

Knowledge, Exposure, and Safety Practices Toward Occupational Hazards Among Healthcare Workers in Accident and Emergency Departments of Tertiary Health Institutions in Rivers State, Nigeria

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Abstract- Healthcare workers in Accident and Emergency (A&E) departments occupy one of the highest risk zones in the health system, routinely encountering biological, physical, chemical, ergonomic, and psycho social hazards that threaten their safety and undermine the quality of emergency care. This study assessed the knowledge, exposure, and safety practices toward occupational hazards among healthcare workers in the A&E departments of two tertiary health institutions in Rivers State, Nigeria, and examined how these variables differed by socio-demographic characteristics. A descriptive cross-sectional design was adopted. A sample of 163 healthcare workers was drawn from the University of Port Harcourt Teaching Hospital and the Rivers State University Teaching Hospital using a self-structured questionnaire that was validated by four public health experts and assessed for reliability through the test-retest method. A total of 157 questionnaires were retrieved, giving a response rate of 96.3 percent. Data were analyzed with SPSS using descriptive statistics (frequency, percentage, mean, standard deviation) and inferential statistics (chi-square, one-way ANOVA, and independent samples t-test) at the 0.05 level of significance. Results showed a moderate overall level of knowledge (grand mean = 1.46, SD = 0.49; 53.4 percent correct response rate), with stronger recognition of biological hazards than of psycho social and ergonomic hazards, and a moderate level of safety practice (grand mean = 3.03, SD = 1.21) marked by high hand hygiene compliance alongside weak training on equipment handling and inconsistent use of personal protective equipment. Age had no significant influence on knowledge, exposure, or safety practice ($p > .05$ in all three comparisons), whereas job duration was significantly associated with knowledge of occupational hazards (chi-square = 31.93, df = 12, $p < .01$). The study recommends institution-driven continuing professional development and strengthened occupational health and safety systems in Nigerian tertiary hospitals.

Index Terms—accident and emergency department, healthcare workers, nigeria, occupational hazards, safety practices

I. INTRODUCTION

Occupational health risk has become a central concern in the global health workforce, particularly among frontline employees in clinical settings who are regularly exposed to a broad range of physical, biological, chemical, ergonomic, and psycho social hazards. The International Labour Organization (ILO, 2021) identifies healthcare workers as one of the most susceptible occupational groups, especially where occupational health and safety standards are low or poorly enforced. In many developing countries, protective equipment remains substandard and training on infection prevention and control is inconsistent, so that occupational risk in healthcare extends beyond physical injury to psycho social conditions such as anxiety, depression, and post-traumatic stress. Compassion fatigue and burnout have been closely linked to the nature of emergency care, where professionals are routinely exposed to trauma, death, and moral conflict. Tens of millions of health workers worldwide carry an elevated occupational risk, with infectious disease, chemical exposure, work-related stress, needle-stick injury, and unsafe patient handling identified among the most prevalent hazards.

Systemic underdevelopment of health infrastructure, fragile regulatory frameworks, and prolonged underinvestment compound occupational hazards among healthcare workers across Sub-Saharan Africa. Makoni et al. (2021) found that more than 58 percent

of healthcare staff in emergency units in the region reported frequent exposure to biological hazards because of inadequate protective equipment and inconsistent adherence to universal safety measures. Adebayo and Fatusi (2019) similarly reported alarming levels of emotional exhaustion, burnout, and psychological distress among Nigerian medical professionals working in critical care units, driven by the absence of organized mental health services, irregular working hours, and workforce shortages. In Ghana, Osei-Bonsu et al. (2020) documented that institutions lacked adequate measures to protect health personnel who were regularly subjected to physical and verbal abuse in accident and emergency settings, further compounding occupational stress. The absence of functional surveillance systems for work-related illnesses and injuries has been identified by the ILO (2021) as one of the most prominent gaps in occupational safety across the sub-region, leaving healthcare specialists to work in conditions that are both unsafe and poorly documented.

