

Predictors of Knowledge about Health and Safety among Health Workers

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Abstract: Health and safety are pivotal in ensuring the protection of healthcare workers (HCWs) and patients from occupational hazards and infectious diseases. This study employed a cross-sectional design to examine the predictors of knowledge about health and safety among HCWs at a tertiary healthcare institution in Northern Nigeria. A sample of 250 HCWs was selected using stratified random sampling across various departments including clinical, nursing, laboratory, and support services. Data were collected using a structured and pretested self-administered questionnaire. The questionnaire covered demographic details and knowledge of health and safety practices. Data were analyzed using SPSS version 25. Descriptive statistics, Chi-square tests, and logistic regression analyses were conducted. The results indicated significant associations between knowledge and factors such as age, type of organization, position held, and years of service. Particularly, HCWs aged 30-39 demonstrated higher knowledge levels, while those in the 40-49 age group and those employed as contractors or support staff showed poorer knowledge. The study underscores the importance of targeted interventions and continuous professional education to enhance health and safety knowledge among HCWs in Nigerian healthcare institutions. These findings have practical implications for policy makers, hospital administrators, and training institutions aiming to strengthen the health and safety culture within the healthcare system.

Keywords: Health workers, safety knowledge, predictors, occupational hazards, Nigeria, healthcare safety, professional training

I. Introduction

Occupational health and safety (OHS) remain critical concerns within healthcare delivery systems, especially in developing countries like Nigeria where health infrastructure is often inadequate. Healthcare workers (HCWs) face numerous hazards in their daily activities, ranging from exposure to infectious diseases, hazardous chemicals, and injuries from sharp objects, to ergonomic and psychosocial risks. According to the World Health Organization (WHO, 2020), HCWs are at a heightened risk of workplace injuries and infections, particularly in low- and middle-income countries (LMICs).

In Nigeria, the situation is compounded by systemic challenges such as insufficient training, poor compliance with safety standards, unavailability of personal protective equipment (PPE), and lack of institutional support (Owolabi et al., 2017). Despite awareness campaigns and safety policies, many healthcare institutions struggle to implement sustainable health and safety practices.

Several studies have highlighted poor knowledge and unsafe practices among HCWs regarding infection control and occupational safety (Adejumo et al., 2019; Amoran & Onwube, 2017). However, little attention has been paid to identifying the specific predictors of health and safety knowledge within the Nigerian healthcare context. Understanding these predictors is vital to designing effective and context-specific interventions.

This study, therefore, aims to assess the level of knowledge about health and safety among HCWs and to identify key sociodemographic and organizational factors that predict this knowledge. The research contributes to existing literature by focusing on a tertiary healthcare facility in Northern Nigeria and by providing evidence-based recommendations for improving safety education and compliance.

Objectives of the Study

1. To assess the level of knowledge about health and safety among healthcare workers.
2. To identify socio-demographic and organizational predictors of knowledge about health and safety practices among HCWs.
3. To provide recommendations for targeted interventions to improve occupational health and safety knowledge.

II. Literature Review

Occupational Hazards in Healthcare

Healthcare environments pose a range of occupational hazards. Common risks include biological exposures (e.g., HIV, hepatitis), chemical hazards, physical injuries, and ergonomic stressors. Studies have shown that needlestick injuries alone account for over 3 million exposure incidents annually, with the majority occurring in LMICs (WHO, 2020). These risks are heightened by inadequate infection control systems and overburdened facilities (Ngatu et al., 2017).

Health and Safety Knowledge among HCWs

Knowledge of safety protocols is essential for protecting both HCWs and patients. Practices such as hand hygiene, proper waste disposal, and correct use of PPE are directly influenced by the worker's knowledge. Bello et al. (2021) found that better-informed workers demonstrated higher adherence to hygiene practices. Nonetheless, studies from Ghana and Nigeria show widespread knowledge gaps (Darko et al., 2022; Adejumo et al., 2019), often linked to infrequent training and inadequate institutional commitment to safety education.

