Original Research Article

Knowledge of Occupational Hazards and Safety Practice among Abattoir Workers of Katagum Local Government Area, Bauchi State, Nigeria

Abstract

Aim: This study investigated the knowledge of occupational hazard and safety practice, and also determines the relationship between knowledge of occupational hazard and safety practice among abattoir workers in Katagum LGA, Bauchi State, Nigeria.

Study design: A descriptive cross sectional study design was used for the study.

Methodology: A semi-structured, self-administered questionnaire was used to collect data from 165 eligible respondents comprising all people working in the selected abattoirs in Katagum LGA. A multi-stage sampling procedure was used to select the participants for the study. Pearson Correlation Coefficient was used to determine the relationship between knowledge of occupational hazards and safety practice.

Results: The results show that 55(36.2%) of the respondents were between the ages of 30-39, majority of the respondents 148(97.4%) were male. 146 (96.0%) of the abattoir workers revealed that there are hazards associated with their work. Cut/injuries were known by most of the respondents 128(84.2%). About one-fifth 18 (11.8%) of the respondents have poor knowledge, 75 (49.3%) have fair knowledge, while 59 (38.8%) have good knowledge of occupational hazards. About 35.5% of the respondents used Personal Protective Equipment (PPE) while performing their duty. The statistical computation for Pearson correlation coefficient (with r value of 0.138) shows that there is positive relationship between knowledge of occupational hazard and safety practice.

Conclusion: In conclusion, majority of the respondents reported that there are hazards associated with their work, have good knowledge of occupational hazards, and high level of personal hygiene practice. But the use of PPE (especially apron, face mask, hand gloves and safety boots) was very low among the respondents. Thus, we recommended that the use of PPE and other preventive measures should be strongly encouraged as well as routine medical

examination/checkup of abattoir workers in Katagum LGA of Bauchi State. Ante mortem and post mortem inspection on all animals should be carry-out before and after slaughter.
Keywords : Knowledge, Occupational Hazard, Safety Practice, Abattoir workers, Katagum, Bauchi, Nigeria

Introduction:

Occupational health (OH) remains a neglected ‘’issue’’ in many developing and transitioning countries of the world mostly due to competing economic, social and political needs. These countries often focus on the provision of clinical care and treatment while placing less emphasis on the appropriate preventive measures.[1]

Occupational global health focuses on prevention of illness and injuries in the work place under a worldwide perspective, the global implications of occupational health and safety are directly related to the international dynamics of the global economy. Given the tight connections of occupational health with global economics, multidisciplinary expertise is needed to understand the links between economic development and the potential effects on the health and safety of workers.[2]

Occupational hazards are the major source of morbidity and mortality among all works since many animal workers are expose to many hazardous situation in their daily practice depending on the type of work.[3] The Centre for Disease Control and Prevention stated that occupational hazards have continue to rise in the past decades resulting in increasing rates of occupational exposure to blood-borne illness and other communicable diseases mostly in the developing and transitioning countries. These hazards can be prevented or mitigated by controlling the occupational exposures using the hierarchy of control as a means to implement feasible and effective control measures.[3-4]

An abattoir is a facility or premises approved, recognized and registered by the controlling authority for hygienic slaughtering and inspection of animals, processing and effective preservation and storage of meat products for human consumption. It is ultimately derived from the French verb Abattre which means ‘’to strike down’’ or ‘’fell’’ and it has existed as long as there have been settlements too large for individuals to rear their own stock for personal consumption. Animals are slaughtered in abattoirs for sale to the public.[5]

Abattoirs may be classified into categories depending on available facilities; rural areas; slaughter slabs and townships; slaughter house. The animals most commonly slaughter for food are Cattle (beef and veal), Sheep (lamb and mutton), Pigs (pork) and Poultry. Typically 45-50% of the animals can be turned into edible products (meat), about 15% is waste and the remaining 40-45% of the animals is turned into by-products such as leather, soaps, candles and adhesives.[5-6]

Meat, a universal staple food item is gotten primarily from farm animals after slaughtering and preparation in the abattoir or slaughterhouse. The slaughtering of animals in abattoirs or slaughterhouses ensures the production of supervised, wholesome meat products. There are pointers that this may not be the situation in all abattoirs in developing countries like Nigeria[6] where the infrastructure facilities for hygienic slaughter and processing of meat are not adequate to meet the maximum standards of hygiene.

