

Identifying And Analysing Occupational Hazards And Injuries Among Abattoir Workers In Oyo State, Southwestern Nigeria.

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Abstract: Abattoir workers are exposed to a multitude of occupational hazards and injuries, posing significant risks to their health, safety, and well-being. These hazards include musculoskeletal disorders (MSDs), injuries from sharp tools, and ergonomic issues, such as awkward postures, repetitive motion, and excessive force, which are prevalent, contributing significantly to the high injury rates in the abattoir industry. The study aimed to examine the causes and consequences of occupational hazards and injuries among abattoir workers. Four hundred and eighty (480) workers comprising 392 males and 88 females from the five (5) geopolitical zones of Oyo State of Nigeria participated in the research survey. Risk Rating Matrix (RRM) was used to analyze the identified hazards. The common identified hazards were slippery or wet floor, sharp tools, flying bone fragments, uneven or damage table, poor workstation design, lifting heavy carcasses, and repetitive motion. The overall risk levels were 29.6 % and 14.1% at high and critical risk for sharp tools, 12.5 % and 8.8% at high and critical risk for flying bone fragments, 2.5 and 0% at high and critical risk for uneven or damage table, 5 % and 4.1% at high and critical risk for poor workstation design, 9.1 % and 8.5% at high and critical risk for repetitive motion, while none were at high and critical risk for slippery or wet floor respectively.

Keywords: Abattoir workers, Occupational hazards, Injuries, Musculoskeletal Disorders.

1. INTRODUCTION

Abattoirs play a critical role in the meat supply chain, providing slaughtering, dressing and meat processing services that are essential for food security and public health. However, these facilities are also recognized as high-risk occupational environments due to physical demanding nature of tasks, exposure to sharp tools, contact with live animals, and potential interaction with zoonotic pathogens [1]. Workers in abattoir are routinely exposed to a range of occupational hazards including mechanical injuries, slips and falls cuts and lacerations, musculoskeletal disorders, and exposure to bloodborne pathogens such as *Brucella* spp., *Salmonella* spp., and *Mycobacterium bovis* [2,3]. The abattoir employees experience high rates of MSDs, especially affecting the upper extremities and lower back due to repetitive motions, forceful exertions, and prolonged standing [4].

In Nigeria, and particularly in Oyo State, many abattoirs operate under informal or semi-regulated systems with limited implementation of occupational health and safety (OHS) measures [5]. The lack of adequate personal protective equipment (PPE), poor facilities maintenance, overcrowded working space, and insufficient worker training have been linked to high rates of work-related accidents and injuries [6; 7]. The systematic identification and analysis of workplace hazards can significantly reduce injury rates, improve worker safety, and enhance operational efficiency [8]. Common approaches to hazard analysis in abattoirs include workplace inspections, job safety analysis, ergonomic risk assessments, and epidemiological studies on injury prevalence [9;10]. Most available studies have been limited in scope, focusing on either zoonotic disease risks or injury prevalence, with few adopting an integrated hazard-injury analytical approach [11].

2. LITERATURE REVIEW

Workers in abattoirs are vulnerable to zoonotic infections since they are in close proximity to live animals, carcasses, blood, and trash. Infections such as Salmonella, E. Coli, Campylobacter, and Listeria have been reported in both European and North American studies [12]. Significant dangers also come from more serious zoonoses including leptospirosis, brucellosis, and anthrax, especially in cases when animal screening is insufficient [13]. Because of the slick flooring, sharp objects (saws, cleavers, and knives), and moving animal parts, the setting is dangerous by nature. The most frequent injuries, according to a systematic study by [14], are cuts, lacerations, and punctures, which are frequently brought on by using tools incorrectly, animal resistance, or slick surfaces. Other known physical stresses include exposure to high heat and noise from machines. The majority of abattoir workers reported at least one work-related injury in the previous year, mostly cuts and sprains, according to studies conducted by [15]. The use of unsecured, badly kept tools, insufficient personal protective equipment (PPE), and slick flooring tainted with blood and offal are the reasons for high injury incidence in abattoirs [16]. Sero-prevalence studies conducted in Nigeria show that workers in slaughterhouses are highly exposed to zoonotic infections. A study in Port Harcourt reported a 78% prevalence of WMSDs among abattoir workers, with the lower back being the most affected body region [17]. The lack of mechanical aids and proper work-rest schedules were identified as key contributing factors. Many Nigerian abattoirs, including some in Oyo State, are plagued by poor sanitation, inadequate waste disposal systems, and a lack of clean water, which amplifies biological and chemical hazards [18]. This leads to a vicious cycle of both occupational risk and environmental damage. These hazards are exacerbated in Nigeria, particularly in the southwest, by inadequate infrastructure, lax regulations, and a lack of worker safety awareness. A focused study in Oyo State that uses an integrated method to identify all occupational hazards, analyze the related injuries, and investigate the underlying socio-economic and regulatory variables is desperately needed, even though earlier research offers a fundamental understanding.

