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Occupational Health Hazards and Compliance with Workplace Safety Practices among Abattoir Workers in Port Harcourt, Rivers State, Nigeria: A Cross-Sectional Study

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Abstract

Background: Abattoir work exposes workers to physical, chemical, biological, ergonomic and psychosocial hazards, yet evidence from Port Harcourt that links hazard exposure to compliance with safety practices is limited. This study assessed the occupational health hazards experienced by abattoir workers and their compliance with workplace safety practices in selected abattoirs in Port Harcourt, Rivers State. ***Methods:*** A descriptive cross-sectional study was conducted among 120 workers in three abattoirs (Okuru Ama, Minapu Azuabie and Eze Gbakagbaka Trans-Woji), selected by simple random sampling with proportional allocation. The sample size was calculated with Cochran's formula and adjusted for 15% attrition. Data were collected in May 2026 with an interviewer-administered structured questionnaire and analysed in SPSS using frequencies, percentages, means and standard deviations. ***Results:*** The mean age of respondents was 45.0 ± 8.2 years; half worked in cutting and processing, and 58.3% had no specialized occupational health and safety (OHS) training. All respondents (100%) had contact with live animals before slaughter, and 91.7% reported exposure to contaminated water or surfaces. Cuts and lacerations (91.7%), body pain (91.7%) and chemical-related symptoms (98.3%) were widely reported, whereas psychosocial hazards were mostly described as rare (83.3%). Biological hazards had the highest overall exposure score (0.68), followed by ergonomic (0.55) and chemical (0.52) hazards. Compliance was high for avoiding chemical preservatives (100%), keeping a first-aid box (91.7%), inspecting animals before slaughter (83.3%) and using proper waste disposal methods (83.4%). However, only 41.7% always used personal protective equipment (PPE), and only 8.3% each reported receiving OHS training, having a hazard-reporting or emergency system, or being given PPE by their employer. ***Conclusion:*** Abattoir workers in Port Harcourt are exposed to several overlapping hazards, led by biological, physical and ergonomic risks, despite high self-reported compliance with basic safety practices. Gaps in training, PPE provision and hazard reporting need to be closed through structured OHS training, employer-supported PPE, non-punitive reporting systems and regular regulatory inspection.

Keywords: Occupational health hazards, Safety compliance, Abattoir workers, Personal protective equipment, Port Harcourt, Nigeria.

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1. INTRODUCTION

Abattoirs are essential to the meat supply chain and urban food security, but they are also high-risk workplaces. Slaughtering, carcass processing and waste handling expose workers to biological, chemical, physical and ergonomic hazards [1]. Zoonotic infections such as brucellosis, leptospirosis, tuberculosis and Q fever are a particular concern in low-resource settings [2], and the World Health Organization has described occupational exposure to biological agents in slaughterhouses as a neglected public health issue [3]. Meat-processing workers are also among the groups most at risk of occupational injury, largely because of high-speed operations, inadequate protective gear and poor training [4].

In Nigeria, high rates of work-related injury among abattoir workers have been linked to poorly regulated practices, limited safety awareness, long working hours, outdated slaughter techniques, inadequate personal protective equipment (PPE) and weak enforcement of occupational health policy [5–8]. Although occupational health legislation and guidelines exist, enforcement remains weak, particularly in peri-urban and informal settings [9]. Musculoskeletal disorders arising from repetitive cutting, awkward postures and heavy lifting are a leading cause of occupational ill health in abattoirs [10], and psychological strain from slaughterhouse work has also been documented [11].

Evidence on hazards and safety practice in Nigerian abattoirs is mixed. An earlier survey of abattoirs in Port Harcourt ranked biological hazards first, followed by ergonomic and physical hazards [12]. In Bauchi State, only about 35.5% of abattoir workers used PPE [13], while in Anambra State most workers had low knowledge of occupational hazards and only a minority reported good preventive practices [14]. Hazards and PPE use among abattoir workers in Port Harcourt have also been examined by other investigators [15, 16].

