Original Article

Occupational Hazards and Health Problems among Butchers in Uyo, Nigeria

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Abstract

Introduction: Butchers are exposed to various types of hazards in the course of their work, which could lead to health problems of varying severity. The aim of this study was to identify the occupational hazards and health problems of butchers in Uyo and also assess the physical conditions of their slaughter facilities. **Materials and Methods:** A descriptive cross-sectional study was carried out among 157 butchers in Uyo using a semi-structured questionnaire for data collection. Facility assessment was made using a checklist. Analysis was carried out using Statistical Package for Social Sciences version 20. Level of significance was set at 0.05. **Results:** The mean age of respondents was 33 ± 9.94 years. Most respondents were males (83.4%). The most commonly reported workplace hazards were knife (93.6%), bones (57.3%), and slippery floor (24.8%). The most common health problems were knife cuts (87.3%), cuts from bones (50.3%), and neck pain (36.9%). Having injuries from live animals and back pain were significantly associated with working with cows ($P < 0.05$). The most common de-furring method was burning with firewood (61.1%). The slaughter facilities lacked many expected amenities of a standard abattoir. **Conclusion:** Identified hazards and health problems of butchers were numerous. The slaughter facilities lacked appropriate equipment that promotes workers' health and safety. It is recommended that slaughter facilities be upgraded to meet the standard abattoir practice. Regular training of butchers should be organized by their association to encourage safer practice, including the use of appropriate protective wears. Use of the chemical method of de-furring should also be encouraged to limit exposure to harmful gases.

Keywords: Abattoir, butchers, health problems, occupational hazards, Uyo

Introduction

The meat industry is a significant employer of labor. The workers are exposed to various kinds of hazards which could be physical, chemical, biological, or ergonomic, even in model abattoirs.[1] In developed countries, traditional slaughter facilities have largely been replaced with meat packing plants, where animals are slaughtered, the meat packaged and then distributed. These large slaughter facilities are usually regulated by the government to ensure occupational health and safety of the workers and hygienic conditions of the meat distributed.[2] In developing countries, slaughter facilities vary from medium-scale industrial facilities in big cities to small unregulated facilities in rural areas and markets.[3] Animals that can be found in a slaughterhouse include sheep, cattle, goats, rams, and poultry.

In many developing countries, it is not unusual to see slaughtering of animals being carried out under a tree, in roadside stalls, in market stalls, or in deteriorated and outdated slaughter units that lack waste management facilities and other facilities necessary for the safety of the workers and consumers of the meat.[3]

Workers in the meat processing sector are exposed to biological agents when handling freshly slaughtered meat and when they are exposed to sick animals. Health effects may manifest as skin infections, gastrointestinal infections, respiratory infections, central nervous infections, and even sepsis.[4] About 61% of infectious organisms affecting man today are zoonotic; and slaughter facilities act as an important interface between human health, animal health, and environmental health.[5]

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Butchers are also exposed to physical hazards such as noise, cold, vibration, physical injuries; and ergonomic hazards such as overexertion, manual and repetitive work like meat hanging and cutting, awkward positions, and lifting of heavy objects.[6] The latter can lead to musculoskeletal disorders (MSD) caused by affectation of muscles, tendons, nerves and joints. These MSDs include back pain, neck pain, nerve entrapment, tenosynovitis, bursitis, and trigger finger.[6-8] Butchers may also sustain physical injuries from cuts of knives, slips, and falls.[9]

Workers in slaughter facilities may be exposed to hazardous chemicals such as ammonia which is used in meat packing, chlorine which may be added to water for disinfecting meat and hydrogen peroxide which is sometimes used as a disinfectant. These exposures may lead to irritations of the throat, eyes, nose, and skin; burns from accidental splashes; and respiratory symptoms.[4]