3. METHODOLOGY

This research was carried out in the five geopolitical zone of Oyo State, Nigeria, namely: Ogbomoso, Oyo, Ibarapa, Okeogun, and Ibadan zone. According to Oyo State Ministry of Agriculture and Rural Development, there are sixty-one (61) abattoir/slaughter slab in the state. The research work covered the five geopolitical zone of Oyo State, the following are the numbers of abattoir/slaughter slab in each zone, three (3) locations in Ogbomoso zone, six (6) in Oyo zone, seven (7) in Ibarapa zone, eighteen (18) in Okeogun zone, and twenty-seven (27) in Ibadan zone.

3.1 Sample Size Determination

The sample size was determined according to Equation 1. [19]

$$N = \frac{Z^2 \times pq}{e^2} \quad \text{Equation 1}$$

Where:

e (margin of error) = 7%,

p (population proportion) = 0.5,

Z = 1.65 (90% confidence level), and

q = 1-p

However, [19] suggested that a sample size greater than 30 and less than 500 should be appropriate for most research since a sample size of 30 or more usually has a mean that is usually quite near to the normal distribution. A total of three (3) abattoir/slaughter slab were visited in Ogbomoso, six (6) in Oyo, nine (9) in Ibarapa, twelve (12) in Oke-Ogun and fifteen (15) in Ibadan. Workplace design observations were conducted. Data were collected from abattoir workers through face-to-face interviews using structured questionnaires. The questionnaires were filled out based on the workers' responses to each question, which were read out in Yoruba, a local Nigerian language or English depending on the worker's preference for better understand

3.2 Identification of Common Hazards and Injuries in Abattoirs.

The workplace hazards, injuries, and risks in abattoir in all the five geopolitical zone of Oyo State Nigeria (Ogbomoso, Oyo, Ibarapa, Oke-Ogun and Ibadan zone) were identified and documented through the feedback from the questionnaire gathered and personal observations and interviews during the visit to the abattoirs.

3.3 Risk Level Assessment

The Risk Rating Matrix (RRM) will be used to analyze the identified risks. The consequence and likelihood of all the identified risks were determined using the risk rating matrix chart in Figure 1. The action required for the risk rating matrix results and overall risk decision were determined using Table 1 and 2.

CONSEQUENCES	LIKELIHOOD				
	Rare (1)	Unlikely (2)	Possible (3)	Very Likely (4)	Almost Certain (5)
Catastrophic (5)	Moderate (5)	Moderate (10)	High (15)	Critical (20)	Critical (25)
Major (4)	Low (4)	Moderate (8)	Moderate (12)	High (16)	Critical (20)
Moderate (3)	Low (3)	Moderate (6)	Moderate (9)	Moderate (12)	High (15)
Minor (2)	Very low (2)	Low (4)	Moderate (6)	Moderate (8)	Moderate (10)
Insignificance (1)	Very low (1)	Very low (2)	Low (3)	Low (4)	Moderate (5)

Figure 1: Risk rating Matrix : Source: [20]