Predictors of Knowledge

Existing research identifies various predictors of safety knowledge. These include age, educational level, years of experience, professional rank, and exposure to formal training (Adane et al., 2019; Askarian et al., 2020). Professional experience often correlates with better knowledge retention and practical application of safety measures. However, some studies suggest that organizational support, departmental differences, and availability of resources may outweigh individual attributes in shaping knowledge (Garus-Pakowska et al., 2019).

III. Methodology

Study Design

This study adopted a descriptive cross-sectional design suitable for identifying the prevalence and predictors of knowledge at a single point in time.

Study Area and Population

The study was conducted at the Federal Medical Centre, Azare, a tertiary healthcare institution in Bauchi State, North-East Nigeria. The target population comprised all categories of HCWs including medical doctors, nurses, laboratory scientists, pharmacists, radiographers, cleaners, and auxiliary staff.

Sample Size Determination

The required sample size of 250 was estimated using Cochran's formula: Assuming a 50% prevalence of good knowledge, a 95% confidence level, and a 5% margin of error, the computed sample was adjusted for non-response. Stratified random sampling was applied to ensure proportionate representation of all relevant departments and job cadres.

Instrumentation and Data Collection

Data were collected using a validated and structured self-administered questionnaire. The tool was divided into four sections: demographic information, training exposure, knowledge assessment, and job-specific variables. The questionnaire underwent pretesting among 20 HCWs from a different facility in the same state. It demonstrated satisfactory reliability with a Cronbach's alpha of 0.78.

Measurement of Variables

Knowledge was measured using 15 multiple-choice items focusing on hygiene practices, PPE usage, and emergency protocols. Responses were scored and categorized as Good (80% and above) or Poor (below 80%).

Ethical Considerations

Approval was granted by the Ethics Review Committee of Federal Medical Centre, Azare (Approval No: FMC/AZ/REC/2024/041). Participants provided written informed consent. Confidentiality and anonymity were maintained throughout the study.

Data Analysis

Data were coded and entered into SPSS version 25. Descriptive statistics were used to summarize demographic characteristics. Chi-square tests examined associations between categorical variables and knowledge levels. Bivariate and multivariate logistic regression analyses were used to determine significant predictors. Results were presented with 95% confidence intervals and p-values <0.05 considered statistically significant.

IV. Results

A total of 250 HCWs participated. Males constituted 59.6%, and females 40.4%. The most represented age group was 30-39 years (36.7%). Most respondents were in the civil service (68.9%), followed by contractors (14.3%). Regarding job positions, general workers (35.3%) and middle managers (25.5%) dominated. Overall, 77.2% of respondents had good knowledge. Bivariate analysis showed significant associations between knowledge levels and age, type of organization, job position, and years of experience ($p < 0.05$).

The sociodemographic profile of the study participants is displayed in Table 1. Respondents are grouped according to their gender, age, kind of organization, position held, and years of service. The distribution of respondents among these groups is highlighted by the frequencies and accompanying percentages, which shed information on the characteristics of the staff members who participated in this assessment. Understanding the viewpoints offered in the study requires knowledge of this information.

Table 1: Socio-Demographic Characteristics of Respondents

Variables	Frequency	Percentage (%)
Gender		
Male	149	59.6
Female	101	40.4
Age (Years)		
≤20 years	8	3.1
20 - 29 years	40	16.1
30 - 39 years	92	36.7
40 - 49 years	69	27.6
≥50 years	41	16.4
Type of Organization		
Consultant	18	7.3
Civil service	172	68.9
Contractor	36	14.3
Regulators	14	5.6
Authority	10	3.8
Position Held		
Top Management	27	10.8
Middle Management	64	25.5
Support Staff	37	14.7
Artisans	34	13.6
General Workers	88	35.3
Duration of service (years)		
≤5 years	60	24.1
6 - 10 years	84	33.6
11 - 15 years	66	26.2
16 - 20 years	28	11.2
≥ 21 years	12	4.9
Knowledge		
Good	193	77.2
Poor	57	22.8

Bivariate statistical examination of the relationship between healthcare workers' (HCWs') sociodemographic traits and their knowledge of health and safety is displayed in Table 2. The participants are divided into groups based on important characteristics such as age, gender, job title, organizational type, and duration of service.