In a study done in Ibadan, Nigeria, the perceived occupational hazards reported by butchers were knives, cows, and bones, all of which can cause physical injury. The most prevalent health problems found were low back pain, joint pain, eye irritation, and knife injuries.[7] Butchers in Nigeria are also exposed to emissions from burning old car tyres which was reported in a study as the most common method used to de-fur animals.[10] These emissions have been established to contain numerous toxic substances which can cause acute and chronic consequences including eye and skin irritations, central nervous depression, as well as exacerbation of cardiac and respiratory conditions.[11]

Nigerian abattoirs are reported to be among the most unhygienic in the world due to improper planning of abattoirs, lack of facilities such as portable water and changing rooms, poor institutional regulations, lack of enforcement and monitoring; as well as corrupt practices by those who supervise the abattoirs.[12,13] An ideal abattoir uses line slaughter system where the animals are hoisted up, starting from the bleeding stage, and other activities are carried out on the suspended carcass while moving along an overhead rail.[14] In Nigeria, however, the batch slaughter system is still used in most abattoirs, with the animals being slaughtered on open slabs, exposing the meat to contamination as evisceration is manually done on the slabs. This is usually done by butchers who use little or no protective wears in abattoirs with poor drainage systems, water supply, and waste disposal system, which expose the butchers to several occupational health problems.[14-16]

So far, no published studies on the occupational hazards and health problems of butchers in Uyo have been identified. This information is necessary to assess the health risks of butchers and can be used to assess the impacts of subsequent interventions. This study, therefore, aimed to identify the occupational hazards and health problems of butchers in Uyo, Nigeria and also to assess the physical conditions of slaughter facilities in that location.

Materials and Methods

Study site

The study was conducted in Uyo, the capital of Akwa Ibom State which is in the South-South region of Nigeria with a projected population of 436,606 in 2019.[17] The town has two major markets which have slaughter facilities: Itam and Akpan Andem markets, and three major slaughter houses: Iba Oku, Itam and Ntak Inyang slaughter houses.

Study design

This was a cross-sectional descriptive study among butchers in Uyo.

Inclusion criteria

1. Respondents who had worked as butchers for at least a year
2. Respondents who were 18 years and above working with cows or goats.

Sample size

A minimum sample size of 150 was determined using the formula for estimating single proportion for cross-sectional studies with a prevalence of 0.89 being the prevalence of physical hazards in a previous study,[1] z of 1.96 and sampling error of 0.05. The sample size was, however, increased to 165 after adding 10% attrition rate.

Sampling technique

This study was conducted among butchers in January 2019. Akpan Andem market and Ntak Inyang slaughter house were selected using simple random sampling. According to the association chairmen, as at the time of the study, there were a total of 168 registered butchers in Akpan Andem market and 146 in Ntak Inyang who belonged to Akwa Ibom State Butchers' Association. The butchers in each location were divided into two broad groups and numbered according to their sitting positions. The first participant from each group was determined by simple random sampling method. Subsequently, systematic sampling of alternate consenting butchers was carried out at both locations. Data collection took a total of 3 days.

Data collection and instruments of data collection

Data were collected using a semi-structured interviewer-administered questionnaire and an observation checklist adapted from previous studies.[7,16] The tool was pretested among 15 butchers in Akan Udua market in Abak, a town about 16 km from Uyo one week before the commencement of the study and all ambiguous statements were subsequently rephrased. The questionnaire obtained information on the sociodemographic characteristics, occupational history, perceived occupational hazards, and self-reported health problems of the respondents. Three previously trained research assistants with a minimum qualification of West African School Certificate were recruited for data collection.

A checklist of expected amenities in a standard abattoir was used in assessing the slaughter locations.

Data management

The data collected was analyzed using the Statistical Package for Social Sciences, version 20.0 (IBM SPSS Statistics for Windows, Armonk, NY: IBM Corp.). Data analysis was performed using descriptive statistics (frequencies and proportions) and inferential statistics (Chi-square to test the significance of the association between two categorical variables). The level of significance was set at $P < 0.05$.

