being the largest group of healthcare professionals and the frontline caregivers, play a critical role in implementing infection prevention practices such as hand hygiene, proper use of personal protective equipment (PPE), safe waste disposal, and environmental sanitation (Gershon *et al.*, 2019).

Submitted 14th November, 2025; Accepted 24th December, 2025; Published 20th February 2026.
DOI: https://doi.org/10.5281/zenodo.18754786
*Corresponding author *Email address:* ogundarefunmi123@gmail.com (Ogundare Janet F.)

License: This article is distributed under the terms of the https://creativecommons.org/licenses/by/4.0/

Compliance with these preventive measures is essential to reduce the incidence of HAIs. Studies have shown varying levels of adherence among nurses in Nigeria, often influenced by workload, institutional policies, and resource availability (Okeke *et al.*, 2021; Afolabi *et al.*, 2019; Ogunsola & Adesiji, 2008).

Despite growing awareness of IPC guidelines and the availability of WHO's multimodal strategies for infection prevention, evidence on the actual compliance level of nurses in Nigerian healthcare settings remains inconsistent (WHO, 2016). Some studies report moderate adherence to hand hygiene protocols but low compliance with biomedical waste management and PPE use (Ekwere & Okafor, 2013; Bello *et al.,* 2020). Furthermore, most available studies in Nigeria focus on single health facilities or urban centres, leaving a gap in understanding the national or regional patterns of nurses' compliance with IPC measures in diverse healthcare settings (Okonkwo *et al.*, 2018).

The existing gap acknowledges the importance of IPC in reducing HAIs, there is limited empirical evidence that holistically examines the extent and determinants of nurses' compliance across varied Nigerian healthcare settings, especially in public institutions and considering resource availability, training exposure, and facility-level differences. Without such comprehensive insights, interventions risk being generic and less effective in addressing context-specific barriers to HAI prevention. This study therefore addresses this gap by examining the impact of health prevention practices on nurses' compliance with HAIs control in selected public healthcare facilities in Nigeria, with a focus on identifying key predictors of adherence and areas requiring targeted improvement.

The findings could be advantageous to professional health practitioners focusing on infection prevention, offering opportunities for nurses to enhance their professional development. By acquiring knowledge and skills in infection control, nurses could advance their careers, improve job satisfaction, and contribute more effectively to patient care. Public health officials could also benefit from this study, as HAI not only affects individual patients but also has broader public health implications. Training nurses in infection prevention practices helps mitigate the spread of antimicrobial resistance and communicable diseases within healthcare facilities and the community at large, thus safeguarding public health.

Research Question

The following research questions were raised to guide the study;

1. How does adherence to hand hygiene practices influence nurses' overall compliance with healthcare-associated infection control measures in selected public healthcare facilities in Nigeria?
2. What is the relationship between biomedical waste management practices and nurses' compliance with healthcare-associated infection control in selected public healthcare facilities in Nigeria??

2. Literature Review

Nigeria Centre for Disease Control (NCDC) and Robert Koch Institute (RKI) developed a training concept focused on improving Infection Prevention and Control (IPC) by considering organisational and systemic aspects. This training approach, known as the "Participatory Approach to Learning in Systems" (PALS), integrates theoretical concepts of inquiry learning and employs a participatory approach. Elements of "Theme-Centred-Interaction" (TCI) are integrated into PALS to highlight IPC influencing factors and adopt a systemic perspective. Through PALS, healthcare workers are equipped with competencies, techniques, and attitudes to drive change and promote IPC improvement (International Medical Corps, 2020).

Hospital-associated infections (HCAIs) represent a significant threat within healthcare facilities, impacting both patients and healthcare workers. They contribute to substantial morbidity and mortality globally across various healthcare settings. According to the World Health Organisation (WHO), approximately 10 out of every 100 in-patients in developing countries and 7 in developed countries acquire at least one healthcare-associated infection. Prevalence rates of HCAIs range from 15% to 20% in low- and middle-income countries. In the United States, the Centres for Disease Control (CDC) report an estimated 1.7 million HCAIs and 99,000 associated deaths annually. Urinary tract infections are the most prevalent HAI (32%), followed by surgical site infections (22%), pneumonia (15%), and bloodstream infections (14%) (Patient Care Link, 2019).

Healthcare-associated infections (HCAIs) are infections that manifest clinically after 48 hours of hospitalisation and pose a significant concern for hospitals worldwide. They greatly impact patient safety and are often associated with procedures such as surgeries and the use of medical devices like catheters or ventilators. While some HCAIs are preventable, they serve as negative indicators of patient care quality, adverse events, and safety issues in healthcare settings (Collins, 2008). All hospitalised patients are susceptible to contracting nosocomial infections, with certain groups, such as young children, the elderly, and individuals with compromised immune systems, being at higher risk. Factors contributing to HCAIs include prolonged hospital stays, long-term disabilities, and increasing microbial resistance to antibiotics. These infections impose substantial financial burdens on hospitals, patients, and their families, often resulting in unnecessary

License: This article is distributed under the terms of the https://creativecommons.org/licenses/by/4.0/

fatalities and decreased quality of life for affected individuals and healthcare workers (Monegro *et al.* 2021).