Within Nigeria, although national instruments such as the National Policy on Occupational Safety and Health exist, implementation across healthcare institutions remains weak. Ilesanmi and Omotosho (2022) reported that more than 70 percent of emergency health workers in Nigeria experienced at least one occupational hazard annually, while Ezenwa (2020) found that awareness of safety measures did not translate into compliance because of the absence of institutional enforcement and logistical support, including inconsistent supplies of personal protective equipment. A persistent limitation in the Nigerian literature is the tendency to treat healthcare workers as an undifferentiated occupational group. Studies such as Auta et al. (2017) and Ogundele et al. (2021) reported occupational hazard exposure broadly across health institutions without distinguishing the risk profiles associated with specific departments or professional cadres. This generalization obscures the fact that Accident and Emergency (A&E) units present a distinct configuration of physical, biological, and psycho social risks shaped by the urgency and unpredictability of patient care, and that the absence of disaggregated data limits the design of interventions that are properly adapted to emergency care realities.

The socio-environmental and systemic conditions of Rivers State, the largest oil-producing area in the Niger Delta, intensify these risks further. The state records a high frequency of road traffic accidents, industrial accidents, pipeline explosions, and episodes of communal and militant violence (Erundu et al., 2019; Okpako et al., 2021), all of which channel a disproportionate volume of critically ill patients into the Accident and Emergency units of its major tertiary hospitals. Despite the centrality of these units to emergency response and health system resilience, empirical evidence on the occupational risks confronting their healthcare personnel remains scarce, with existing studies emphasizing clinical outcomes over the lived occupational experience of frontline staff. This gap in role-specific, region-specific evidence provided the motivation for the present study, which investigated the knowledge, exposure, and safety practices toward occupational hazards among healthcare workers in the A&E departments of two tertiary institutions in Rivers State, Nigeria.

The specific objectives of the study were to: (i) determine the level of knowledge toward occupational health hazards among healthcare workers in A&E departments of tertiary health institutions in Rivers State; (ii) ascertain the level of safety practices toward occupational health hazards among these workers; (iii) assess the level of knowledge toward occupational health hazards based on socio-demographic variables; and (iv) ascertain the level of safety practices toward occupational health hazards based on socio-demographic variables. Correspondingly, the study tested the null hypotheses that there is no significant difference in the level of knowledge, exposure, and safety practices toward occupational health hazards among healthcare workers based on socio-demographic characteristics, with age examined as the principal demographic variable of interest, at the 0.05 level of significance.

II. METHODS

A. Research Design

A descriptive cross-sectional survey design was adopted for the study. This design permits the collection of data from a representative subset of a population at a single point in time in order to describe

existing conditions, attitudes, or practices without manipulating the study environment (Asika, 2010; Creswell, 2014). It was considered the most appropriate design for examining the knowledge, exposure, and safety practices of A&E healthcare workers toward occupational hazards, consistent with prior studies of a similar nature, such as Ijeoma and Agunwa (2021) on occupational stress and burnout among Nigerian emergency nurses and Okonkwo et al. (2022) on biohazard exposure and safety compliance in a Nigerian teaching hospital.

B. Study Area and Population

The study was conducted in Rivers State, in the South-South geopolitical zone of Nigeria, at the Accident and Emergency departments of the University of Port Harcourt Teaching Hospital (UPTH) and the Rivers State University Teaching Hospital (RSUTH), the two leading tertiary referral centers in the state. The study population comprised all cadres of healthcare workers, including doctors, nurses, community health workers, cleaners, porters, and administrative staff, directly attached to the A&E units of the two institutions. Health workers whose routine duties were outside the A&E unit were excluded, since the occupational hazard profile associated with emergency care differs materially from that of other clinical areas.

C. Sample and Sampling Technique

A sample of 163 healthcare workers was drawn from the accessible population across the two institutions using a sampling procedure proportionate to the size of each A&E unit. The two institutions were purposively selected on the basis of their status as the state's highest-volume tertiary referral centers for emergency care. A total of 163 questionnaires were distributed, and 157 were completed and returned, representing a response rate of 96.3 percent.