The information is carefully organized to make it easier to compare respondents' knowledge levels—which are classified as "Good" or "Poor"—across various sociodemographic factors. There were 250 participants in the study overall, and the frequency and percentage distributions that were obtained provide important information about the characteristics of the medical staff that were participated

Table 2: Bivariate Statistical Exploration of Association Between Health and Safety Knowledge of the Respondents and Their Socio-demographic Variables.

Factors	Level	Knowledge Level		n = 250	
		Good (%)	Poor (%)	Total	χ^2 (P-value)
Gender	Male	116(77.9)	33(22.1)	149	0.8(0.765)
	Female	77(76.2)	24(23.8)	101	
	Total	193(77.2)	57(22.8)	250	
Age (Years)	≤20	3(37.5)	5(62.5)	8	60.8(0.000)
	20 - 29	34(85.0)	6(15.0)	40	
	30 - 39	87(94.6)	5(5.4)	92	
	40 - 49	33(47.8)	36(52.2)	69	
	≥50	36(87.8)	5(12.2)	41	
Type of Organization	Consultant	16(88.9)	2(11.1)	18	107.3(0.000)
	Civil service (Medical)	155(90.1)	17(9.9)	172	
	Contractor	4(11.1)	32(88.9)	36	
	Regulators	11(78.6)	3(21.4)	14	
	Authority	7(70.0)	3(30.0)	10	
Position Held	Top Management	23(85.2)	4(14.8)	27	25.3(0.000)
	Middle Management	57(89.1)	7(10.9)	64	
	Support Staff	21(56.8)	16(43.2)	37	
	Artisans	19(55.9)	15(44.1)	34	
	General Workers	73(83.0)	15(17.0)	88	
Duration of service (years)	≤5	35(58.3)	25(41.1)	60	20.4(0.000)
	6 - 10	65(77.4)	19(22.6)	84	
	11 - 15	60(90.9)	6(9.1)	66	
	16 - 20	24(85.7)	4(14.3)	28	
	≥ 21	9(75.0)	3(25.0)	12	

Table 3 provides an extensive overview of Bivariate Logistic Regression Analysis, explaining the crude odds ratios (COR) related to respondents' awareness of health and safety when categorized by different socio-demographic variables. When it comes to age demographics, respondents who were between the ages of 30 and 39 had the highest level of knowledge attainment, with 94.6% of them being classified as "Good." This was accompanied by a statistically significant odds ratio of 0.18 ($p < 0.001$), indicating a notable decline in knowledge levels for older age groups, especially those who were between the ages of 40 and 49 (47.8% "Good"). The table also illustrates organizational kinds and highlights notable differences in knowledge levels. For example, the percentage of civil service medical workers and regulatory staff with strong knowledge was higher (90.1% and 78.6%, respectively).

Table 3: Bivariate Logistic Regression Analysis Summary (Crude Odds Ratios) of the Health and Safety Knowledge of the Respondents and Their Socio-demographic Variables