In the Kingdom of Saudi Arabia and globally, HCAIs are linked to prolonged hospital stays, increased mortality rates, higher antibiotic costs, and overall healthcare expenses. For instance, in the US, central line-associated bloodstream infections (CLABSI) occur at a rate of 0.8 per CL-days, with an attributed mortality rate of 12%–25%. In the United Kingdom, CLABSI constitutes a significant portion of HCAIs, with varying rates and associated mortality. Common types of infections include pneumonia, urinary tract infections, and bloodstream infections, with a notable percentage being device-associated (Khan *et al.* 2019).

Although HCAIs have historically been underreported in hospitals, efforts to track and report them have increased in recent years. Proper healthcare practices and adherence to evidence-based infection prevention procedures are crucial in preventing HCAIs (Collins, 2008). Healthcare facilities prioritise controlling disease spread and minimising HAI incidence by implementing Infection Prevention and Control programs based on WHO guidelines (WHO, 2020). This study aims to evaluate infection prevention and control practices among staff nurses, which will inform hospitals' protocols and contribute to patient safety advocacy efforts aimed at reducing HAI rates in Nigerian hospitals.

In Bangladesh, few studies focus on infection control in hospital settings. For instance, a study by Faruquzzaman (2011) at Dhaka Medical College's surgical ward found that 30% of patients suffered nosocomial infections, with wound infections (38.7%), urinary tract infections (26.6%), acute respiratory tract infections (19.2%), and acute gastrointestinal infections (12.5%) being prevalent. Shamsuzzaman (2015) emphasised hand hygiene as a strategic action for infection control, suggesting it should be ingrained in hospital organisational culture. An analysis of medical records from a private hospital in Dhaka, Bangladesh, in 2014 revealed a nosocomial infection rate of 2.29%, with respiratory tract infections accounting for the highest proportion (63%) and skin and soft tissue infections the lowest (2%) (Begum *et al.* 2017). Hasan (2010) noted that infection control is not widely recognised within Bangladesh's health system, with only some private hospitals in Dhaka implementing basic measures.

Infection prevention is pivotal in reducing healthcare-associated infection (HAI) rates, the most common adverse event in healthcare globally. HCAIs, occurring either endemic or epidemically, impact the quality of care for millions of patients annually across developed and developing nations (Allegranzi *et al.* 2011; Allegranzi *et al.* 2007). Defined by the CDC as infections resulting from exposure to infectious agents in healthcare settings, HCAIs pose a significant threat to patient safety, leading to increased morbidity, mortality, and financial costs (Horan *et al.* 2008; Kennedy *et al.* 2013; Green *et al.* 2015). Moreover, they contribute to prolonged hospital stays, antimicrobial resistance, and economic burdens on healthcare systems (Plowman *et al.* 2001).

Afolabi *et al.* (2022) conducted a study to evaluate the pattern of healthcare-associated infections (HCAIs) and the state of hygiene in a tertiary hospital in southwest Nigeria. They analysed data collected routinely between January 2000 and December 2009 by the infection control committee on HCAIs, along with primary data generated on hygiene in the wards, using appropriate statistical techniques. During the study period, a total of 37,957 patients were admitted, among whom 1,129 cases of HAI were reported, representing a prevalence of 3.0%. The highest prevalence, at 9.0%, was recorded in 2006. The Intensive Care Unit (ICU) had the highest period prevalence of 14.7%, followed by the Orthopaedics ward (7.7%), with the surgical ward contributing the highest number of cases (433). Gram-negative organisms were the most commonly implicated pathogens, accounting for 78% of cases, with Klebsiella species being the most prevalent at 38%, while Staphylococcus aureus was the only Gram-positive organism identified, representing 28% of cases. While hand washing was universally practised by health workers, facilities for proper hand washing were found to be inadequate. The pattern of HAI showed no significant change over the past decade, with Klebsiella being the most frequently implicated organism, particularly in the ICU. The study highlighted suboptimal facilities for proper hand washing and recommended the introduction of a hand washing policy for the hospital, along with the provision of an environment conducive to its implementation by hospital management. Additionally, adequate support for the infection control committee in carrying out its duties was emphasized.

3. Methodolgy

This study adopted a cross-sectional survey design, focusing on nurses in public healthcare facilities across Southwest Nigeria. The target population comprised 180,709 registered nurses and 126,863 midwife nurses as recorded in the RN Bulletin (2020). A total sample of 344 respondents was determined to ensure adequate representation of the target population from South West Nigeria (figure 1).

Stratified and quota sampling techniques were employed to achieve proportionate representation across different healthcare facilities and regions within the country. Data were collected using a structured, self-administered questionnaire designed to assess key domains such as “Infection control procedures minimize HAIs”, “sterilization of medical equipment reduces HAIs”, “use of protective barriers (e.g., gloves, masks) prevents HAIs”, which served as indicators of adherence