D. Instrument for Data Collection

Data were collected using a self-structured questionnaire titled the Knowledge, Exposure and Safety Practices toward Occupational Hazards among Healthcare Workers in Accident and Emergency Departments (KSPOHHCWAE), developed following an in-depth review of the literature and validated instruments in occupational health research. The final

instrument comprised 26 items across three sections: Section A captured socio-demographic characteristics; Section B contained 12 true or false items assessing knowledge of occupational hazards; and Section C contained 8 items on a five-point Likert scale (ranging from Never to Always) assessing safety practices. The instrument required approximately 20 to 25 minutes to complete and was self-administered under the researcher's supervision.

E. Validity and Reliability

Content validity was established through review by four experienced public health professionals, who assessed the clarity, relevance, and contextual appropriateness of the items for the Nigerian A&E setting; their recommendations informed subsequent revisions to item phrasing and structure. Instrument reliability was assessed using the test-retest method, with a Pearson correlation coefficient of at least 0.60 adopted as the threshold for acceptable consistency.

F. Data Collection and Analysis

Following institutional clearance, unit heads at both hospitals facilitated the distribution and collection of questionnaires, with the researcher available on site to provide clarification. Data were coded and analyzed using SPSS. Descriptive statistics (frequency, percentage, mean, and standard deviation) were used to summarize the demographic profile of respondents and to answer the research questions on knowledge, exposure, and safety practices, while inferential statistics, comprising one-way analysis of variance (ANOVA), the chi-square test, and the independent samples t-test, were used to test the study hypotheses at a 0.05 level of significance. A criterion mean was computed as the scale midpoint to classify response levels as high or low.

III. RESULTS

A total of 157 valid responses were analyzed, comprising 90 respondents (57.3 percent) from RSUTH and 67 respondents (42.7 percent) from UPTH. The socio-demographic characteristics of the respondents are presented in Table 1.

Table 1. Socio-demographic Characteristics of Respondents (N = 157)

Variable	Category	n	%
Age (years)	18-25	27	17.2
	26-34	20	12.7
	35-42	70	44.6
	43 and above	40	25.5
Gender	Male	79	50.3
	Female	78	49.7
Marital status	Married	68	43.3
	Not married	89	56.7
Educational qualification	Primary	10	6.4
	Secondary	74	47.1
	Tertiary	73	46.5
Professional cadre	Doctors	15	9.6
	Nurses/auxiliary nurses	20	12.7
	Cleaners	46	29.3
	Community health workers	44	28.0
	Porters	12	7.6
Years of work experience	Less than 3 years	45	28.7
	3 to 6 years	80	51.0
	More than 6 years	32	20.4

Note. Percentages for professional cadre sum to 87.2% as reported in the source dataset; the residual reflects unclassified or missing-cadre responses in the original survey records. Source: Field survey, 2025.

Most respondents (44.6 percent) were aged 35 to 42 years, indicating a predominantly mid-career workforce, while the sex distribution was almost evenly split (50.3 percent male, 49.7 percent female). Slightly more than half (56.7 percent) were not married, and educational attainment was concentrated at the secondary (47.1 percent) and tertiary (46.5 percent) levels. Non-physician cadres, cleaners (29.3 percent) and community health workers (28.0 percent), constituted the largest occupational groups, illustrating that a substantial share of the A&E workforce exposed to occupational hazards falls outside the medically licensed cadres typically emphasized in Nigerian occupational health research. Slightly over half of the workforce (51.0 percent) had between three and six years of work experience,

suggesting a workforce with a reasonable depth of institutional exposure.

Comparison across institutions revealed only minor differences: RSUTH recorded a marginally higher proportion of female staff than UPTH, while both institutions reported a similar marital status distribution (56.7 percent not married in each). These similarities suggest that the two institutions draw from a broadly comparable A&E workforce, supporting the pooling of data across sites for the purposes of hypothesis testing.

Table 2 presents the distribution of responses on the 12-item knowledge scale.