Table 1: Actions Required for the Risk Rating Matrix Results

Risk Level Rating	Required Action
Critical	Immediate action is needed. Access to the hazard should be restricted until the risk can be lowered to an acceptable level
High	Action is needed quickly (within 1-2 days). The task should not proceed unless the risk is assessed and control
Moderate	Action is required this week to eliminate or minimize the risk.
Low	Action is required within a reasonable time frame (2-4 weeks) to eliminate or minimize the risk.
Very Low	Risk to be eliminated or lowered when possible

Source: [21]

Table 2: Overall Risk Decision

Risk Rating	Descriptor	Acceptability
20 – 25	Critical	Unacceptable
10 – 16	High	Likely to be unacceptable
5 – 9	Moderate	Could be acceptable
3 – 4	Low	Acceptable
1 – 2	Very Low	Very acceptable

Source : [21]

4. RESULTS AND DISCUSSIONS

Of the 480 participants surveyed, 392 are male which indicates 81.7%, while females constituted 18.3%.as shown in Table 3 This gender distribution is representative of the actual population within the visited abattoirs, indicating that this sector of the workforce is predominantly male. Furthermore, the data suggest that the workforce is primarily composed of individuals within the 31-40

years age bracket, representing their prime working age. This demographic is typically characterized by the physical capacity necessary to meet the role's demands, including lifting heavy carcasses, prolonged standing, and operating cutting machinery. Regarding occupational characteristics, over 33.54% of workers reported a high level of experience, with 16–20 years in the field. A significant majority (74.17%) worked more than five hours per day, and an even larger proportion (88.12%) worked more than five days per week, with 77.39% employed on a full-time basis.

A critical finding was that all participants reported having undergone no formal safety training and did not use any Personal Protective Equipment (PPE) while working. This universal lack of safety protocols and protective gear significantly increases their vulnerability to occupational hazards, injuries, and accidents.

Table 2. Demographic Data of Abattoir Workers

Variable	Categories	Frequency (n)	Percentage (%)
Age (years)	<21	19	3.96
	21-30	69	14.38
	31-40	239	49.79
	41-50	109	22.71
	51 above	44	9.16
	Mean Age	37	9.17
Gender	Male	392	81.07
	Female	88	18.3
Educational Background	Adult literacy	134	27.91
	Primary school	122	25.42
	Junior secondary	85	17.71
	SSCE	139	28.96
	National Diploma	0	0
	HND	0	0
Years of Experience	First Degree	0	0
	1-5	22	4.58
	6-10	49	10.21
	11-15	119	24.80
	16-20	161	33.54
Nature of work	21 above	129	26.86
	Full-time	366	77.39
Daily Working Hours	Part-time	114	22.61
	1-2	0	0
	2-3	0	0
	3-4	40	8.33
	4-5	84	17.5
Working Days	>5	356	74.17
	1-2	0	0
	2-3	0	0
	3-4	0	0
	4-5	57	11.88
	>5	423	88.12

4.1 Identification of Risk Factors, Hazards and Injuries in the Abattoir Environment

The identified workplace risk factors, in abattoirs of five geopolitical zone of Oyo State include fatigue from long working hours, poor body posture or awkward working position, repetitive movement and insufficient rest breaks. Others are poor physical fitness or strength, improper lifting techniques, poor workstation layout and improper or uncomfortable PPE.

The various identified hazards in abattoirs are sharp tools, slippery or wet floors, uneven or damaged table, repetitive motion, flying bone fragments, poor workstation design and lifting heavy carcasses.

The injuries identified in the abattoirs are cuts and lacerations, puncture wounds, sprains and strains and back injuries. Others include fractures, eye injuries and repetitive Strain Injuries (RSIs)

4.2 Risk level analysis of the identified hazard

Among all assessed hazards, sharp tools presented the highest critical risk (14.1%) and a high-risk rating (29.6%), making them the most dangerous hazard in the abattoir environment. This is not surprising as knives are a primary tool in meat processing. Improper handling, dull blades requiring more force, and lack of personal protective equipment (PPE) increase the risk of deep cuts and amputations [22]. In a high-paced slaughterhouse, even experienced workers are vulnerable.