Ethical considerations

Ethical approval for this study was obtained from Ethical Committee, Ministry of Health, Akwa Ibom State, Nigeria (MH/PRS/99/VOL.V/558). Furthermore, permission was obtained from the chairmen of the butchers' associations in both locations. In addition, verbal consent was obtained from each respondent after explaining the purpose of the study, assuring of confidentiality, and indicating that no names were required. Participation was entirely voluntary.

Results

Sociodemographic characteristics and occupational history of respondents

A total of 157 respondents participated in the study giving a response rate of 94.6%. The mean age of the respondents was 33 ± 9.94 years. Most respondents were males (83.4%), whereas 82 (52.2%) were married and 65 (41.4%) had completed secondary education. Sixty (38.2%) respondents had worked as butchers for 1–5 years and 81.5% traded in cow meat. Seventy-nine (50.3%) respondents had undergone apprenticeship on butchering animals [Table 1].

Table 1: Sociodemographic characteristics and occupational history of respondents (*n*=157)

Characteristic	Frequency, *n* (%)
Age	
<20	9 (5.7)
20-29	59 (37.6)
30-39	45 (28.7)
≥40	44 (28.0)
Sex	
Male	131 (83.4)
Female	26 (16.6)
Marital status	
Single	71 (45.2)
Married	82 (52.2)
Divorced/widowed	4 (2.6)
Level of education	
No formal education	16 (10.2)
Primary completed	63 (40.1)
Secondary completed	65 (41.4)
Tertiary completed	13 (8.3)
Monthly income	
<10,000	28 (17.8)
11-20,000	45 (28.7)
21-30,000	39 (24.8)
31-40,000	19 (12.1)
>40,000	26 (16.6)
Duration of work (years)	
1-5	60 (38.2)
6-10	52 (33.1)
>10	45 (28.7)
Type of animal	
Goat	29 (18.5)
Cow	128 (81.5)
Apprenticeship	
Yes	79 (50.3)
No	78 (49.7)

Perceived occupational hazards

The most commonly perceived hazards were knife (93.6%), bones (57.3%), and slippery floor (24.8) [Table 2].

Table 2: Perceived occupational hazards of respondents (*n*=157)

Hazards*	Frequency (%)
Knives	147 (93.6)
Bones	90 (57.3)
Slippery floor	39 (24.8)
Blood	32 (20.4)
Live animal	31 (19.8)
Noise	28 (17.8)
Chemical	10 (6.4)
Odour	9 (5.7)

*Multiple responses allowed

Health problems of respondents

The most commonly reported health problems were knife cuts (87.3%), cuts from bones (50.3%), neck pain (36.9%), back pains (35.0%), and injuries from animals (34.4%). Health problems observed by the researchers included wounds on the hand (16.6%), redness of eyes (7.6%), and hand dermatitis (7.0%) [Table 3].

Ownership and use of personal protective equipment

Ninety-one (58.0%), 29 (18.5%), and 5 (3.2%) owned aprons, boots, and gloves, respectively, whereas 85 (54.1%) and 22 (14.0%) used apron and boots, respectively [Table 4]. However, during the study, only 28.0% were observed to use apron, whereas 3.2% used boots, respectively.

Methods of de-furring of the animals

One hundred and sixteen (73.9%) respondents were present during de-furring of the animals. Methods of de-furring included burning with firewood 96 (61.1%), burning with plastic/rubber 16 (10.2%), and burning of tyre 4 (2.6%) [Figure 1].