Nigerian abattoirs are considered among the dirtiest in the world, where health hazards result from careless handling and failure to organize proper collection schemes for animal waste.[6] Abattoir work could be associated health hazards that could results in occupational diseases or may aggravate the existing ill-health of non-developing origin.[7] Studies suggests that

butchers are likely to experience one occupational hazard or another. Such hazards include includes infections, lung cancer, musculoskeletal disorders and knife injuries.[8] Human errors have highly contributed to the accidents and injuries involved in the slaughterhouses.[9]

Occupational infection mostly contracted by abattoir workers could be iatrogenic or by transmissible agents including Virus, Bacteria, Fungi and parasites and their toxins. Again while manipulating body parts of large animals and lifting heavy equipment workers could stress their muscles and joints, thus, subjecting them to severe physical stress and pain predisposing them to musculoskeletal disorders, one of the major occupational hazard faced by butchers in the workplace.[8] As work tasks performed in the meat industry and abattoir are considered static and repetitive, with rapid movement of the upper and lower limbs involving knives, slippery floors, live animals, cold exposure and dangerous machines.[10]

Laws and regulations which are supposed to govern the workers have failed to ensure their safety by protecting the workers against the hazards and risk they are facing in the slaughterhouse and abattoir. The workers' rights end up neglected which can cause them to suffer about the risks involving in the slaughterhouse. Reduction of human errors can improve human safety measures and productivity in any working place. Top managers of any working plants such as slaughterhouse and abattoirs need advice on how to implement guidelines and rules and what can be done to prevent errors from occurring which can cause accidends.[9]

In the developed world, there is a chain of organized, skilled labour in the processing industry including job specification such as butchers, meat processors and packagers. Conversely in Nigeria there is no such organized labour; the man who butchers the animals is

usually the one who processes, packages and sell the meat. This further predisposes butchers in this environment to higher degrees of work related musculoskeletal disoreders.[8]

All the activities associated with meat processing have a greater risks of accidents, injuries and diseases due to continues movement of workers in the work place in managing animal body and other meat products. Although the technological advancement has led to decrease in injuries but still the rate is high in meat processing industries because the mitigation measures are not properly implemented and the workers especially in developing countries are not aware of the working operations. As a result they do not place a pressure on management for proper implementation of standard working condition.[11] Occupational health risks have been reported as the 10th leading cause of morbidity and mortality all over the world.[4] Out of the over 1400 species of infectious microbes of human pathogens 617 are zoonotic Viruses and Bacteria.[1]

About 250million cases of occupational injuries and illness occur annually worldwide, with prevalence studies from Botswana, Zambia, Ghana and Nigeria suggesting a high occurrence of occupational diseases in Africa.[7] The number of occupational infections that occur each year is largely unknown as a result of under reporting especially in developing countries. It has been estimated that over 120million occupational accidents, with over 200,000 fatalities occur each year in these countries and sub-saharan Africa appears to have the highest rate followed by asia.[7]

Lack of empirical studies on butchers, meat handlers and retailers are some of the major causes hampering any effort to bring desired change in the availability of hygienic meat

consumers. The consumers in both developed and developing countries expect quality meat, a broad diversity of meat cuts more ease in preparation and enhanced assurances of safety.[12]

In Nigeria, abattoir workers constitute a major group at risk of contracting occupational Zoonoses, due to the close contact existing between them and animal/tissues during slaughter and processing.[7] The working conditions, hygiene and operations of slaughterhouses in most African countries, especially Nigeria, parts of Kenya and Tanzania have not been in compliance with the recommendation of world trade organization (WTO), World Organization for Animal Health (OIE), World Health Organization (WHO), Food and Agricultural Organization (FAO) and Codex Alimentarius Commission (CAC), unlike the abattoirs in Europe where consumers are protected from foodborne Zoonoses, by adoption of an integral approach to food safety from farm to the fork through risk assessment and risk management practices.[7]