License: This article is distributed under the terms of the https://creativecommons.org/licenses/by/4.0/

to healthcare-associated infection (HAI) prevention protocols among nurses. The research instrument underwent a rigorous two-phase validation process. In the first phase, content validity was established through expert evaluation by two scholars from the Department of Environmental Health Sciences, Kwara State University, Malete. These experts assessed the relevance, clarity, and comprehensiveness of the questionnaire items, and their feedback was used to refine and improve the accuracy and alignment of the instrument with the study objectives. In the second phase, construct validity and reliability were statistically examined through a series of psychometric analyses. The Kaiser–Meyer–Olkin (KMO) Measure of Sampling Adequacy produced a value of 0.912, indicating excellent suitability of the dataset for factor analysis. Bartlett's Test of Sphericity yielded a Chi-square value of 2820.76 with a significance level of $p < 0.001$, confirming that the correlation matrix was not an identity matrix and that the data were appropriate for factor extraction. Further analysis using Exploratory Factor Analysis (EFA) revealed a clear two-factor structure corresponding to Prevention Strategies (TPPQ) and HAI Practices (HAIPsQ), with all factor loadings exceeding 0.5, thereby confirming strong construct validity. Reliability analysis was performed using Cronbach's Alpha to assess the internal consistency of the instrument. The Prevention Strategies subscale (TPPQ) recorded a Cronbach's Alpha coefficient of 0.755, while the HAI Practices subscale (HAIPsQ) yielded a coefficient of 0.933 (see appendix II). These results indicate acceptable to excellent internal consistency, confirming that the instrument reliably measures the constructs it was designed to assess. Overall, the internal reliability of the instrument was considered robust and suitable for the main study. Data were analyzed using Analysis of Variance (ANOVA) to explore prevalence patterns and identify predictors of adherence to HAI prevention protocols among nurses in public healthcare facilities. Ethical approval for the study was obtained from the University Research Ethics Committee. Informed consent was obtained from all participants before data collection, and they were assured of the confidentiality and anonymity of the information provided.

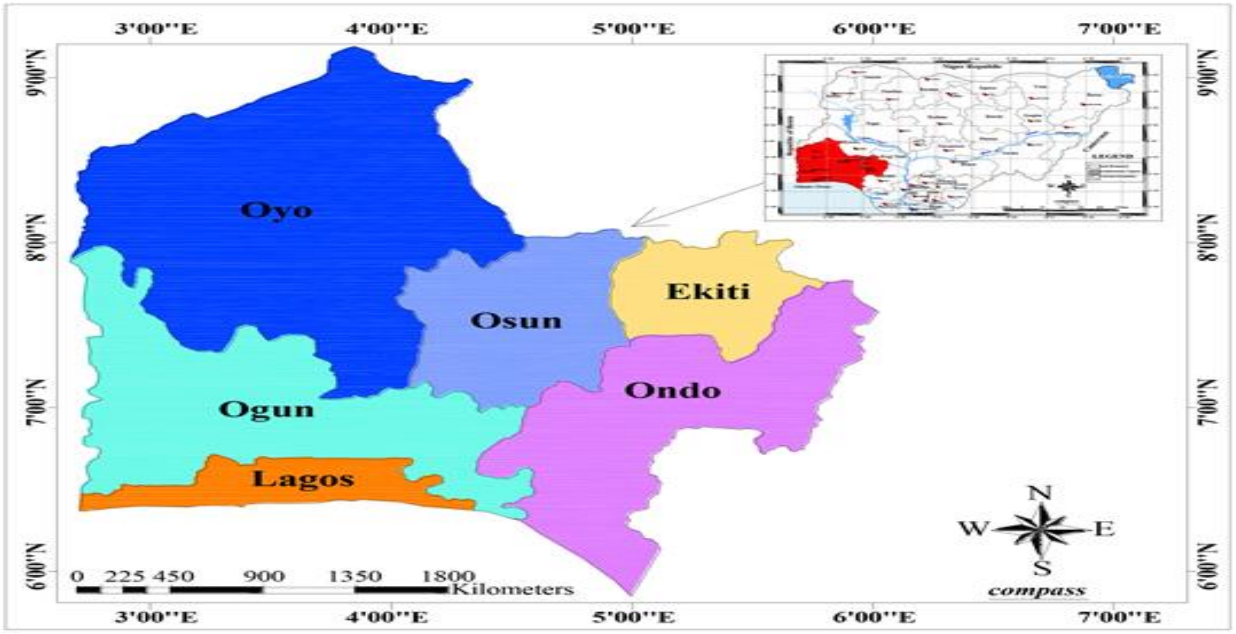


Figure 1: Map of the study area (Oyinloye *et al.*, 2023)

4. Result

4.1. *Socio-Demographic Characteristics of Respondents*

From table 1, the nursing workforce in the selected federal teaching hospitals was predominantly female (n = 285, 82.8%), reflecting the generally female-dominated nature of the nursing profession in Nigeria. Male nurses constituted only 17.2% of respondents. Most respondents had a Bachelor of Nursing Science (B.NSc, 60.2%), followed by Master's (M.Sc, 19.5%), and Doctorate (PhD, 7.9%). Diploma Nurses (DN) accounted for 12.5% which means that majority of nurses had formal tertiary-level education. The majority were Registered Nurses (RN, 55.5%), with NANNM certification being the second most common (23.3%). Smaller proportions held NNA, APHP, ANNE, and other qualifications. Respondents were fairly distributed across experience categories. Nurses with less than 5 years of experience formed a third (33.7%),

License: This article is distributed under the terms of the https://creativecommons.org/licenses/by/4.0/

while those with ≥12 years formed a slightly larger group (34.6%). On the ranking, Staff Nurses (SNO, 24.4%) and Deputy Directors of Nursing Services (DDNS, 21.2%) made up the largest proportions, and on the unit of assignment, the largest proportion of respondents (61.3%) worked in "Other" units outside the major specialties listed which means that most nurses were in general or mixed clinical units. Specialized units like TB, UTI, or GTI had smaller representation (3.5–8.4%).