Relationship between selected characteristics of respondents and certain outcome variables

A higher proportion of respondents aged <20 years (94.1%) reported having been cut by knives than other age groups. Prevalence of knife cuts reduced with years of work and among those who had undergone apprenticeship. These relationships

Table 3: Health problems of respondents (n=157)

Self-reported health problems*	Frequency (%)
Knife cuts	137 (87.3)
Cuts from bones	79 (50.3)
Neck pain	58 (36.9)
Back pain	55 (35.0)
Injuries from animals	54 (34.4)
Leg wound	34 (21.7)
Joint pains	24 (15.3)
Frequent headaches	24 (15.3)
Rashes	13 (8.3)
Eye irritation	11 (7.0)
Peeling of skin	10 (6.4)
Difficulty in breathing	8 (5.1)
Cough	5 (3.2)
Yellow eyes	4 (2.5)
Blood in urine	3 (1.9)
Observed health problems	
Hand wounds	26 (16.6)
Redness of the eyes	12 (7.6)
Hand dermatitis	11 (7.0)
Peeling skin	5 (3.2)

*Multiple responses

Table 4: Ownership and use of personal protective equipment (n=157)

Variable	Frequency (%)
Ownership of protective equipment	
Apron	91 (58.0)
Boots	29 (18.5)
Gloves	5 (3.2)
Goggles	2 (1.3)
Use of protective equipment	
Apron	85 (54.1)
Boots	22 (14.0)
Gloves	5 (3.2)
Goggles	0 (0.0)

were, however, not statistically significant ($P > 0.05$). Respondents who worked with cows had a significantly higher proportion of injuries from live animals (39.1%) compared to those selling goats, (13.8%) ($P = 0.01$) [Table 5].

A higher proportion of respondents who worked with cows had back pain (39.8%) compared to those working with goats (13.8%) ($P = 0.008$) [Table 6].

Researcher's observations of slaughter facilities

The slaughter facilities at Akpan Andem Market and Ntak Inyang were surveyed. The findings in comparison to standard abattoir practices[18] were very poor in both locations, as shown in Table 7.

Discussion

Butchers are exposed to various work-related hazards that may lead to numerous health problems. Majority of the butchers in this study perceived knives as a key occupational hazard. Other perceived hazards reported were bones and live animals. In a previous study, the perceived occupational hazards reported were knives (82%), live cows (23%), and bones (6%).[7] This is similar to findings of the present study except that more than half of the butchers in the present study considered bones as hazards compared to 6% in the aforementioned study, possibly due to a better bone disposal system at that location compared to the present study location. The perceived hazards in this study correlated with the reported health problems as the majority of the respondents had knife cuts (87%), and about half reported having cuts from bones. This is similar to findings from other studies which reported that butchers were most prone to physical hazards due to knife cuts.[1,7,9] Knife injury among butchers is not a surprising event as this is a key work tool in their occupation. They, however, need to device ways of minimizing injuries while using this tool. Knife cut was more among younger respondents in the present study, and this may be due to inexperience in knife use compared to the older respondents. Furthermore, injury from the knife was lower among those who worked for over 10 years. This may be due to improved skills.

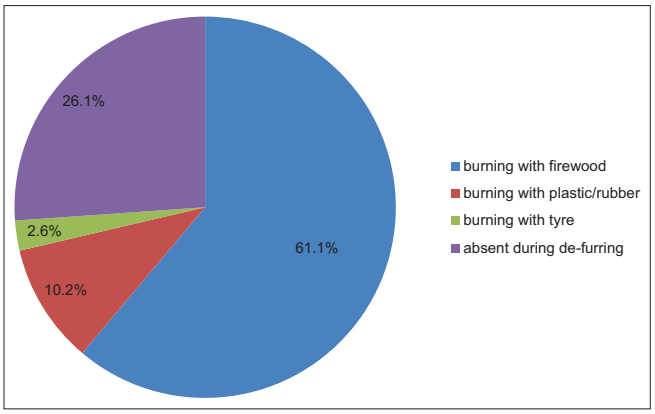

Figure 1: Different methods of de-furring of animals reported by respondents

Cuts among butchers can lead to various types of potentially serious infections such as hepatitis B and C infections, which are easily transmitted through percutaneous exposure and exposure of broken skin to infected body fluids such as blood.[19] They may also lead to bacterial infections.[1] Infected workers may transmit the infection to their co-workers through sharing of knives and other sharp objects. The high prevalence of cuts in this study is not surprising as the majority of the butchers did not use protective hand wears. Cuts can be prevented by the use of mesh glove or gauntlet, which is a harder type of glove that can protect against cuts from knives and other sharp objects.[20] Leg wounds, like cuts, can predispose to various types of infections, including tetanus, and about a fifth of the respondents reported having had wounds in the leg. This may be due to the lack of use of protective footwears by the butchers as only 14.0% reported using boots regularly.