Globally, food borne illness is a growing public health problem because of increasing global trade in food, changes in the way food is produced and changes in the consumer's requirements. These changing pattern cause new challenges in the way of food safety management. About 75% of the new communicable diseases that have affected human over the past 10 years have been caused by pathogens originating from animals or from products of animal origin.[13]

Food borne diseases occur commonly in the developing countries due to the predominant poor food handling and sanitation practices, inadequate food safety laws, weak regulatory systems, lack of financial resources to invest in safer equipment and lack of education for

food handlers. Food such as meat could be regarded as a high-risk food owing to their abundant ingredients that could favour the growth of microorganisms.[14]

To ensure proper control of occupational hazards among abattoir workers, standard design and good environmental hygiene must be taken into consideration all the time. The use of PPE and other preventive measures should be strongly encouraged. The abattoir management should entail the of safer equipment that are easy to clean and decontaminate, as well as routine cleaning of all working equipment and surfaces, routine medical surveillance and diagnostic investigation on possible risk exposure to occupational health hazards be conducted as they are important disease control measures. Animal owners and handlers, especially those at risk of lacerations and cuts at their work places should be educated on the importance of vaccination to prevent them from contracting zoonotic diseases. The butcher's knowledge and awareness about the hazards of improper meat processing and handling, is essential to safeguard their heath as well as the health of the community.[7]

Adoption of good hygienic and sanitary practices by personnel engaged in unorganized meat production will improve and suitability of meat which leads to increase marketability and consumption finally resulting into better socio economic status of all personnel engaged either in animal rearing, trade or processing of meat.[12]

This study therefore assessed the determinants of knowledge of occupational hazard and safety practices among abattoir workers. The findings from this study will help in planning targeted programs to improve the safety practices of the workers and by so doing reduce their risk of occupational hazards.

Materials and Methods:

We used a cross-sectional descriptive study design. A total sample size of 165 was calculated using Fisher's formula for estimating the minimum sample size for descriptive studies,[15] assuming a prevalence of 89% (Butchers's predisposing to physical hazards) obtained from a previous study.[1] The minimum sample size was inflated by 10% to compensate for non-response and incomplete responses. A multi-stage sampling method was used in selecting the paeticipants for the study. In the first stage, ten (10) wards were selected out of the twenty (20) wards of Katagum L.G.A, using simple random sampling by balloting. Namely; Yayu, Madachi, Bulkachuwa, Gambaki, Bidir, Ragwam, Madangala, Buskuri, Magwanshi and Kafin kuka. In the secong stage, most of the wards has only one abattoir, therefore, ten (10) abattoirs were selected from the respective wards. In the final stage, the respondents were selected (from the respective abattoirs) using cluster sampling technique. Each of the selected abattoirs was considered as a cluster. The numbers of respondents in each abattoir were allocated based on the population of workers in the abattoir.

Instrument description/data collection

A semi structured, interviewer administered Questionnaire was used for the study, and was adapted from previous study.[7] with some modifications to suit the objectives of this study. These modifications included the use of PPE while performing their duties, provision of waste disposal materials and provision of first aid services. The questionnaire was translated to the respondents into local language (Hausa) and it consisted of three (3) sections; Section elicited information on socio-demographic characteristics. Section B sought information on Knowledge of occupational hazards, while Section C elicited information on Occupational Safety practice. Six (6) trained Hausa speaking research assistants administered the questionnaire. Informed consent was

obtained from all prospective respondents. The consent form was in the local language (Hausa), and literate respondents indicated acceptance by signing the consent form, while illiterate participants affixed their thumbprint. Ethical clearance for the study was obtained from the Ethics committee, Bauchi State University Gadau. The permission of the local authorities and traditional community leaders (of the selected wards) was obtained before commencement of data collection. In addition, an advocacy visit was conducted to the leadership of each abattoir during which relevance of the study was explained to them for their maximum corporation.