Important gaps remain. Few studies have examined all five hazard categories together in the urban abattoirs of Port Harcourt, and many rely on questionnaires alone, which may overstate compliance because of social desirability bias [17–19]. This study therefore aimed to (i) identify the physical, chemical, biological, ergonomic and psychosocial hazards experienced by abattoir workers and (ii) assess their compliance with workplace safety practices in selected abattoirs in Port Harcourt, Rivers State.

2. METHODS

Study Design

This study adopted a descriptive cross-sectional design, in which data are collected from a defined population at a single point in time to describe the occurrence of a condition [20].

Study Area

The study was conducted in three abattoirs in Port Harcourt, Rivers State, Nigeria: Okuru Ama Slaughter (Okuru), Minapu Slaughter (Azuabie) and Eze Gbakagbaka Slaughter (Trans-Woji). Port Harcourt is a major commercial and industrial city in the oil and gas sector, with a high demand for meat. It is a rapidly urbanizing city with inadequate waste management systems and a tropical climate with heavy rainfall throughout the year. The three abattoirs are active slaughter and meat-handling sites where workers may be exposed to multiple occupational hazards.

Study Population

The study population comprised butchers, slaughterers, meat handlers, cleaners, waste handlers, transport or handling assistants and supervisors working in the three abattoirs, a total of 241 eligible workers according to the abattoirs' worker registers. Workers were eligible if they were aged 18 years or above, lived in Port Harcourt, were currently working full-time or part-time in the abattoir with at least six months of experience, gave informed consent, and could communicate in English or Pidgin. Persons not directly involved in abattoir work and those who declined consent were excluded.

Sample Size

The sample size was calculated with Cochran's formula, $n = Z^2pq/e^2$, using $Z = 1.96$, $e = 0.05$ and an assumed proportion (p) of 7.3% taken from an earlier study in Port Harcourt, giving a minimum of 104. Adding a 15% allowance for attrition or non-response gave a final sample of 120 respondents.

Sampling Technique

The sample was allocated to the abattoirs in proportion to their workforce: Okuru Ama (120 workers) contributed 60 respondents, Minapu Azuabie (60 workers) contributed 30, and Eze Gbakagbaka Trans-Woji (61 workers) contributed 30. Within each abattoir, respondents were selected by simple random sampling across the various job roles until the allotted number was reached.

Method of Data Collection

After ethical approval and permission from the abattoir authorities, trained research assistants administered a structured questionnaire by interview, because literacy levels varied among workers. Data were collected in May 2026. The questionnaire contained mostly closed-ended items and a few open-ended items. Section A covered socio-demographic and occupational characteristics (age, abattoir, job role, education, average working hours and specialized OHS training). Section B assessed exposure to physical, chemical, biological, ergonomic and psychosocial hazards, including injuries, work-related symptoms and available reporting systems. Section C assessed safety practices and compliance, including PPE type and frequency of use, safety supervision, OHS training, hazard-reporting and emergency systems, employer provision of PPE, animal inspection before slaughter, first-aid facilities, avoidance of chemical preservatives, waste disposal methods, belief in the value of safety practices and willingness to attend training. An observational checklist covering PPE, the physical environment, waste management, emergency preparedness and administrative controls was also prepared to verify workplace conditions; its findings are not reported in this paper.

Face and content validity were established through review by experts in environmental health, occupational health, veterinary public health and research methodology. The instrument was pretested among workers in a comparable abattoir outside the

study sites, and internal consistency was assessed with Cronbach's alpha (acceptable value ≥ 0.70)

Method of Data Analysis

Data were checked, coded and analysed with the Statistical Package for the Social Sciences (SPSS). Frequencies, percentages, means and standard deviations summarized socio-demographic characteristics, hazard exposure and compliance. Yes/No responses were scored Yes = 1 and No = 0, so that the mean of each item equals the proportion of respondents reporting the hazard or practice. Means were interpreted with the following scales. For physical and chemical hazards: 0.80–1.00 very high, 0.60–0.79 high, 0.40–0.59 moderate, 0.20–0.39 low and 0.00–0.19 very low. For ergonomic hazards: 0.00–0.29 low, 0.30–0.49 low–moderate, 0.50–0.69 moderate, 0.70–0.89 high and 0.90–1.00 very high. For safety practices: 0.00–0.49 low, 0.50–0.69 moderate, 0.70–0.89 high and 0.90–1.00 very high. Open-ended responses were grouped into themes by similarity of content. Hypotheses were tested at the 0.05 level using a decision rule in which the null hypothesis was not rejected when mean scores across hazard domains or safety indicators were similar, and was rejected when they showed clear variation.