Factors	Level	Knowledge Level		COR (95% CL)	P-value
		Good (%)	Poor (%)		
Gender	Male	116(77.9)	33(22.1)	1	
	Female	77(76.2)	24(23.8)	0.28(0.19-0.42)	
Age (Years)	≤20	3(37.5)	5(62.5)	1	
	20 - 29	34(85.0)	6(15.0)	1.67(0.40-6.97)	0.484
	30 - 39	87(94.6)	5(5.4)	0.18(0.07-0.42)	0.000
	40 - 49	33(47.8)	36(52.2)	0.06(0.02-0.14)	0.000
	≥50	36(87.8)	5(12.2)	1.09(0.68-1.75)	0.718
Type of Organization	Consultant	16(88.9)	2(11.1)	1	
	Civil service (Medical)	155(90.1)	17(9.9)	0.13(0.03-0.54)	0.006
	Contractor	4(11.1)	32(88.9)	0.11(0.07-0.18)	0.000
	Regulators	11(78.6)	3(21.4)	8.00(2.83-22.6)	0.000
	Authority	7(70.0)	3(30.0)	0.27(0.08-0.98)	0.046
Position Held	Top Management	23(85.2)	4(14.8)	1	
	Middle Management	57(89.1)	7(10.9)	0.17(0.06-0.50)	0.001
	Support Staff	21(56.8)	16(43.2)	0.12(0.06-0.27)	0.000
	Artisans	19(55.9)	15(44.1)	0.76(0.40-1.46)	0.413
	General Workers	73(83.0)	15(17.0)	0.79(0.40-1.55)	0.494
Duration of service (years)	≤5	35(58.3)	25(41.1)	1	
	6 - 10	65(77.4)	19(22.6)	0.71(0.43-1.19)	0.199
	11 - 15	60(90.9)	6(9.1)	0.29(0.18-0.49)	0.000
	16 - 20	24(85.7)	4(14.3)	0.10(0.04-0.23)	0.000
	≥ 21	9(75.0)	3(25.0)	0.17(0.06-0.48)	0.001

A summary of multivariate logistic regression analysis is shown in Table 4, which includes adjusted odds ratios (AOR) based on several socio-demographic variables that correspond to the degree of knowledge that healthcare personnel have about health and safety standards. The results shown in this table demonstrate the relationship between demographic characteristics and knowledge level, which are divided into two categories: "Good" and "Poor."

The results indicate that workers in the contractor category had significantly lower health and safety knowledge, with an AOR of 0.04 ($p = 0.001$). On the other hand, employees in the civil service had strong knowledge, with 90.1% being classified as good, but their AOR of 0.13 was not statistically significant ($p = 0.181$). The positions in top management served as the benchmark for comparison. AORs were seen for other categories as well, such as support personnel (0.28, $p = 0.182$) and middle management (0.23, $p = 0.261$), none of which reached statistical significance but suggest noteworthy trends. The group serving 6–10 years approached significance (AOR = 10.78, $p = 0.054$), but other durations showed AORs indicating lower knowledge levels without reaching significance, especially for those serving 5 years or less. The term of service also showed varied odds ratios.

Table 4: Multivariate Logistic Regression Analysis Summary (Adjusted Odds Ratios) of the Health and Safety Knowledge of the Respondents and Their Socio-demographic Variables.

Factors	Level	Knowledge Level		AOR (95% CL)	P-value
		Good (%)	Poor (%)		
Gender	Male	116(77.9)	33(22.1)	1	
	Female	77(76.2)	24(23.8)	0.61(0.19-1.92)	0.400

Age (Years)	≤20	3(37.5)	5(62.5)	1	
	20 - 29	34(85.0)	6(15.0)	1.22(0.07-21.9)	0.894
	30 - 39	87(94.6)	5(5.4)	0.16(0.01-1.70)	0.127
	40 - 49	33(47.8)	36(52.2)	0.00(0.00-0.00)	0.992
	≥50	36(87.8)	5(12.2)	7.99(1.56-41.0)	0.013
Type of Organization	Consultant	16(88.9)	2(11.1)	1	
	Civil service (Medical)	155(90.1)	17(9.9)	0.13(0.01-2.54)	0.181
	Contractor	4(11.1)	32(88.9)	0.04(0.00-0.27)	0.001
	Regulators	11(78.6)	3(21.4)	0.05(0.00-0.00)	0.992
	Authority	7(70.0)	3(30.0)	0.41(0.03-5.35)	0.498
Position Held	Top Management	23(85.2)	4(14.8)	1	
	Middle Management	57(89.1)	7(10.9)	0.23(0.02-2.96)	0.261
	Support Staff	21(56.8)	16(43.2)	0.28(0.04-1.81)	0.182
	Artisans	19(55.9)	15(44.1)	1.87(0.40-8.73)	0.426
	General Workers	73(83.0)	15(17.0)	0.58(0.11-3.05)	0.517
Duration of service (years)	≤5	35(58.3)	25(41.1)	1	
	6 - 10	65(77.4)	19(22.6)	10.78(0.96-121)	0.054
	11 - 15	60(90.9)	6(9.1)	4.55(0.48-43.0)	0.187
	16 - 20	24(85.7)	4(14.3)	0.28(0.03-2.55)	0.256
	≥ 21	9(75.0)	3(25.0)	3.49(0.16-76.6)	0.428