Data Analysis

Data collected was stored in a computer using Microsoft word excels. The data was analyzed using Statistical Package for the Social Science (SPSS) Version 21[16]. Ten questions on Knowledge of occupational hazards were asked, a correct response was scored one point while a wrong response was allocated a zero point. Respondents with knowledge score of (0-3), (4-6) and (7-10) were considered to have poor, fair and good knowledge of occupational hazards respectively. Quantitative variables were summarized using mean and standard deviation, while categorical variable were presented as frequencies and percentages. The dependent/outcome variables are knowledge of occupational hazard and safety practice, and while the independent variables are Gender, Age, Educational status, Ethnicity, Marital status among others. A Pearson Product Moment Correlation Coefficient (PPMCC) was used to check the relationship between knowledge of occupational hazards and safety practice.

Results:

Out of one hundred and sixty five (165) questionnaires distributed (being the total sample size), one hundred and fifty two (152) questionnaires were dully filled and returned making a response rate of 92.1%. Almost all of the respondents (97.4%) and were between the ages 30-39, with mean age of 25.3. Majority 98(64.5%) of the respondents were married and most of them 133(87.5%) are Hausa. Less than one third of the respondents 44(28.9%) had secondary education and majority of the respondents 75(49.3%) have working experience of 6-10years.Table 1

Table 1: Distribution of socio-demographic characteristics of the respondents

Characteristics	Frequency (n=152)	Percentage (%)
Age (years)		
10-19	10	6.6
20-29	45	29.6
30-39	55	36.2
40-49	30	19.7
50-59	6	3.9
≥60	6	3.9
TOTAL	**152**	**100**
Mean Age	**25.3yrs**	
Sex		
Male	148	97.4
Female	4	2.6
TOTAL	**152**	**100**
Marital status		
Single	41	27.0
Married	98	64.5
Widowed	8	5.3
Divorced	5	3.3
TOTAL	**152**	**100**

Characteristics	Frequency (n=152)	Percentage (%)
Ethnicity		
Hausa	133	87.5
Fulani	17	11.2
Igbo	1	0.7

Yoruba	1	0.7
Others	0	0
TOTAL	**152**	**100**
Level of education		
No education	16	10.5
Primary	31	20.4
Secondary	44	28.9
Tertiary	32	21.1
Qur'anic only	29	19.1
TOTAL	**152**	**100**
Duration of work experience		
1-5	48	31.6
6-10	75	49.3
>10	29	19.1
TOTAL	**152**	**100**
Hours of work per day		
1-6	51	33.6
7-12	92	60.5
≥13	9	5.9
TOTAL	**152**	**100**
How meat preparation was learnt		
Parent	102	67.1
Friends	43	28.3
Others	7	4.6
TOTAL	**152**	**100**
Where do you go when sick/injured		
Traditional	33	21.7
Orthodox	82	53.9
Religious	8	5.3
Others	29	19.1
TOTAL	**152**	**100**

Table 2 shows that 146 (96%) of the abattoir workers revealed that there are hazards associated with their work with cut/injuries known by most of the respondents 128(84.2%), while musculoskeletal pain and animal kick were known by 117(77.0%) and 121(79.6%) of the respondents respectively. Distribution of Knowledge score shows that 18 (11.8%) have poor knowledge, 75 (49.3%) have fair knowledge, while 59 (38.8%) have good knowledge.