Table 1 Socio-Demographic Characteristics of Respondents (N = 344)

Variable	Category	Count	%
Gender	Male	59	17.2
	Female	285	82.8
Education	DN	43	12.5
	B.NSc	207	60.2
	M.Sc	67	19.5
	PhD	27	7.9
Professional Qualification	RN	191	55.5
	NANNM	80	23.3
	NNA	42	12.2
	APHP	19	5.5
	ANNE	4	1.2
	Others	8	2.3
Working Experience	<5 years	116	33.7
	5–8 years	46	13.4
	9–11 years	63	18.3
	≥12 years	119	34.6
Rank	NOII	40	11.6
	NOI	38	11.1
	SNO	84	24.4
	PNO	40	11.6
	ACNO	26	7.6
	CNO	38	11.1
	DDNS	73	21.2
	DNS	5	1.5
Unit	UTI	17	4.9
	SSI	25	7.3
	TB	29	8.4
	BBI	21	6.1
	SI	12	3.5
	GTI	29	8.4
	Others	211	61.3

Note: Percentages calculated from total respondents (N = 344).

4.2. *Respondents' Responses on Prevention Strategies of HAIs*

Table 2 presents the distribution of respondents' opinions on various prevention strategies for Healthcare Associated Infections (HAIs). The findings reveal a very strong consensus among nurses on the importance of preventive measures. A majority of respondents, representing 64.53%, strongly agreed that prevention strategies reduce the incidence of HAIs, while a further 28.49% agreed with this statement.

Only a very small proportion disagreed (4.36%) or strongly disagreed (2.62%), indicating that the overwhelming perception is that preventive practices are essential in reducing infection rates. Similarly, when asked whether proper hand hygiene is effective in preventing HAIs, 56.40% strongly agreed and 36.63% agreed, making a combined agreement rate of over 93%. This demonstrates the recognition of hand hygiene as one of the most reliable strategies for infection control, while fewer than 7% expressed any level of disagreement.

License: This article is distributed under the terms of the https://creativecommons.org/licenses/by/4.0/

In relation to infection control procedures, 65.70% of nurses strongly agreed and 25.58% agreed that such measures minimize HAIs. This reflects nearly universal acceptance of structured infection control practices as central to patient and staff safety. Only a minority, 8.72%, disagreed or strongly disagreed. A similar pattern was observed with sterilization of medical equipment, where 60.17% strongly agreed and 30.81% agreed that sterilization reduces HAIs. This finding emphasizes that sterilization remains one of the most trusted and widely accepted components of infection prevention. Disagreement was again limited, with only 6.10% disagreeing and 2.91% strongly disagreeing. Furthermore, when respondents were asked whether the use of protective barriers such as gloves and masks prevents HAIs, 54.65% strongly agreed and 35.76% agreed, making protective equipment another highly endorsed strategy. Here, 9.59% of respondents expressed disagreement, which, though small, suggests that a minority may perceive gaps in the consistent use or effectiveness of protective barriers.

Table 2: Respondents' Responses on Prevention Strategies of HAIs (N = 344)

Item	Statement (Prevention Strategy)	SA (n, %)	A (n, %)	D (n, %)	SD (n, %)
B6	Prevention strategies reduce incidence of HAIs	222 (64.53)	98 (28.49)	15 (4.36)	9 (2.62)
B7	Proper hand hygiene is effective in preventing HAIs	194 (56.40)	126 (36.63)	17 (4.94)	7 (2.03)
B8	Infection control procedures minimize HAIs	226 (65.70)	88 (25.58)	16 (4.65)	14 (4.07)
B9	Sterilization of medical equipment reduces HAIs	207 (60.17)	106 (30.81)	21 (6.10)	10 (2.91)
B10	Use of protective barriers (e.g., gloves, masks) prevents HAIs	188 (54.65)	123 (35.76)	20 (5.81)	13 (3.78)

Source: Field Survey, 2025

4.3. *Binary Prevention Classification and HAI Outcome*

From figure 2, when responses were dichotomized into "good prevention" and "poor prevention," the majority of nurses 189(57.8%) fell into the good-prevention group, while a smaller but notable proportion 145(42.2%) were classified as poor-prevention. Interestingly, good prevention was far more common when prevention strategies were consistently practiced, whereas lapses in training or compliance increased the likelihood of poor-prevention classification.