Ethical Considerations

Ethical approval was obtained from the Research Ethics Committee of the Faculty of Basic Medical Sciences, College of Medical Sciences, Rivers State University **RSU/FBMS/REC/25/769**. Permission was obtained from the relevant abattoir authorities. Participation was voluntary, informed consent was obtained from all respondents, and respondents could withdraw at any time without penalty. No personal identifiers were collected, and confidentiality was maintained. The study posed minimal risk, and data collection was arranged so as not to interfere with abattoir operations or expose workers or researchers to avoidable harm. The study followed the principles of the Declaration of Helsinki [21].

3. RESULTS

3.1 Socio-demographic and occupational characteristics of respondents

All 120 respondents provided data. Their mean age was 45.0 ± 8.2 years, with equal numbers (33.3% each) in the 30–40, 40–50 and 50–60-year groups. Half were from Okuru Ama abattoir (50.0%) and half of all respondents (50.0%) worked in cutting and processing. Two-thirds (66.6%) had secondary or tertiary education. Most worked 6–8 hours a day (66.7%), although 12.5% worked 12 hours or more (mean 8.5 ± 2.4 hours). More than half (58.3%) had no specialized training in abattoir work or OHS (Table 1).

Table 1: Socio-demographic and Occupational Characteristics of Respondents (n = 120)

Variable	Category	Frequency (n)	Percentage (%)	Mean ± SD
Age Group (years)	30–40	40	33.3	
	40–50	40	33.3	
	50–60	40	33.3	45.0 ± 8.2
Abattoir Location	Okuru Ama Abattoir	60	50.0	–
	Minapu Azuabie Abattoir	30	25.0	–
	Eze Gbakagbaka Trans-Woji Slaughter	30	25.0	–
Job Role	Cutting/Processing	60	50.0	–
	Waste Cleaning Staff	20	16.7	–
	Meat Packaging	20	16.7	–
	Others	20	16.7	–
Highest Level of Education	No Formal Education	20	16.7	–
	Primary	20	16.7	–
	Secondary	40	33.3	–
	Tertiary	40	33.3	–
Average Working Hours	6–8 hours	80	66.7	
	9–11 hours	25	20.8	
	≥12 hours	15	12.5	8.5 ± 2.4
Specialized Training (OHS)	Yes	50	41.7	–
	No	70	58.3	

Results of Researcher's field survey, May 2026.

Note: OHS = occupational health and safety; SD = standard deviation.

3.2 Occupational health hazards experienced by abattoir workers

Physical hazards.

Cuts and lacerations were the most common physical hazard (91.7%), while exposure to noise or vibration (33.3%) and slips, trips and falls (8.3%) were less common. One in four respondents (25.0%) reported having sustained an injury in recent months or years. In open-ended responses, 70 participants reported bruises

from falls, and others mentioned cuts, hand cuts and knife-related injuries (Table 2).

Table 2: Physical Hazards among Abattoir Workers (n = 120)

Physical Hazard Indicator	Yes n (%)	No n (%)	Mean	SD	Interpretation
Experience of cuts/lacerations	110 (91.7%)	10 (8.3%)	0.92	0.27	Very high occurrence of physical injuries
Exposure to noise/vibration from machinery	40 (33.3%)	80 (66.7%)	0.33	0.47	Low exposure to mechanical hazards
Experience of slips, trips and falls	10 (8.3%)	110 (91.7%)	0.08	0.27	Very low occurrence of accidents
Sustained injury in past months/years	30 (25.0%)	90 (75.0%)	0.25	0.43	Low reported injury experience

Results of Researcher's field survey, May 2026.