Infectious skin diseases such as occupational pyodermas and skin tuberculosis can be found among butchers.[21] Furthermore,

Table 5: Relationship between selected characteristics of respondents and injuries

Variable	Injuries from knives		Statistics
	Yes	No	
Age (years)			
<20	8 (88.8)	1 (10.2)	Fishers exact=0.93
20-29	51 (86.4)	8 (13.6)	
30-39	36 (80.0)	9 (20.0)	
≥40	34 (77.3)	10 (22.7)	
Duration of work (years)			
1-5	55 (91.7)	5 (8.3)	χ^2=5.145; *P*=0.076
6-10	47 (90.4)	5 (9.6)	
>10	35 (77.8)	45 (22.2)	
Apprenticeship			
Yes	67 (84.8)	12 (15.2)	χ^2=0.859; *P*=0.354
No	70 (89.7)	8 (10.3)	
	Injuries from live animal		
	Yes	No	
Type of animal			
Goat	4 (13.8)	25 (86.2)	Fishers exact=0.01*
Cow	50 (39.1)	78 (60.9)	

*Statistically significant

Table 6: Relationship between selected characteristics of respondents and back pain

Variable	Back pain		Statistics
	Yes	No	
Age			
<20	3 (33.3)	6 (66.7)	Fishers exact=0.67
20-29	23 (39.0)	36 (61.0)	
30-39	20 (44.4)	25 (55.6)	
40	22 (50.0)	22 (50.0)	
Duration of work (years)			
1-5	19 (31.7)	41 (68.3)	χ^2=0.79
6-10	18 (34.6)	34 (65.4)	*P*=0.67
>10	18 (40.0)	27 (60.0)	
Type of animal			
Goat	4 (13.8)	25 (86.2)	Fishers exact=0.008*
Cow	51 (39.8)	77 (60.2)	

*Statistically significant

allergic reactions to the animal blood and the meat itself may produce dermatitis, as well as reactions to chemical substances used. About 7% of the butchers were observed to have dermatitis in the present study.

Slippery floor was one of the perceived hazards reported by about a quarter of the respondents in the present study. This may be caused by poor drainage of blood, body fluids, and water. It can predispose to falls which have potentially serious consequences, including injuries to the head and spinal cord.[21] Noisy environment was also identified as a perceived hazard in this study by 17.8% of the respondents, comparing favorably with Abdullahi *et al*.[9] who reported a 17.0% prevalence of noise exposure among the butchers in their study. A study on individuals chronically exposed to loud noise at work revealed that compared to those who were never exposed, they had a two- to three-fold increase in the prevalence of heart diseases.[22]

The incidence of the neck and back pain reported by more than a third of respondents in the present study could be caused by strain associated with lifting, awkward wrist angle, arm and shoulder positions, repetitive forceful movements when pushing the knife into meat, bent neck, and back while working and prolonged standing or sitting. These hazards are especially common in unstructured setting with poor workspace and hand tool designs[23] like the setting of this study. Use of knives with ergonomically shaped handles could help keep butchers wrists, hands, and shoulders angled correctly to avoid awkward posture. Furthermore, training workers on the proper way to hold and cut meat is an essential way to reduce risk of MSD. Provision of work stations which position butchers at the best height to cut meat may also help.

Back pain was significantly higher among butchers who worked with cows than among those who worked with goats. This may be because the cow butchers have to haul large pieces of meat from one work station to another. Provision of a rail and line system where the animals are hoisted up, and the butchers do not need to haul them may help reduce back pain among butchers. Injuries from live animals were reported by over a third of the respondents, and this was significantly higher among those who worked with cows probably as these are bigger animals and more difficult to handle compared to goats.