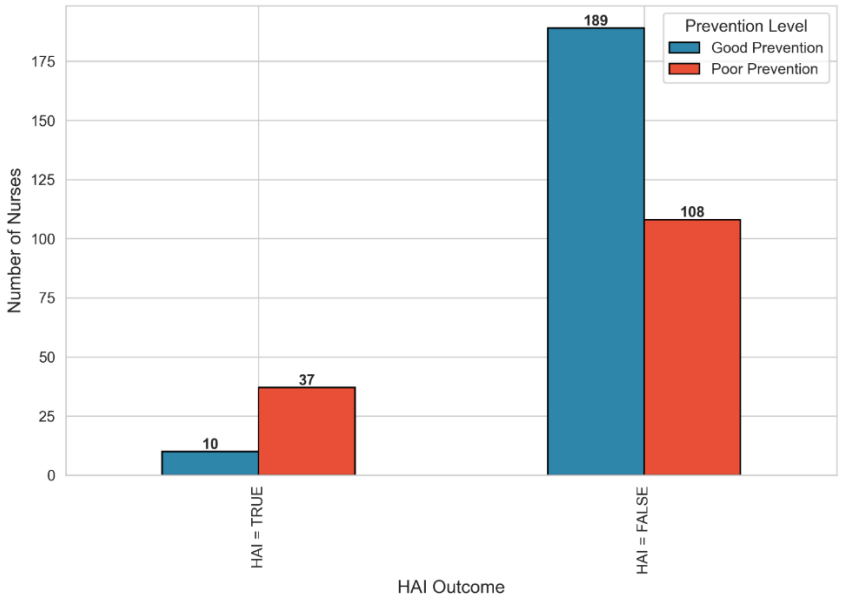


Figure 2: Binary Prevention Classification and HAI Outcome

License: This article is distributed under the terms of the https://creativecommons.org/licenses/by/4.0/

Test of Hypothesis

Null Hypothesis (H_0): Prevention strategies do not significantly influence Healthcare Associated Infections (HAIs) among nurses in selected Public Healthcare Facilities in Southwest Nigeria.

Alternative Hypothesis (H_1): Prevention strategies significantly influence Healthcare Associated Infections (HAIs) among nurses in selected Public Healthcare Facilities in Southwest Nigeria.

Decision Rule: If $p < 0.05$, reject H_0 and conclude that prevention strategies have a significant effect on HAI outcomes. Otherwise, fail to reject H_0.

4.4. *Correlation and Regression of Prevention Score with HAI Score*

Table 3 summarizes the relationship between prevention strategies and Healthcare Associated Infections (HAIs). The Pearson correlation between the prevention score and HAI score was $r = –0.382$ ($p < 0.001$), indicating a statistically significant, moderate negative association. This suggests that higher prevention scores shows stronger adherence to preventive strategies and were associated with fewer reported HAIs among nurses.

The regression analysis further supports this relationship. The simple OLS model showed that the prevention score significantly predicted HAI outcomes with a coefficient of $\beta = –0.062$ ($p < 0.001$). This means that for every one-unit increase in the prevention score, the HAI score decreased by approximately 0.06 units. Although the absolute effect size is small, it is meaningful in the context of infection control, where even marginal reductions can have substantial public health implications. The model explained about 14.6% of the variance in HAIs ($R^2 = 0.146$), means that prevention strategies play an important but not exclusive role in infection control outcomes.

The chi-square test examined the categorical relationship between prevention practice (good vs poor) and the presence of any HAI. The results were highly significant ($\chi^2 = 28.149$, $p < 0.001$), showing that the likelihood of HAIs was strongly dependent on whether respondents fell into the good- or poor-prevention group. Nurses with good prevention practices were significantly less likely to report HAIs compared to those with poor prevention, reinforcing the regression and correlation findings. Since the p-values across multiple tests were consistently below the 0.05 threshold, the null hypothesis is rejected. This indicates that prevention strategies have a significant influence on HAI outcomes.

Table 3: Correlation and Regression of Prevention Score with HAI Score

Analysis	Statistic	Value	p-value
Pearson correlation (prevention × HAI)	r	–0.382	0.000
Simple OLS regression	β (prevention score)	–0.062	0.000
	R^2	0.146	
Chi-square (prevention binary × HAI any)	χ^2	28.149	0.000

Source: Field Survey, 2025

4.5. *Mixed Linear Model for Prevention Strategies and HAI Score*

Table 4 presents the results of a mixed linear model that accounted for socio-demographic characteristics alongside prevention strategies to predict HAI outcomes. The findings provide deeper insight into which factors significantly influence the risk of HAIs after adjusting for clustering effects across groups. The prevention score remained a strong and statistically significant predictor (Coef. = –0.046, $p < 0.001$). This indicates that higher prevention adherence is consistently associated with lower HAI scores, even after adjusting for gender, education, and years of experience. This result strengthens the evidence from the correlation and regression analysis, confirming that preventive measures independently reduce infection risk. Among socio-demographic factors, gender emerged as a significant predictor. Female nurses were more likely to report higher HAI scores compared to males (Coef. = 0.033, $p = 0.002$). This finding could reflect differences in role assignments, workload, or exposure to infection-prone procedures, although further contextual analysis would be required to explain this differences. Educational attainment also played a role. Respondents with an M.Sc degree had significantly higher HAI scores compared to those with diploma/nursing certificates (DN) (Coef. = 0.071, $p < 0.001$). Interestingly, other levels of education, including B.NSc and PhD, were not significant predictors meaning that advanced education does not uniformly protect against HAIs. This counterintuitive pattern may point to the fact that higher-qualified nurses are often assigned to more complex procedures and high-risk environments, thereby increasing their likelihood of exposure. Years of experience did not significantly predict HAIs across categories (all $p > 0.15$). This implies that while experience may improve awareness and practice, it does not necessarily shield nurses from infection risks.