Note: Mean and Standard Deviation (SD) were computed using Yes = 1, No = 0.

Chemical hazards.

About half of respondents (50.8%) reported exposure to cleaning agents or disinfectants, and 9.2% to tyre smoke or fumes. Almost all reported chemical-related symptoms such as skin rash, eye irritation or breathing problems (98.3% and 99.2% on two related items) (Table 3).

Table 3: Chemical Hazards among Abattoir Workers (n = 120)

Chemical Hazard Indicator	Yes n (%)	No n (%)	Mean	SD	Interpretation
Exposure to cleaning agents/disinfectants	61 (50.8%)	59 (49.2%)	0.51	0.50	Moderate exposure to chemical agents
Exposure to tyre smoke/fumes	11 (9.2%)	109 (90.8%)	0.09	0.29	Very low exposure to hazardous fumes
Experience of chemical-related symptoms	118 (98.3%)	2 (1.7%)	0.98	0.13	Very high reported symptom experience
Ever experienced symptoms (skin rashes, eye irritation, breathing problems due to chemical exposure)	119 (99.2%)	1 (0.8%)	0.99	0.09	Extremely high occurrence of chemical-related symptoms

Results of Researcher's field survey, May 2026.

Note: Mean and Standard Deviation (SD) were computed using Yes = 1, No = 0.

Biological hazards.

Two-thirds of respondents (66.7%) always handled animal carcasses or parts, 8.3% did so frequently and 25.0% never did. All respondents (100%) had contact with live animals before slaughter. Work-related infections or illnesses were attributed to contaminated water or surfaces by 91.7% and to blood-borne pathogens by 8.3%, and no respondent reported a follow-up or reporting system (Table 4). In open-ended responses, one respondent reported assault by an animal, and one reported breathing difficulties, typhoid and exposure to environmental pollution.

Table 4: Biological Hazards among Abattoir Workers (n = 120)

Biological Hazard Indicator	Response Category	Frequency (n)	Percentage (%)
Handling of animal carcasses/parts	Always	80	66.7
	Frequently	10	8.3
	Sometimes	0	0.0
	Never	30	25.0
Contact with live animals before slaughter	Yes	120	100.0
	No	0	0.0
Work-related infections/illnesses experienced	Contaminated water/surfaces	110	91.7
	Blood-borne pathogens	10	8.3
	Yes	0	0.0
Follow-up response (if system exists)	None reported	120	100.0

Results of Researcher's field survey, May 2026.

Ergonomic hazards.

Body pain in the back, neck or joints was reported by 91.7% of respondents. Awkward posture (58.3%) and repetitive hand movements (50.0%) were the commonest ergonomic exposures, followed by prolonged standing (41.7%), heavy lifting (41.7%) and

working without breaks (33.3%); 25.0% reported no ergonomic risk (Table 5). Among respondents who named the affected body part, ten reported back pain, ten neck pain, three waist pain and ten hand pain, with fewer reporting shoulder, elbow, wrist or combined pain.

Table 5: Ergonomic Hazards among Abattoir Workers (n = 120)

Ergonomic Task Indicator	Yes n (%)	No n (%)	Mean	SD	Interpretation
Repetitive hand movements	60 (50.0%)	60 (50.0%)	0.50	0.50	Moderate exposure
Prolonged standing	50 (41.7%)	70 (58.3%)	0.42	0.49	Low–moderate exposure
Heavy lifting	50 (41.7%)	70 (58.3%)	0.42	0.49	Low–moderate exposure
Awkward posture	70 (58.3%)	50 (41.7%)	0.58	0.49	Moderate exposure
Working without breaks	40 (33.3%)	80 (66.7%)	0.33	0.47	Low exposure
No ergonomic risk reported	30 (25.0%)	90 (75.0%)	0.25	0.43	Low reporting
Body pain (back, neck, joints)	110 (91.7%)	10 (8.3%)	0.92	0.28	Very high occurrence

Results of Researcher's field survey, May 2026.