Slippery or wet floors had the highest percentage of "Very Low" (33.1%) and "Low" (46.5%) risk ratings, with no cases rated as high or critical, suggesting that while this hazard is widespread, it is often undervalued by workers. This perception is problematic because slippery surfaces are a major contributor to slip, trip, and fall injuries, which can result in fractures, back injuries, or head trauma [23]. The presence of blood, water, and fat on abattoir floors significantly increases this risk.

Risk from uneven or damage tables received mixed ratings: low (57.5%) and moderate (18.8%), indicating significant concern. Uneven tables affect posture, cutting angles, and body mechanics. Workers may bend asymmetrically, putting strain on their lower back, shoulders, and wrists, increasing the chance of developing MSDs [24]. They can also lead to dropped tools or materials, adding to the injury potential. Modifying workstations to have height-adjustable and level surfaces can improve posture and reduce physical strain. Engineering controls are recommended over administrative controls for long-term effectiveness.

Risk from repetitive motion received (21.5%) moderate and (9.1%) high risk rating. Continuous repetition without adequate rest leads to overuse of specific muscles, tendons, and joints, this can cause Musculoskeletal Disorders (MSDs) such as tendonitis, carpal tunnel syndrome, lower back strain, and shoulder injuries.

Sharp bones accounted for 8.8% critical and 12.5% high-risk ratings. These types of injuries occur during deboning and carcass splitting, particularly if bones break into irregular or jagged shapes. Injuries from sharp bones can be deep, infected, and occasionally lead to internal damage if not treated promptly. The danger is further compounded by fatigue, distraction, or poorly maintained tools. Training workers on safe cutting angles and providing protective sleeves and gloves can significantly reduce these injuries. Moreover, limiting shift duration and implementing rest breaks can reduce fatigue and increase alertness.

Poor workstation design received (33.8%) very low and (32.9%) low risk ratings. Poor workstation design in abattoirs exposes workers to several health and safety risks, inadequate space for movement can increase the risk of slips, trips, and falls, while poor arrangement of tools and equipment may cause frequent reaching, twisting, or bending, which adds to fatigue and injury risk.

Lifting heavy carcasses presented the second to the highest critical risk (9.4%) and highest high-risk rating (32.7%), making it a major source of occupational hazard in the abattoir. Repeated or improper lifting places excessive strain on the lower back, shoulders, arms, and legs, leading to musculoskeletal disorders such as lumbar strain, herniated discs, and chronic back pain.

Table 3. Final Risk Score

Risks	Very Low	Low	Medium	High	Critical
Sharp Tools	46	102	122	142	68
(%)	9.6	21.3	25.4	29.6	14.1
Slippery or Wet Floors	159	223	98	0	0
(%)	33.1	46.5	20.4	0	0
Uneven or Damaged Table	102	276	90	12	0
(%)	21.2	57.5	18.8	2.5	0
Repetitive Motion	94	198	103	44	41
(%)	19.6	41.3	21.5	9.1	8.5

Flying Bone Fragment (%)	84 17.5	109 22.7	185 38.5	60 12.5	42 8.8
Poor Workstation Design (%)	162 33.8	158 32.9	116 24.2	24 5	20 4.1
Lifting Heavy Carcasses (%)	42 8.8	106 22	130 27.1	157 32.7	45 9.4

4.4 Identified Injuries and Musculoskeletal Disorder (MSDs) Associated with Abattoir Workers

The data presented in Table 4 shows the high prevalence of Musculoskeletal Disorders (MSDs) among abattoir workers. MSDs represent a significant occupational health concern in the meat processing industry, resulting from a combination of repetitive motions, forceful exertions, awkward postures, and manual handling of heavy loads.

The results indicate a high prevalence of multiple MSDs among the workers (n=480), with several conditions affecting a majority of the studied population.

The most frequently reported disorders affect the core and lower body, which are critically engaged in abattoir tasks. Hip strain/sprain with 66.7% and thoracic spine strain/sprain at 62.7%. These are closely followed by cervical strain/sprain with 62.3%. This high prevalence points to the biomechanical stress of sustained stooping, bending, twisting, and lifting carcasses. The significant rate of Lower Back Pain (LBP) at 39.4% further reinforces that the lumbar spine is under constant strain during manual material handling activities.