License: This article is distributed under the terms of the https://creativecommons.org/licenses/by/4.0/

Table 4: Mixed Linear Model for Prevention Strategies and HAI Score

Predictor	Coef.	Std.Err	z	p-value	95% CI
Intercept	–0.212	169170.6	–0.000	1.000	–331568.5 – 331568.1
Gender (Female vs Male)	0.033	0.011	3.073	0.002	0.012 – 0.054
Education (B.NSc vs DN)	–0.000	0.012	–0.022	0.982	–0.025 – 0.024
Education (M.Sc vs DN)	0.071	0.016	4.587	0.000	0.041 – 0.101
Education (PhD vs DN)	0.000	0.019	0.013	0.990	–0.037 – 0.038
Experience (5–8 yrs vs <5 yrs)	–0.005	0.013	–0.387	0.699	–0.031 – 0.021
Experience (9–11 yrs vs <5 yrs)	–0.017	0.012	–1.408	0.159	–0.042 – 0.007
Experience (≥12 yrs vs <5 yrs)	–0.004	0.011	–0.347	0.729	–0.025 – 0.017
Prevention score	–0.046	0.008	–5.836	0.000	–0.062 – –0.031

Source: Field Survey, 2025

5. Discussion

Nurses exhibited strong consensus regarding the effectiveness of preventive strategies in reducing HAIs. Nurses in this study demonstrated high awareness of the efficacy of preventive strategies, with over 93% acknowledging hand hygiene and approximately 64.5% strongly agreeing that prevention strategies reduce infection rates. Adherence scores indicated that 57.8% demonstrated "good-prevention" practices, while 42.2% were classified as "poor-prevention." This leaves a substantial proportion of the nurses to risk due to suboptimal compliance. Prevention scores were negatively correlated with HAI incidence ($r = –0.382$, $p < 0.001$). Regression analyses showed that prevention practices significantly predicted reduced HAI outcomes ($\beta = –0.062$, $p < 0.001$; $R^2 = 0.146$). Chi-square analyses confirmed a strong association between prevention adherence and HAI occurrence ($\chi^2 = 28.149$, $p < 0.001$). Mixed-effects modeling demonstrated that prevention scores remained a robust predictor of lower HAI incidence (Coef = –0.046, $p < 0.001$), independent of gender and educational level. Years of experience did not significantly influence HAI risk. Consistent adherence to prevention strategies substantially mitigates the risk of HAIs, independent of professional experience. These findings are consistent with Ketata *et al*. (2021), Khanam *et al*. (2020), and Stewart *et al*. (2021), which collectively highlighted the centrality of strict compliance with hand hygiene, barrier precautions, and sterilization protocols in mitigating HAIs. Mixed-effects modeling further demonstrated that these effects were independent of years of professional experience, emphasizing that knowledge and adherence, rather than tenure, are the primary determinants of effective infection prevention. The results also echo studies from developing countries, including Nigeria, where Murni *et al.* (2015) reported that multifaceted interventions which includes hand hygiene campaigns and rational antibiotic use significantly reduced HAI prevalence. Similarly, Bob-Manuel *et al.* (2023) and Afolabi *et al.* (2022) documented that adherence to preventive protocols is pivotal in reducing HAIs, particularly in tertiary hospitals with high patient volumes. These findings illustrate that structural and behavioural factors, such as workload, supervision, and institutional culture, are as important as knowledge. In addition, prevention strategies may fail without consistent monitoring, feedback, and reinforcement which is a gap highlighted by the suboptimal surveillance reported in this study.

6. Conclusion

This study investigated nurses' compliance with healthcare-associated infection (HAI) prevention practices in public healthcare facilities in Nigeria. The findings revealed that nurses possessed a strong awareness of infection prevention principles and demonstrated positive attitudes toward the importance of preventive strategies in controlling HAIs. The majority of respondents recognized hand hygiene, sterilization, and the use of protective barriers as effective interventions in reducing infection rates. However, the analysis also indicated several differences in the consistency of these practices. Although more than half of the nurses exhibited good preventive behaviors, a significant proportion still demonstrated lapses in compliance. The correlation and regression analyses established a significant negative relationship between prevention practices and HAI occurrence, implying that consistent adherence to infection control measures effectively reduces infection risk. The mixed linear model further confirmed that preventive practices remained a strong predictor of lower HAI outcomes, even after adjusting for demographic and professional characteristics. In conclusion, the study demonstrates that while nurses in public healthcare facilities in Nigeria possess adequate knowledge and a generally positive attitude toward infection prevention, gaps remain in the consistent application of these practices. Therefore, nurses' prevention practices can be described as moderately satisfactory but in need of continuous improvement.

License: This article is distributed under the terms of the https://creativecommons.org/licenses/by/4.0/

7. Recommendation

- Hospitals should implement mandatory, periodic refresher courses on infection prevention and control (IPC) for all nursing staff. Regular workshops, simulations, and practical demonstrations should be organized to reinforce compliance with hand hygiene, and sterilization.
- Healthcare administrators should establish structured systems for supervision, monitoring, and evaluation of IPC practices. Regular audits and performance feedback will help sustain behavioral change and ensure accountability across all nursing cadres.
- Adequate provision of handwashing facilities, sterilization equipment, protective barriers materials is essential. Hospitals should ensure uninterrupted access to these resources to eliminate compliance barriers caused by shortages