Table 2. Knowledge of Occupational Health Hazards Among Respondents

Item	Statement	False n (%)	True n (%)	Mean	SD
1	HIV is a biological hazard in the A&E unit.	38 (30.6)	86 (69.4)	1.31	0.46
2	Hepatitis is a biological hazard in the A&E unit.	62 (50.0)	62 (50.0)	1.50	0.50
3	Cuts can be seen as a biological hazard in the A&E unit.	45 (36.3)	79 (63.7)	1.36	0.48
4	Contact with contaminated specimens can result in a health hazard.	40 (32.3)	84 (67.7)	1.32	0.47
5	Contact with blood-borne pathogens can result in a health hazard.	48 (38.7)	76 (61.3)	1.39	0.49
6	Stress at work can cause a health hazard in the A&E unit.	79 (63.7)	45 (36.3)	1.64	0.48
7	Airborne infection such as tuberculosis can be hazardous.	68 (54.8)	56 (45.2)	1.55	0.50
8	Fractures are hazardous to healthcare workers.	51 (41.1)	73 (58.9)	1.41	0.49
9	Noise is hazardous to healthcare workers in the A&E unit.	76 (61.3)	48 (38.7)	1.61	0.49
10	Musculoskeletal falls can be hazardous to healthcare workers.	76 (61.3)	48 (38.7)	1.61	0.49
11	Exposure to burns is hazardous in the A&E unit.	53 (42.7)	71 (57.3)	1.43	0.50
12	Exposure to radiation can be a health hazard.	58 (46.8)	66 (53.2)	1.47	0.50
Grand total		694 (46.6)	794 (53.4)	1.46	0.49

Table 2 shows a moderate overall level of knowledge, with a grand mean of 1.46 (SD = 0.49), corresponding to a 53.4 percent correct response rate. Recognition of biological hazards was consistently high, with items on HIV (69.4 percent), handling of contaminated specimens (67.7 percent), and cuts (63.7 percent) attracting the highest correct-response proportions, likely reflecting the emphasis placed on infection transmission in existing training. By contrast, recognition of psycho social and ergonomic hazards was markedly weaker, with only 36.3 percent of

respondents correctly identifying work-related stress as a hazard and 38.7 percent correctly identifying noise and musculoskeletal falls. This pattern indicates that occupational health education in these institutions has disproportionately emphasized biological risk at the expense of psycho social and ergonomic dimensions of workplace safety, a gap consistent with the broader Nigerian literature on occupational hazard awareness.

Table 3. Knowledge of Exposure to Occupational Health Hazards Among Respondents

Item	Statement	False n (%)	True n (%)	Mean	SD
1	Exposure to radiation causes an occupational health hazard.	33 (26.6)	91 (73.4)	1.81	0.93
2	Ache such as joint pain can cause a health hazard.	56 (45.2)	68 (54.8)	2.35	0.86
3	Contact with infectious bodily fluids can expose one to a health hazard.	13 (10.5)	111 (89.5)	3.10	0.91
4	Injury from needle-sticks.	25 (20.2)	99 (79.8)	2.81	0.93
5	Burnout / emotional exhaustion.	73 (58.9)	51 (41.1)	1.65	0.76
6	Harmful chemical spills during the course of work.	30 (24.2)	94 (75.8)	2.69	0.89
7	Verbal harassment from patients or patients' relatives.	60 (48.4)	64 (51.6)	1.98	0.96

Item	Statement	False n (%)	True n (%)	Mean	SD
	Grand total	290 (33.4)	578 (66.6)	2.34	0.89

Table 3 indicates a moderate to high level of awareness of exposure pathways, with a grand mean of 2.34 (SD = 0.89) and 66.6 percent correct (true) responses overall. Awareness was highest for contact with infectious bodily fluids (89.5 percent) and needle-stick injury (79.8 percent), hazards that are routinely emphasized in standard infection control training. Awareness was markedly lower for psycho social exposures, with only 41.1 percent of respondents recognizing burnout and emotional

exhaustion as an occupational exposure and 51.6 percent recognizing verbal harassment, reinforcing the pattern observed in Table 2 that biological and physical hazards are better understood than the psycho social dimensions of occupational risk in the A&E environment.

Table 4 presents the level of safety practice reported by respondents.