Table 2: Distribution of positive responses to knowledge of occupational hazards

Knowledge of occupational hazards	**Frequency (n=152)**	**Percentage (%)**
1. Aware that hazards is associated with their work	146	96.0
Factors that is negatively associated with their work		
2. Cut/Injuries	128	84.2
3. Falling from a height	49	32.2
4. Inhalation of chemicals	57	37.5
5. Contracting diseases from infected animals	80	52.6
6. Getting secondary infection from the wound sustained	71	46.7
7. Slipping from the wet floor	98	64.5
8. Musculoskeletal pain	117	77.0
9. Animal bite	69	45.4
10. Animal kick	121	79.6

Table 3 shows that more than half of the respondents 97(63.8%) carryout meat inspection and only one third 54(35.5%) use Personal protective equipment (PPE) while performing their duty. Majority of the respondents wash their hands before and after preparation of meat 146(96.1%) and after visiting the toilet 149(98.0%). About half of the butchers 75(49.3%) clean their work surfaces twice per day, 88(57.9%) clean their meat preparation instrument twice per day and more than half 98(64.5%) used water and detergent in cleaning their instruments. About one third 59(38.8%) have waste disposal facilities, while 64(42.1%) have first aid services.

Table 3: Distribution of positive responses to safety practice

Safety practice	Frequency (n=152)	Percentage (%)
1. Do you carryout meat inspection	97	63.8
2. Do you use Personal protective equipment (PPE) while performing your duty?	54	35.5
3. If yes in 2 above, specify		
Overall	13	8.6
Apron	9	5.9
Hand glooves	13	8.6
Face mask	10	6.6
Boot	33	21.7
Others	22	14.5
4. Do you practice medical examination?	93	61.1
5. As a meat handler, when should you routinely go for medical check-up?		
When sick	10	6.6
Quarterly	13	8.6
After every six (6) month	15	9.7
Yearly	21	13.8
6. Under which of the following conditions do you wash your hands.		
Before commencement of meat preparation	146	96.1
After preparation of meat	146	96.1
Before serving each customer	2	1.3
After touching money	0	0
After visiting the toilet	149	98.0
After handling refuse	123	80.9
7. If yes in any above, with what?		
Klin	53	38.9
Soap	40	26.3
Detergent	11	7.2
Water	26	17.1
Morning fresh	15	9.9
8. How often do you wash your protective clothing?		
Daily	50	32.9
Once a week	46	30.3
Twice a weak	27	17.8
Thrice a week	29	19.1
9. How often do you clean your work surfaces per day?		
Once	54	35.5
Twice	75	49.3
Thrice	23	

10. How often do you clean your meat preparation instrument per day?		
Once	47	30.9
Twice	88	57.9
Thrice	17	11.2
11. Which method do you used in cleaning your instruments?		
Water only	39	25.6
Water and detergent	98	64.5
Hot water	15	9.9
12. Which of the following practice (s) you use while serving your customers		
Nylon bag	82	53.9
Sheet of paper	63	41.4
Others	7	4.6
13. Do you have waste disposal facilities	59	38.8
14. In case you are sick do you work?	33	21.7
15. If No, in 14 above, what kind sickness makes you stay at home		
Fever and headache	53	34.9
Cough/Sore throat	21	13.8
Diarrhoea	29	19.1
Skin conditions	6	5.9
Others	8	5.3
16. Do you have first aid services?	64	42.1
17. If Yes in 16 above specify		
Traditional	20	13.2
Bandage	23	15.1
Cotton	6	3.9
Scissors	5	3.3
Antiseptics	4	2.6
Others	6	3.9

Using Pearson correlation coefficient analysis on relationship between knowledge of occupational hazard and safety practice in Katagum L.G.A, it reveals the mean score of 13.78 for knowledge of occupational hazard and 26.94 for occupational safety practice. The statistical computation indicated that the r value of 0.138 is a positive correlation. Thus, the findings show that there is a positive relationship between knowledge of occupational hazard and safety practice.

Discussions:

Majority of the respondents (96.0%) reveals that there are hazards associated with their work; with cut/injuries (84.2%), falling from a height (32.2%), Inhalation of chemicals (37.5%), contracting diseases from infected animals (52.6%), getting secondary infection from the wound sustained (46.7%), slipping from the wet floor (64.5%), musculoskeletal pain (77.0%), animal bite (45.4%) and animal kick (79.6%). This is in line with a study conducted in Kano, Nigeria which found Physical hazards among the workers comprised of knife cuts (89%), punctured wounds (5%); head injury (5%) and rashes (1%).[1] In contrast, a study found that cut/injuries was known by most of the respondents (96.3%),[7] while getting secondary infections from sustained wound and contracting diseases from infected animals were known (75.1%) and 211(65.7%) by the respondents respectively.