References

Afolabi, A. O., Onipede, A. O., Omisore, A. G., Osho, P. O., Adewale, O. A., & Afolabi, O. J. (2022). Pattern of healthcare-associated infections and state of hygiene in a tertiary hospital in southwest Nigeria. *Journal of Infection Prevention, 23*(1), 17–25. https://doi.org/10.1177/17571774211029341

Afolabi, M. O., Onipede, A. O., Omokanye, L. O., Olaitan, J. O., & Ajayi, A. O. (2019). Knowledge and practice of infection control among healthcare workers in a tertiary hospital in southwest Nigeria. *American Journal of Infection Control, 47*(4), 431–436. https://doi.org/10.1016/j.ajic.2018.08.013

Afolabi, O. T., Onipede, A. O., Omotayo, S. K., Oluyede, C. O., Olajide, F. O., Oyelese, A. O., and Olawande, O. (2022). Hospital Acquired Infection in Obafemi Awolowo University Teaching Hospital, Ile-Ife, Southwest, Nigeria: A Ten Year Review (2000-2009). *Sierra Leone Journal of Biomedical Research, 3*(2), 110-115.

Allegranzi, B., Bagheri Nejad, S., Combescure, C., Graafmans, W., Attar, H., Donaldson, L., & Pittet, D. (2017). Burden of endemic health-care-associated infection in developing countries: Systematic review and meta-analysis. *The Lancet, 377*(9761), 228–241. https://doi.org/10.1016/S0140-6736(10)61458-4

Allegranzi, B., Bagheri Nejad, S., Combescure, C., Graafmans, W., Attar, H., Donaldson, L., & Pittet, D. (2011). Burden of endemic health-care-associated infection in developing countries: Systematic review and meta-analysis. *The Lancet, 377*(9761), 228–241. https://doi.org/10.1016/S0140-6736(10)61458-4

Allegranzi, B., Storr, J., Dziekan, G., Leotsakos, A., Donaldson, L., & Pittet, D. (2007). The First Global Patient Safety Challenge "Clean Care is Safer Care": From launch to current progress and achievements. *Journal of Hospital Infection, 65*(Suppl 2), 115–123. https://doi.org/10.1016/S0195-6701(07)60027-9

Appiah, B. (2010). The impact of training on employee performance: A case study of HFC Bank (Ghana) Ltd. *Commonwealth Executive Master of Business Administration (CEMBA) Thesis*. Kwame Nkrumah University of Science and Technology.

Appiano, A. (2014). The effect of training on employee performance. *International Journal of Management Research and Business Strategy, 3*(2), 1–9.

Begum, S., Sarker, S., Sultana, R., & Hossain, M. S. (2017). Prevalence of nosocomial infections in a private hospital in Dhaka, Bangladesh. *Bangladesh Journal of Medical Microbiology, 11*(2), 3–7. https://doi.org/10.3329/bjmm.v11i2.31419

Bello, A. I., Asiedu, E., Adegoke, B. O. A., Quartey, J. N. A., Appiah-Kubi, K. O., & Owusu-Ansah, B. (2020). Infection prevention and control practices: A cross-sectional survey of healthcare workers in Ghana and Nigeria. *BMC Health Services Research, 20*(1), 1–10. https://doi.org/10.1186/s12913-020-05269-3

Bob-Manuel , M., Oboro , I. L., Okafor AC, A., Briggs, D. C., Amadi, S. C., Enyinnaya, S., Uzosike, T. C., Lawson, S. D., Dan-Jumbo, A. I., and Aaron, F. E. (2023). Point Prevalence Survey of Healthcare associated infections in a Tertiary Institution, in Southern Nigeria: *Nigerian Medical Journal, 64*(1), 125.https://doi.org/10.60787/NMJ-64-1-228

Cohen, J. (1988). *Statistical power analysis for the behavioral sciences* (2nd ed.). Lawrence Erlbaum Associates.

Collins, A. S. (2008). Preventing health care–associated infections. In R. A. Hughes (Ed.), *Patient safety and quality: An evidence-based handbook for nurses* (pp. 547–575). Agency for Healthcare Research and Quality (US).

Ekwere, T. A., & Okafor, I. P. (2013). Hand hygiene knowledge and practices among healthcare providers in a tertiary hospital, South West Nigeria. *International Journal of Infection Control, 9*(4), 1–10. https://doi.org/10.3396/IJIC.v9i4.035.13

Faruquzzaman, M. (2011). Nosocomial infections in surgical ward of Dhaka Medical College Hospital. *Bangladesh Journal of Medicine, 22*(1), 21–26.

Federal Ministry of Health. (2025). *Ethical approval for research involving human participants*. Abuja: Author.

Gershon, R. R., Pearson, J. M., Sherman, M. F., Samar, S. M., Canton, A. N., Stone, P. W., & Damsky, M. R. (2019). The role of organizational climate in preventing healthcare-associated infections. *BMJ Quality & Safety, 28*(3), 180–187. https://doi.org/10.1136/bmjqs-2018-008706

Green, C., Armstrong, P., Todd, J., & Jones, R. (2015). Healthcare-associated infections: Causes, prevention, and treatment. *British Journal of Nursing, 24*(21), 1078–1084. https://doi.org/10.12968/bjon.2015.24.21.1078

Harrison, R. (2000). Employee development. *Institute of Personnel and Development*.

Hasan, M. (2010). Infection control in Bangladesh: Current situation and future perspectives. *Journal of Health, Population and Nutrition, 28*(4), 345–352.