Note: Mean and Standard Deviation (SD) were computed using Yes = 1, No = 0.

Psychosocial hazards.

Stress due to workload, harassment or bullying, and violence or threats were each reported by 16.7% of respondents, monotony or boredom by 8.3%, and 8.3% reported none. Most respondents (83.3%) experienced these hazards rarely and 16.7% monthly. While 91.7% reported having sought or received some support (counselling, stress-management training or peer support, 25.0% each, and 16.7% a combination of counselling and peer support), 83.3% said there was no workplace procedure for addressing psychosocial hazards (Table 6).

Table 6: Psychosocial Hazards among Abattoir Workers (n = 120)

Variable / Indicator	Response Category	Frequency (n)	Percent (%)	Mean	SD
Experience of psychological hazards (multiple response)	Stress due to workload	20	16.7	0.17	0.37
	Harassment or bullying	20	16.7	0.17	0.37
	Violence/threats from animals or colleagues	20	16.7	0.17	0.37
	Monotony or boredom	10	8.3	0.08	0.28
	None	10	8.3	0.08	0.28
	All of the above	20	16.7	0.17	0.37
	Bullying, violence threats & long hours	20	16.7	0.17	0.37
Frequency of experiencing hazards	Monthly	20	16.7	0.17	0.37
	Rarely	100	83.3	0.83	0.37
Procedure in place for psychological hazards	Yes	20	16.7	0.17	0.37
	No	100	83.3	0.83	0.37

Results of Researcher's field survey, May 2026.

Note: SD = standard deviation.

Overall exposure by hazard domain.

Biological hazards recorded the highest overall mean score (0.68, high exposure), followed by ergonomic (0.55) and chemical (0.52) hazards, which were moderate, while physical (0.40) and psychosocial (0.39) hazards were low to moderate (Table 7). The clear variation among domains led to rejection of the null hypothesis of no difference in the hazards experienced.

Table 7: Overall Exposure to Occupational Health Hazards by Hazard Domain (n = 120)

Hazard Domain	Key Indicators Summary	Overall Mean	Overall Interpretation
Physical	Cuts/lacerations (0.92), low slips (0.08), low injury reporting (0.25)	0.40	Low–moderate exposure
Chemical	Very high symptoms (0.98–0.99), low safety training (0.08), moderate exposure (0.51)	0.52	Moderate exposure
Biological	Universal animal contact (1.00), high contamination exposure (0.91), poor reporting system (0.00)	0.68	High exposure
Ergonomic	Very high body pain (0.92), moderate posture strain (0.58), repetitive work (0.50)	0.55	Moderate exposure

Hazard Domain	Key Indicators Summary	Overall Mean	Overall Interpretation
Psychosocial	Low frequency (0.17–0.83 mix), poor institutional support (0.16)	0.39	Low–moderate exposure

Results of Researcher's field survey, May 2026.

Note: The null hypothesis was decided by variation in mean scores across hazard domains.

3.3 Compliance with workplace safety practices

Reported compliance with basic practices was high, with means of 0.83 to 1.00 (Table 8). All respondents (100%) avoided chemical preservatives, 91.7% had a first-aid box, 83.3% inspected animals before slaughter and 83.4% used proper waste disposal methods. The indicators clustered within the good to very high range with only minor variation, so the null hypothesis of no difference in compliance was not rejected.

Table 8: Basic Safety Practices and Preparedness among Abattoir Workers (n = 120)

Safety Practice Indicator	Yes n (%)	No n (%)	Mean	Interpretation
Inspection of animals before slaughter	100 (83.3%)	20 (16.7%)	0.83	Good safety practice awareness
Availability of first aid box	110 (91.7%)	10 (8.3%)	0.92	Very high safety preparedness
Avoidance of chemical preservation	120 (100.0%)	0 (0.0%)	1.00	Very high compliance behaviour
Use of proper waste disposal methods	100 (83.4%)	20 (16.6%)	0.83	Good environmental safety practice

Results of Researcher's field survey, May 2026.

Note: Mean was computed using Yes = 1, No = 0.