The finding of this result shows that 11.8% have poor knowledge, 49.3% have fair knowledge, while 38.8% have good knowledge. This is in contrast with a study that found ***m***ore than three-quarters (75%) of the respondents had good knowledge of occupational hazard.[7] Again, a study in Cairo, Egypt found that 71.9% of workers had unsatisfactory level of knowledge while 28.1% of them had satisfactory level of knowledge.[17]

The study also revealed that more than half of the respondent (63.8%) carryout meat inspection, 35.5% use Personal protective equipment (PPE) while performing their duty; and reported the type of PPE they are using as overall (8.6%), apron (5.9%), hand gloves (8.6%), face mask (6.6%), boot (21.7%), and others (14.5%). The findings also shows that 61.1% practice medical examination in which they go for medical check-up on quarterly basis (8.6%), biannually (9.7%) and yearly (13.8%). They reported hand wash before commencement of meat preparation (96.1%), after preparation of meat (96.1%), before serving each customer (1.3%), after visiting the toilet (98.0%) and after handling refuse (80.9%). Most of the respondents use either

detergents, soap and or water in washing their hands and equipment. These findings concur with a study[18] that revealed 96% of them washed their hand all the time after the work and 84% of the respondents wash their hands using water and detergent, 9% used only water.

The study further revealed that about 42.1% of the respondents have first aid services at work place. The study also found a relationship between knowledge of occupational hazard and safety practice, with a Pearson correlation, r value of 0.138 and a mean score of 13.78 for knowledge of occupational hazard and 26.94 for occupational safety practice. This statistical computation indicating an r value of 0.138 is a positive correlation. Thus, there is a positive relationship between knowledge of occupational hazard and safety practice.

Limitations:

In evaluating our results, several limitations should be considered. First, respondents were very uncooperative at first for fear of revealing their secrets, they were assured that, it was purely an academic exercise and their responses would be treated in utmost confidence. Secondly, northern Nigeria is by no means homogenous and, therefore, findings from one community need to be extrapolated with caution. More studies at National level comprising all regions of the country could provide more representative data. Despite these limitations, the issues highlighted by this study are of considerable importance for the understanding of the hazards and safety practice among abattoir workers and could inform public campaign programs.

Recommendations:

We found a high level of knowledge of occupational hazards and hygiene practice among abattoir workers. But the use of PPE was very low among the respondents. This is more of attitude, requiring behaviour change. Thus, we recommended that the use of PPE and other preventive measures should be strongly encouraged as well as routine medical

examination/checkup of abattoir workers in Katagum LGA of Bauchi State. More studies are needed to determining the relationship between the high levels of personal hygiene practice despite the low level of the use of PPE among abattoir workers in this community. Ante mortem and post mortem inspection on all animals should be carry-out before and after slaughter. Similarly, sanitary waste disposal facilities should be provided in each abattoir including provision of portable and safe water supply. We recommend for an emergency medical unit equipped with first aid materials and trained personnel be provided in abattoirs and first aid box for each slaughter slab. Enforcement of laws and orders, penalties (fines) as regulatory tools governing the abattoir operation of abattoir in the country should be enforced. In order to ensure sanitary and safety practice, Public health practitioners should be posted to each abattoir to ensure workers, meat and environmental safety and also to provide health education on the importance of vaccinations, occupational safety practice and ways of protecting themselves against various occupational hazard and disease.

Conclusion:

The study revealed that majority of the respondents has good knowledge of occupational hazards, and high level of personal hygiene practice. But the use of PPE (especially apron, face mask, hand gloves and safety boots) was very low among the respondents. It also shows that workers with good knowledge of occupational hazards have a better safety practice. Therefore, a multi-disciplinary team approach (involving the community, local authority, sub-nationals and national, with both the ministries of Health, Agriculture and Local Governments etc.) is required in providing extensive health awareness/promotion, training and proper use of PPEs and equipment for preventing occupational hazards and improving safety practice among abattoir workers and more studies are needed to determining the relationship between the high levels of personal hygiene practice despite the low level of the use of PPE.