Horan, T. C., Andrus, M., & Dudeck, M. A. (2008). CDC/NHSN surveillance definition of health care–associated infection and criteria for specific types of infections in the acute care setting. *American Journal of Infection Control, 36*(5), 309–332. https://doi.org/10.1016/j.ajic.2008.03.002

International Medical Corps. (2020). *Participatory Approach to Learning in Systems (PALS): Training manual for infection prevention and control*. International Medical Corps.

Kennedy, K. J., Roberts, J. A., & Buising, K. L. (2013). Health care–associated infections: Prevention strategies. *Internal Medicine Journal, 43*(6), 649–654. https://doi.org/10.1111/imj.12121

Ketata N, Ayed HB, Hmida MB, Trigui M, Jemaa MB, Yaich S, Maamri H, Baklouti M, Jedidi J, Kassis M, and Feki H. (2021) Point prevalence survey of health-care associated infections and their risk factors in the tertiary-care referral hospitals of Southern Tunisia. *Infect Dis Health. 26*(4):284–91.

License: This article is distributed under the terms of the https://creativecommons.org/licenses/by/4.0/

Khan, H. A., Baig, F. K., & Mehboob, R. (2019). Nosocomial infections: Epidemiology, prevention, control, and surveillance. *Asian Pacific Journal of Tropical Biomedicine, 7*(5), 478–482. https://doi.org/10.1016/j.apjtb.2017.01.019

Monegro, A. F., Muppidi, V., & Regunath, H. (2021). Hospital acquired infections. In *StatPearls*. StatPearls Publishing.

Murni, I. K., Duke, T., Kinney, S., Daley, A. J., and Soenarto, Y. (2015). Reducing Healthcare associated infections and improving the rational use of antibiotics in a developing country: An effectiveness study. *Archives of Disease in Childhood, 100*(5), 454-459.

Ogunsola, F. T., & Adesiji, Y. O. (2008). Comparison of four methods of hand washing in situations of inadequate water supply. *West African Journal of Medicine, 27*(1), 24–28. https://doi.org/10.4314/wajm.v27i1.28287

Okeke, I. N., Aboderin, A. O., Byarugaba, D. K., Ojo, K. K., & Opintan, J. A. (2021). Growing problem of multidrug-resistant enteric pathogens in Africa. *Emerging Infectious Diseases, 23*(1), 164–169. https://doi.org/10.3201/eid2301.160646

Okonkwo, I., Akunne, A., & Chukwuka, C. (2018). Point prevalence survey of hospital-acquired infections in three acute care hospitals in Nigeria. *Antimicrobial Resistance & Infection Control, 7*(1), 1–7. https://doi.org/10.1186/s13756-018-0360-9

Oyinloye, M. , Adegboyega, S. , Akinluyi, F. , Komolafe, A. , Akinyede, J. , Aladejana, O. and Akande, S. (2023) Detection and Mapping of Violent Crime Hotspots in Southwestern Nigeria. *Journal of Geographic Information System, 15*, 334-365. doi: 10.4236/jgis.2023.153017.

Patient Care Link. (2019). *Healthcare-associated infections fact sheet*. https://patientcarelink.org

Pigors, P., & Myers, C. A. (1989). *Personnel administration: A point of view and a method* (9th ed.). McGraw-Hill.

Plowman, R., Graves, N., Griffin, M. A. S., Roberts, J. A., Swan, A. V., Cookson, B., & Taylor, L. (2001). The rate and cost of hospital-acquired infections occurring in patients admitted to selected specialties of a district general hospital in England and the national burden imposed. *Journal of Hospital Infection, 47*(3), 198–209. https://doi.org/10.1053/jhin.2000.0881

RN Bulletin. (2020). *Statistics of registered nurses and midwives in Nigeria*. Nursing and Midwifery Council of Nigeria.

Shamsuzzaman, A. K. M. (2015). Hand hygiene in infection control: A strategic approach. *Bangladesh Journal of Medical Science, 14*(2), 115–120. https://doi.org/10.3329/bjms.v14i2.18107

Swart, J., Mann, C., Brown, S., & Price, A. (2005). *Human resource development: Strategy and tactics*. Elsevier Butterworth-Heinemann.

WHO. (2020). *Core components for infection prevention and control programmes*. World Health Organization.

World Health Organization. (2016). *Guidelines on core components of infection prevention and control programmes at the national and acute health care facility level*. WHO. https://www.who.int/publications/i/item/9789241549929

World Health Organization. (2020). *Report on the burden of endemic health care-associated infection worldwide*. WHO. https://www.who.int/publications/i/item/9789241501507

World Health Organization. (2022). *Health care-associated infections fact sheet*. WHO. https://www.who.int/news-room/fact-sheets/detail/health-care-associated-infections

Wright, P. C., & Geroy, G. D. (2001). Changing the mindset: The training myth and the need for world-class performance. *International Journal of Human Resource Management, 12*(4), 586–600. https://doi.org/10.1080/713769653

Zhang, Y. (2024). Capacity building for infection prevention and control in Nigeria through the PALS approach. *Journal of Global Health, 14*, 02015. https://doi.org/10.7189/jogh.14.02015

License: This article is distributed under the terms of the https://creativecommons.org/licenses/by/4.0/