Most respondents (83.3%) reported a safety officer or supervisor enforcing compliance, and all respondents (100%) believed that safety practices reduce injury and illness and were willing to attend safety training (Table 9). By contrast, only 8.3% each reported having received OHS training, having a hazard-reporting or emergency response system, or being provided with PPE by their employer. Frequency of training was reported as monthly by 66.7% of respondents, which is not consistent with the 8.3% who reported having received training. PPE use was inconsistent: only 41.7% always used PPE, 25.0% used it sometimes, 16.7% rarely and 16.7% never. The PPE items used were aprons (25.0%), a combination of boots and apron (25.0%), gloves (16.7%), boots (16.7%) and goggles (8.3%), and 8.3% used none.

Table 9: Level of Compliance with Safety Practices among Abattoir Workers (n = 120)

Variable / Indicator	Key Findings (n, %)	Mean	SD
Type of PPE used	Gloves (20, 16.7%), Boots (20, 16.7%), Apron (30, 25.0%), Goggles (10, 8.3%), None (10, 8.3%), Boots & apron (30, 25.0%)	0.17–0.25	0.28–0.43
Frequency of PPE use	Always (50, 41.7%), Sometimes (30, 25.0%), Rarely (20, 16.7%), Never (20, 16.7%)	0.42	0.49
Safety officer enforcing compliance	Yes (100, 83.3%), No (20, 16.7%)	0.83	0.37
Received occupational health & safety training	Yes (10, 8.3%), No (110, 91.7%)	0.08	0.28
Frequency of safety training	Monthly (80, 66.7%), None/Once/Annually/Weekly (10, 8.3% each)	0.67	0.47
Hazard reporting/emergency system	Yes (10, 8.3%), No (110, 91.7%)	0.08	0.28
PPE provided by employer	Yes (10, 8.3%), No (110, 91.7%)	0.08	0.28
Belief safety reduces injury/illness	Yes (120, 100.0%)	1.00	0.00
Willingness to attend safety training	Yes (120, 100.0%)	1.00	0.00

Results of Researcher's field survey, May 2026.

Note: PPE = personal protective equipment; SD = standard deviation.

4. DISCUSSION

This study found that abattoir workers in selected abattoirs in Port Harcourt are exposed to overlapping hazards in all five categories. Biological exposure was universal and biological hazards had the highest overall score (0.68), followed by ergonomic (0.55) and chemical (0.52) hazards, while cuts, body pain and chemical-related symptoms were each reported by more than 90% of respondents. At the same time, self-reported compliance with basic hygiene and

preparedness practices was high, while institutional supports such as OHS training, PPE provision and hazard reporting were largely absent.

The very high prevalence of cuts and lacerations (91.7%) reflects the dependence of manual slaughter and meat processing on knives and other sharp tools, a pattern that matches the risks described for meat-processing work [1, 4]. Poor facilities and weak enforcement have been identified as contributors to such hazards in Nigerian abattoirs [22]. Slips, trips and falls were reported by only 8.3% of respondents, and only 25.0% reported an injury in recent months or years, despite the near-universal experience of cuts. This gap suggests that minor cuts may not be regarded as injuries, which would mean that injury burden is underreported and risk is normalized.

The universal contact with live animals and the high exposure to contaminated water and surfaces (91.7%) place biological hazards among the most serious risks in this setting. This agrees with the earlier Port Harcourt survey in which biological hazards ranked first [12] and with reports of zoonotic exposure among slaughterhouse workers in Nigeria and elsewhere [7, 23]. A critical finding is that no respondent reported a follow-up or reporting system for biological hazards. Without such a system, infections and exposures cannot be recorded or investigated, which weakens infection control for both workers and the wider community.

Body pain affected 91.7% of respondents and was mainly located in the back, neck, waist and upper limbs, consistent with the repetitive cutting, awkward postures and manual handling that characterize abattoir tasks. Musculoskeletal disorders have been identified as a major cause of occupational ill health among abattoir workers [10]. Because the instrument asked about pain in general rather than using a standardized musculoskeletal questionnaire, the prevalence should be interpreted as self-reported discomfort rather than diagnosed disorder. Task rotation, rest breaks and better workstation and tool design would be sensible first steps.