Table 4. Level of Safety Practices Toward Occupational Health Hazards

Item	Statement	Never n (%)	Rarely n (%)	Sometimes n (%)	Often n (%)	Always n (%)	Mean	SD
1	Involved in safety education before?	7 (5.6)	14 (11.2)	28 (22.4)	38 (30.4)	38 (30.4)	3.43	1.31
2	Received training on universal safety precautions?	15 (12.0)	25 (20.0)	35 (28.0)	30 (24.0)	20 (16.0)	2.77	1.16
3	Washes hands with soap after seeing a patient.	3 (2.4)	7 (5.6)	20 (16.0)	40 (32.0)	55 (44.0)	3.84	1.13
4	Received training on all machinery and equipment used?	30 (24.0)	35 (28.0)	33 (26.4)	18 (14.4)	9 (7.2)	2.31	1.03
5	Washes hands before and after attending to patients.	8 (6.4)	17 (13.6)	30 (24.0)	35 (28.0)	35 (28.0)	3.20	1.20
6	Uses a personal set of PPE while working.	7 (5.6)	15 (12.0)	28 (22.4)	37 (29.6)	38 (30.4)	3.28	1.24
7	Uses a face mask in the A&E unit when seeing patients.	20 (16.0)	30 (24.0)	35 (28.0)	25 (20.0)	15 (12.0)	2.64	1.32
8	Uses hand gloves while seeing patients.	11 (8.8)	20 (16.0)	32 (25.6)	34 (27.2)	28 (22.4)	3.05	1.29
	Grand total	101 (10.1)	163 (16.3)	241 (24.1)	257 (25.7)	238 (23.8)	3.03	1.21

Overall safety practice was moderate, with a grand mean of 3.03 (SD = 1.21) on the five-point scale, corresponding to the "sometimes" range. Practice was strongest for basic infection control behaviors: washing hands with soap after seeing a patient recorded the highest mean (3.84, SD = 1.13), with only 2.4 percent of respondents reporting that they never

did so. Use of personal protective equipment was reasonably consistent (mean = 3.28, SD = 1.24), with 60.0 percent of respondents reporting that they often or always used PPE. However, training on the use of machinery and equipment was notably weak (mean = 2.31, SD = 1.03), with 52.0 percent of respondents reporting that they were never or rarely trained, a gap

with direct implications for safe operation of emergency equipment. Face mask use was similarly inconsistent, with 40.0 percent of respondents reporting never or rarely using one, a concerning finding given the centrality of respiratory protection to infection control in emergency care.

Table 5 summarizes the results of hypothesis testing on the influence of socio-demographic and occupational characteristics on knowledge, exposure, and safety practice.

Table 5. Summary of Hypothesis Testing

Hypothesis / comparison	Statistic	df	P	Decision
Knowledge of occupational hazards by age	$F = 1.526$	3, 120	.211	Retained
Exposure to occupational hazards by age	$F = 1.787$	3, 120	.153	Retained
Safety practices by age	$F = 1.579$	3, 120	.198	Retained
Knowledge by job duration	$\chi^2 = 31.926$	12	.001	Rejected
Knowledge by institution (RSUTH vs UPTH)	$t = -0.476$	122	.635	Retained

Note. Null hypotheses were tested at $\alpha = .05$. "Retained" indicates no statistically significant difference; "Rejected" indicates a statistically significant association. Source: Field survey, 2025.

Age was not significantly associated with knowledge, exposure, or safety practice in any of the three comparisons (all $p > .05$), indicating that these constructs were broadly uniform across age groups in the sampled institutions. By contrast, the chi-square test revealed a significant association between knowledge of occupational hazards and the number of years a respondent had spent on the job ($\chi^2 = 31.93$, $df = 12$, $p < .01$), suggesting that accumulated work experience, rather than age itself, is the more meaningful predictor of hazard knowledge in this population. The independent samples t-test further showed no significant difference in knowledge between RSUTH and UPTH staff ($t = -0.476$, $df = 122$, $p = .635$), indicating that institutional context did not materially affect knowledge outcomes across the two hospitals.