Burning with firewood was the most commonly used method of de-furring in this study, in contrast to findings in Abuja, Nigeria, where burning with tyres was the most commonly used method.[10] Smoke from wood fire contains gases and particles that could be potentially harmful to health. Pollutants in wood smoke include carbon monoxide, particulate matter, benzene, formaldehyde, and polycyclic aromatic hydrocarbons.[24] Particulate matter may cause respiratory problems and eye irritation.[25] About 10% of the respondents reported that burning plastic was used to de-fur animals. Plastics release toxic gases such as dioxins, furans, mercury, and polychlorinated biphenyls into the atmosphere when burnt. These substances increase the risk of heart disease, aggravate respiratory problems and can cause headaches, nausea, and neurological deficits.[26] Even though only 2.5% of the respondents reported de-furring with burning tyres, it is necessary to discourage this practice as such emissions are known to contain numerous toxic substances. Findings of a study in Abuja reported a significant deterioration of lung functions among butchers chronically exposed to tyre emissions compared to the control group who were administrative staff.[10] These hazards can be prevented by practicing chemical de-hairing method which uses 10% sodium sulfide with 3% hydrogen peroxide which not only de-hairs but also reduces microbacterial load on the hide of the animals.[27]

The slaughter facilities surveyed in the present study did not meet standard abattoir practices.[18] Most of the amenities required to

Table 7: Characteristics of slaughter facilities used by respondents

Component of slaughter house	Akpan Andem	Ntak Inyang
Lairage	Present	Present
Slaughter hall	Poor	Poor
Rail system	Absent	Absent
Gut and tripe room	Absent	Absent
Cold room	Present	Absent
Detained meat room	Absent	Absent
Drainage system	Poor	Poor
Veterinary laboratory	Absent	Absent
Water supply	Present (bore hole)	Present (stream)
Electricity supply	Absent	Absent
Disinfection facilities	Absent	Absent
First aid room	Absent	Absent
Changing room	Absent	Absent
Waste disposal	Open dumping	Open dumping

ensure the health and safety of butchers were either absent or poor. There was the absence of a rail system for hoisting up the animals which meant that the butchers had to move the carcasses manually and this could have contributed to the musculoskeletal problems they experienced. Certain butchers interviewed in a study were not in favor of a rail system as they claimed it would increase redundancy among them as it requires less workforce. They also complained that the rail system takes a longer time in processing each carcass.[28] A rail system also needs electricity to operate, which was absent in the present study locations.

Inspection of the slaughter facilities also revealed poor drainage system which predisposed the butchers to slips and falls. Moreover, the waste disposal method found in both slaughter facilities was open dumping system which could lead to various health problems. A standard abattoir should have portable water which meets drinking standard, electricity, good waste disposal method including sewage, proximity to uncongested roads, freedom from odor, dust, smoke, and pollution from other industries.[18] A study in Malaysia in five abattoirs reported that 65% had good infrastructure with the general conditions of 63% considered as being good. It was therefore not surprising that 68.6% of the workers in that study were in good health condition.[9] Efforts should be made by relevant government authorities in charge of building abattoirs to provide the needed amenities to reduce the hazards and health problems experienced by the butchers.

Conclusion

Numerous occupational hazards and health problems were reported among butchers in this study. The slaughter facilities studied lacked appropriate equipment that promotes workers' health and safety. Therefore, many health problems were seen and reported.

It is recommended that workplace design by the government should meet standard abattoir practice. Regular training of butchers should be organized by the butchers association to encourage safer practices, including the use of appropriate protective wears. Use of the chemical method of de-furring of animals which is known to be safe and environmental friendly should be encouraged to limit exposure to harmful gases produced by burning firewood, plastic, or tyres.

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Conflicts of interest

There are no conflicts of interest.

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