Almost all respondents (98.3%) reported symptoms such as skin rash, eye irritation or breathing problems, although only half reported exposure to cleaning agents or disinfectants. This mismatch suggests that workers may not recognize all chemical exposures, which can include disinfectants and other cleaning chemicals [24], or that some symptoms have other causes such as contaminated water, smoke or dust. The questionnaire did not link symptoms to a specific agent, so these symptoms cannot be attributed to chemical exposure with certainty. Psychosocial hazards were reported least often, with most respondents experiencing them rarely, yet 83.3% reported that no workplace procedure existed to deal with them. Psychological strain from slaughterhouse work has been described in the literature [11], and the low reporting here may partly reflect normalization of stress in manual work and limited recognition of mental health risks, although this explanation needs further study.

Reported compliance with basic practices, including avoiding chemical preservatives, keeping a first-aid box, inspecting animals before slaughter and proper waste disposal (83.4%), was high. This is in line with the generally good hygiene practices reported among abattoir workers in Bauchi State [13]. PPE use, however, was inconsistent: only 41.7% always used it, 16.7% never did, and only 8.3% said their employer provided it. Low PPE use has also been reported in Bauchi State [13], and inadequate PPE and weak enforcement have been linked to injury in other Nigerian abattoirs [5, 6]. Similarly, only 8.3% reported receiving OHS training and 58.3% had no specialized training, which is consistent with the low knowledge and limited preventive practice reported in Anambra State [14]. Notably, every respondent was willing to attend safety training, which is a strong opportunity for intervention.

The contrast between high self-reported compliance and weak institutional support deserves caution. Responses of 100% for several practices, and the presence of a reported safety officer in 83.3% of cases alongside very low training, PPE provision and reporting, suggest that compliance is largely routine and self-driven rather than supported by a functioning safety management system. Self-reported compliance can also be inflated by social desirability bias, and questionnaire reports may not match observed behaviour [17–19]. Direct observation should therefore be combined with self-report in future work, and the inconsistent responses on training suggest that training items need clearer wording.

Limitations

- The cross-sectional design limited the ability to establish causal relationships between hazards and health outcomes.
- Findings rely on self-reported responses, which may be affected by recall and social desirability bias; observational and environmental measurements are not reported here.
- Hypotheses were decided by comparing mean scores across hazard domains and safety indicators, and associations with socio-demographic characteristics were not examined.
- Some responses on training were inconsistent (66.7% reported monthly training, but only 8.3% reported having received training), which may reflect misunderstanding of the items.
- The study covered three selected abattoirs in Port Harcourt, which limits generalisability to other settings, and few respondents answered the open-ended questions.

5. CONCLUSION AND RECOMMENDATIONS

Abattoir workers in Port Harcourt are exposed to multiple overlapping occupational hazards, most notably biological, physical and ergonomic hazards, despite high self-reported compliance with basic safety practices. Limited OHS training, inconsistent PPE use, lack of employer-provided PPE and the absence of hazard-reporting systems weaken protection. Based on these findings, we recommend:

1. Regular, structured OHS training for all abattoir workers, covering all hazard categories including chemical and psychosocial hazards.
2. Consistent provision and enforcement of PPE (gloves, boots, aprons, masks and eye protection) by abattoir management and government.
3. A non-punitive hazard and injury reporting system, including surveillance of zoonotic infections.
4. Upgrading of abattoir facilities, including drainage, clean water supply and waste disposal units.
5. Task rotation, rest breaks and routine health checks to reduce musculoskeletal strain and detect work-related illness early.
6. Regular inspection of abattoirs by the relevant regulatory bodies, supported by stress-management and counselling services for workers.

Author's Contribution

The author(s) contributed to the study conception and design, data collection, analysis and interpretation of findings, and preparation of the manuscript.

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Declaration of Conflicting Interest

The author(s) declares no conflict of interest.

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