IV. DISCUSSION

The finding that knowledge, exposure, and safety practice did not differ significantly by age is consistent with Jonah and Dahiru (2024) and Mousa et al. (2024), who similarly reported that knowledge of occupational hazards among healthcare workers tended to be uniform across age groups where standardized training and continuing professional education were applied

consistently across cadres. Nsengimana and Raphela (2024) likewise found that age had minimal influence on knowledge levels once workers were exposed to comparable institutional safety information. This pattern is compatible with the Health Belief Model (Glanz et al., 2015), which frames health-protective behavior as a function of perceived susceptibility, perceived severity, perceived benefits and barriers, cues to action, and self-efficacy, rather than age per se. Within the A&E units studied, workers of different ages appear to draw on the same institutional training and orientation, so that age alone offers little explanatory power for variation in hazard awareness or protective behavior.

The absence of an age effect on safety practice also aligns with Nwankwo and Osahon (2022), who found that while awareness of infection control precautions was high among Nigerian emergency department staff, actual adherence was shaped more by workload, availability of personal protective equipment, and managerial enforcement than by individual demographic characteristics. This suggests that safety behavior in the A&E setting is substantially institution-driven rather than a function of individual traits, a conclusion also supported by Olayinka and Duru (2023), who found that managerial support, peer

collaboration, and workplace recognition were significant predictors of safety outcomes among emergency workers in southern Nigeria.

The significant association between knowledge and years of work experience is consistent with Olayinka and Duru (2023) and Ijeoma and Agunwa (2021), both of whom reported that experience accumulated over time strengthens hazard awareness through repeated exposure and informal, on-the-job learning. Van Der Molen et al. (2022) similarly observed, in a global review of musculoskeletal injury among healthcare workers, that longer work experience was associated with heightened hazard consciousness and more proactive risk control, particularly in high-strain occupational settings. This finding is well explained by the Job Demand-Control-Support model (Karasek, 1979), which holds that workers gain a greater sense of control and competence over job demands as they accumulate experience, thereby improving their capacity to recognize and manage occupational hazards. Taken together, the present findings suggest that in the Nigerian A&E context, occupational hazard knowledge and safety behavior are shaped less by who a worker is demographically and more by how long they have worked in the unit and how well the institution structures training, supervision, and safety enforcement.

The comparatively weak recognition of psycho social and ergonomic hazards, relative to biological and physical hazards, echoes a broader pattern in the Nigerian and regional literature in which occupational health training has historically prioritized infection control over the mental health and musculoskeletal dimensions of workplace safety. This gap carries direct implications for A&E units in Rivers State, where the pressures of a high-volume, trauma-intensive caseload make burnout, verbal abuse, and musculoskeletal strain persistent occupational realities that current training appears not to adequately address.

V. CONCLUSION AND RECOMMENDATIONS

This study found a moderate overall level of knowledge and a moderate level of safety practice toward occupational hazards among healthcare

workers in the Accident and Emergency departments of two tertiary institutions in Rivers State, Nigeria, with clearly stronger awareness of biological and physical hazards than of psycho social and ergonomic hazards. Age was not a significant determinant of knowledge, exposure, or safety practice, whereas years of work experience was significantly associated with knowledge, underscoring the value of accumulated, institution-based learning over demographic profile in shaping occupational hazard awareness. These findings support the applicability of the Health Belief Model and the Job Demand-Control-Support model to occupational risk behavior among healthcare workers in resource-constrained emergency care settings.

On this basis, the study recommends: (i) enhanced continuing professional development programs, including regular refresher training on infection prevention, chemical hazard handling, and safety protocols relevant to the A&E environment; (ii) the establishment of structured, mentorship-driven learning arrangements that support the transfer of safety knowledge and practice from experienced to less experienced staff; and (iii) strengthened institutional occupational health and safety systems, including supervisory training for unit managers and the deliberate cultivation of a supportive safety culture across all cadres, not only medically licensed staff. The study was limited by constraints of funding and time, which restricted its scope to two tertiary institutions; future research should examine whether these findings generalize across Nigeria's wider tertiary health sector, incorporate mediating variables such as leadership style and safety climate, and adopt longitudinal or mixed-methods designs to strengthen causal inference regarding the drivers of occupational hazard exposure among emergency healthcare workers.

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