REFERENCES

1. Banjo T.A, Onilude A.A, Amoo A.O.J, Busari A, et al. Occupational health hazards among abattoir workers in Abeokuta. *Academia Arena* 2013;5(10):29-36
2. Lucchini R.G, London L. Global occupational health current challenges and the need for urgent Action. *Annals of Global health* 2014;80:251-256
3. Abdullahi A, Hassan A, Kadarrma N, Junaidu Y.M, et al. Occupational hazards among abattoir workers associated with noncompliance to the meat processing and waste disposal laws in Malaysia. *Risk management healthcare police* 2016;9:157-163
4. Onowhakpor A.O, Abusu G.O, Adebayo B, Esane H.A. Determinants of occupational health and safety, knowledge, attitude, and safety practices toward occupational hazards of sawmill workers in Ergor L.G.A, Edo State. *Afr J Med Health* Sci 2017;16:58-64
5. Obidiegwu C.S, Chineke H.N, Ubajaka C.N, Adogu P.O.U. Public health challenges in somachi main abattoir Owerri, Nigeria: A review and field activity report. *European Journal of Medical and Health Sciences* 2019;1:1-7
6. Douglas K.E, Ovua A, Orji C, Sapia B, et al. Health implications of sanitation in a public abattoir in Port Harcourt Nigeria. *The Nigerian health journal* 2013;13(2):91-95
7. Gajida A.U, Ibrahim U.M, Iliyasu Z, Jalo R.I et al. Knowledge of occupational hazards and safety practices among Butchers in Kano metropolis, Kano state, Nigeria. *Pyramid journal of medicine* 2 (2), 2019
8. Kaka B, Idowu O.A, Fawole H.O, Adeniyi A.F, et al. An analysis of work-related musculosketal disorders among Butchers in Kano metropolis, Nigeria. *Safety and health at work* 7 (3) 218-224, 2016

9. Barbra D. The hazard and potential risks associated with the physical hazard of slaughterhouse workers. Barbradozierblog 2017:1-6
10. Mansi S, Prevalence of musculoskeletal disorders among slaughterhouse workers. Journal of physical and rehabilitation medicine forecast 2019:2(1):1010.1-5
11. Hamid A, Fatima S.A, Khalid Z. Occupational health and safety in a meat processing industry. World Journal of Dairy and Food Sciences 2016;11(2):163-178
12. Bafanda R.A, Khandi S.A, Sharma R. Assessment of existing meat handling and hygienic practices among butchers and meat retailers in Jammu District of Jammu and Kashmir: A socio-economic Analysis. Asian Journal of Agricultural Extension, Economics and Sociology 2017:18(3):1-9
13. Bafanda R.A, Khandi S.A, Minhaj S.U, Khateeb A.M. Meat hygiene and associated health hazards awareness among consumers of Jammu District of Jammu and Kashmir. Current Journal of Applied Science and Technology 2017;23(3):1-11
14. Abdullahi A, Hassan A, Kadarman N, Saleh A, et al. Food safety knowledge, attitude and practice toward compliance with abattoir laws among the abattoir workers in Malaysia. International Journal of General Medicines 2016;9:79-87
15. Lwanga S, Lemeshow S. Sample size determination in health studies: A practical manual, Geneva; World Health Organization; 1991. p. 23-41.
16. SPSS for Windows, Rel. 21.0.1, Chikago. SPSS Inc. 2007
17. Mohammed H.H, Rizk S.M, Ebied E.M, Occupational health hazards as perceived by poultry processing slaughterhouse workers. Med. J Cairo University 2018;86(3):1129-1138

18. Junaidu M, Bhagavandas M, Umar Y.U. Study of knowledge, attitude and practices regarding hygiene among abattoir workers in Kano State Metropolitan. International Journal of Science and Research 2015;4(1):2474-2478