It further shows a substantial morbidity in the upper extremities. Carpal Tunnel Syndrome (CTS) is remarkably prevalent at 56.0%, a figure that far exceeds rates in the general population. This is a classic repetitive strain injury associated with the highly repetitive, forceful, and often vibratory tasks such as deboning, cutting, and trimming. Rotator Cuff Tendinitis/Tear gives 24.2% and Lateral Epicondylitis at 12.5% are linked to repetitive overhead work, forceful arm motions, and static shoulder loading, common in slaughtering and processing tasks.

Similarly, the high percentage of Plantar Fasciitis at 49.6% suggests prolonged standing on hard, unforgiving surfaces is a major risk factor. Knee Osteoarthritis has 34.4% can be exacerbated by the same prolonged standing, combined with squatting and kneeling postures required for various floor-level tasks.

The overall analysis indicates that most workers are suffering from multiple concurrent *MSDs*. This multimorbidity suggests a work environment where the entire musculoskeletal system is under assault and not just isolated body parts.

For the abattoir workers, these MSDs translate into chronic pain, physical disability, reduced mobility, and sleep disturbances (particularly with CTS). This chronic pain can lead to decreased overall quality of life, mental health issues such as anxiety and depression, and financial strain due to medical costs and potential lost wages. It unequivocally identifies the anatomical regions most at risk: the spine, hips, wrists, and feet. Ergonomic interventions must be prioritized.

Table 4 : Musculoskeletal Disorders (MSDs) and Injuries

MSDs	Frequency (n)	Percentage (%)
Cervical strain/sprain	299	62.3
Thoracic spine strain/sprain	301	62.7
Lower Back Pain (LBP)	189	39.4
Rotator Cuff Tendinitis/Tear	116	24.2
Lateral Epicondylitis (Tennis Elbow)	60	12.5
Carpal Tunnel Syndrome (CTS)	269	56.0
Hip Strain/Sprain	320	66.7
Knee Osteoarthritis	165	34.4
Plantar Fasciitis	238	49.6

5. Conclusion

The hazards identified in this research include sharp tools, slippery floors, uneven or damaged table, repetitive motion, flying bone fragments, poor workstation design and lifting heavy carcasses. The injuries identified with abattoir operations include cuts and laceration, puncture wounds, sprain and strain, back injuries, fractures, eye injuries and Repetitive Strain Injuries (RSIs). The operations of abattoir in Nigeria are extremely challenging and demanding due to the repetitive nature of its activities and clumsy working position.

Research on abattoir operations in Nigeria identifies a multitude of significant occupational hazards. These include physical dangers such as sharp tools, slippery floors, and flying bone fragments, as well as ergonomic risks stemming from repetitive motions, poorly designed workstations, uneven surfaces, and the manual lifting of heavy carcasses. Consequently, a high incidence of both acute and chronic injuries is documented, ranging from cuts, lacerations, and puncture wounds to more severe outcomes like sprains, fractures, back injuries, and repetitive strain injuries (RSIs).

The work is characterized as extremely demanding due to its repetitive nature and the adoption of awkward, static postures, leading to high levels of worker fatigue and long-term health impairments. The results of Risk Rating Matrix (RRM) assessment and questionnaires shows that the activities were laborious with often results in fatigue and long-term health hazards.

The root causes of this elevated risk environment are multifaceted. Key contributing factors are a systemic lack of appropriate tools and safety equipment, an absence of proper training, and broader economic hardships that compel workers to prioritize income over their own health and safety.

To mitigate these issues, this research advocates for a comprehensive intervention strategy. This includes the frequent promotion of safety awareness, the implementation of regular training and seminars, and the strict enforcement of personal protective equipment (PPE) use. Ultimately, the findings emphasize the critical need to enforce appropriate occupational health, hygiene, and safety practices to reduce physical strain and minimize hazards within the Nigerian abattoir industry.

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