V. Discussion

The analysis indicates that previous research has identified several factors influencing healthcare workers' (HCWs') comprehension of health and safety protocols. Important factors include age, gender, years of work experience, educational achievement, and exposure to health and safety training. According to studies, health and safety professionals with greater education tend to be better knowledgeable about safety protocols. This implies that education is essential for improving HCWs' comprehension of and adherence to safety regulations (Adane et al., 2019). Regular health and safety training increase the likelihood that participants will remember safety precautions and apply them successfully in their work (Askarian et al., 2020).

Professional experience is also a key predictor of health and safety knowledge. HCWs with more experience demonstrate a greater level of awareness and knowledge about safety measures than their less experienced peers. This finding lends credence to the idea that spending more time in medical environments fosters better learning and safety procedure adaptation (Babatunde et al., 2022). Given that different age groups have differing levels of knowledge, research suggests that age may also play a part. Younger workers could not have received the same exposure or training as more seasoned workers, which could account for knowledge gaps (Garus-Pakowska et al., 2019).

Depending on the specific healthcare setting, predictors' impact may vary. Formal education or training alone may not be as crucial for knowledge application and retention as departmental environment and resource availability, according to some study. This emphasizes how important it is to tailor interventions to specific contexts in order to meet unique needs (Garus-Pakowska et al., 2019). Although gender is taken into account as a variable in the study, previous research has produced contradictory findings about its influence on knowledge of safety and health. The differences in other studies suggest that further research is necessary to discover any gender-related patterns in training and knowledge transfer, even if the percentage of male respondents with good knowledge was somewhat higher in this study than in others.

VI. Conclusion

The study's conclusion emphasizes how crucial it is to comprehend the factors that influence healthcare workers' (HCWs') knowledge of health and safety at the Federal Medical Centre in Azare. The results show that a number of demographic characteristics, such as years of service, position held, age, and organization type, have a substantial impact on HCWs' understanding of health and safety procedures. In particular, lower knowledge levels were shown by younger age groups and support professionals, indicating the need for focused educational interventions. According to the report, in order to increase adherence to health and safety regulations, improved training programs customized for various staff categories are required.

Addressing the observed gaps in knowledge could decrease occupational dangers and produce a safer healthcare environment for both staff and patients. These results can guide the development of effective training resources, ensuring that all staff, particularly those in vulnerable roles, receive the necessary information and education on health and safety standards. Ultimately, improving health and safety knowledge among HCWs is vital for cultivating a culture of safety and enhancing overall workplace conditions in healthcare settings in Nigeria.

The study concludes that age, employment type, and job cadre significantly influence HCWs' knowledge of occupational health and safety. While knowledge levels were generally high, disparities exist that require tailored interventions. Enhancing institutional policies and training frameworks is key to promoting safety culture.

VII. Recommendations

1. Improve access to health and safety education across all staff categories.
2. Mandate periodic refresher courses and certifications.
3. Prioritize inclusion of contract and support staff in safety initiatives.
4. Establish departmental safety officers to monitor compliance.
5. Foster a safety-first workplace culture through leadership commitment.
6. Integrate feedback mechanisms for continuous improvement.
7. Partner with regulatory bodies to ensure compliance with national standards.

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