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Abattoir Workers' Perceptions, Knowledge and Practices of Severity and Susceptibility to Zoonoses in Ibadan, Nigeria

*Dairo M.D, Adebayo, M. D and Salawu A.T.
Department of Epidemiology and Medical Statistics, Faculty of Public Health, College of Medicine, University of Ibadan.

E-mail: drdairo@yahoo.com

Corresponding Author:
Dairo, M.D., as above

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Abstract
Abattoir workers constitute a major group at risk of occupational zoonoses due to the close contact during the slaughtering or processing of animals. This study therefore aimed at determining the perception, knowledge and practices relating to meat handling among abattoir workers in Bodija abattoir, Ibadan, Nigeria. A cross- sectional study of 258 workers in Bodija abattoir, Ibadan, Nigeria was carried out. Data was collected using pretested interviewer administered semi-structured questionnaire containing questions with sections on socio-demographic characteristics, knowledge of zoonoses, practices related to meat handling, perceived severity, perceived susceptibility. Knowledge of zoonoses and practices related to meat handling were categorized as good and poor while perceptions were categorized as high and low based on the scores of the correctness of the respondents' responses. Data was put into the Statistical Package for the Social Sciences software (SPSS) version 20. Descriptive statistics such as mean, standard deviation and percentages were used to summarize quantitative variables. Chi-square, odds ratio and logistic regression were used to assess associations using 95% confidence interval (CI). The mean age of the respondents was 40.1 $\pm$12.2. Most were males (69.8%). About 49.2% of the abattoir workers had good knowledge of zoonoses. About a quarter (24.4%) had good practices related to meat handling. At multiple logistic regression being a male (OR = 2.93, 95% C.I. = 1.11 – 7.76) and having primary education (OR = 0.07, 95% C.I. = 0.01 – 0.59) were significantly associated with good knowledge of zoonoses. Similarly, being a male (OR = 2.35, 95% C.I. = 1.13 – 4.76), having good practices related to meat handling (OR = 7.60, 95% C.I. = 2.95 – 19.57), those with high perceived severity (OR = 1.82, 95% C.I. = 1.82 – 7.05) and those with high perceived susceptibility (OR= 2.08, 95% C.I. =1.07 - 4.05) were significantly associated with good knowledge of zoonoses. The level of knowledge of zoonoses and practices related to meat handling among abattoir workers was poor. This suggests that abattoir workers are at risk of contracting occupational zoonoses. The association of knowledge with high perceived severity and susceptibility to zoonoses indicates the need for continuous public health educationamong the abattoir workers.

Introduction

An abattoir is a special facility designed and licensed for receiving, holding, slaughtering and inspecting meat animals and meat products before release to the public (Alonge, 2005). Establishment and management of abattoirs and wastes in Nigeria are social services provided by all the three tiers

of government. Abattoir workers constitute a major group at risk of occupational zoonoses, due to the close contact that exists between them and animals/tissue of animals during slaughtering or processing. Occupational zoonoses are diseases that result from exposure of humans to animal diseases during work. An estimated 320,000 occupationally related deaths from infectious diseases are reported yearly worldwide (Haagsma*et al.*, 2011). The likelihood that majority of the animals brought for slaughter to be harbouring chronic or subclinical zoonotic diseases increase the risk of infection among abattoir workers (Swai *et al*., 2010).

The upsurge in the prevalence of infectious and zoonotic diseases in our communities are additional indicators to the relevance of our abattoirs and slaughter houses as disease surveillance points. The numerous wastes produced by abattoir operation not only pose a significant challenge to effective environmental management but also are associated with decreased quality of the ambient environment, poor aesthetic appearance of the environment, potential transferable antimicrobial resistance and exposure, several infectious agents that can be pathogenic to humans. Documented reports have shown a variety of contaminants, microbial agents and health effects in people occupationally or accidentally exposed to improperly managed abattoir waste (Adelegan, 2002; Adeyemo, 2002; Abiade *et al.* 2006).

Zoonoses are diseases transmissible between animals (domestic and wild) and humans. An estimated 60% of all human diseases and 75% of emerging infectious diseases are zoonotic (Taylor *et al.,* 2001; Woolhouse *et al*., 2005). In general, they have high impacts on human health, livelihoods, animals and ecosystems. It has been estimated that in the least developed countries, 20% of human sickness and death was due to zoonoses or diseases recently jumped species from animals to people (Grace *et al*, 2011a).

Food borne diseases, intoxications and zoonoses are important public health problems that affect health and disrupt community life, business and economic activities in both developed and developing countries (OIE, 2006). One third of the human populations in developed countries are affected by food-borne diseases every year and, the problem is likely to be even more widespread in developing countries (WHO, 2002). Globally, unsafe food causes disease in at least one person in three annually (WHO, 2002). Many occupational zoonotic diseases of multiple aetiologies are encountered in abattoir workers who deal with the slaughter of different species of food animals for human consumption.

A high-level WHO convened group recommended the assessment of the societal burden of diseases attributable to zoonoses (Molyneux *et al*., 2011). This therefore, cannot be properly assessed without the adequate information on the practices engaged by those who work in the animal sector.

The World Health Organisation (WHO) Global Burden of Disease Disability Adjusted Life Years (DALY) table has shown that 20 out of 27 infectious diseases listed are zoonotic in nature (Coleman, 2002). In addition to this, many occupational zoonotic diseases of multiple aetiologies are encountered in abattoir workers (Battelli *et al*., 2006; Aworh *et al.,* 2011). Therefore, the purpose of this study is to assess the practices of abattoir workers relating to meat handling and the attendant zoonotic risks.

According to the WHO (2000) Global food safety strategy, traditional food safety management systems have not been effective in preventing food-borne diseases and zoonoses over the last decades. The strategy therefore, advocates food safety programmes based on a broader science based concept of risk assessment, risk management through process controls along the entire production chain and risk communication. In addition, the prevention of occupational zoonoses must be implemented jointly by both veterinary and medical services through prevention and epidemiological surveillance of human and animal health, risk evaluation, diagnosis of infections and working safety. This study seeks to identify and evaluate practices of abattoir workers and the associated risks. The outcome of this studyif adopted and implemented by policy formulators in the appropriated government agencies would serve as vital bedrock in strategies geared toward prevention and control of occupational zoonoses in our communities.

Materials and Methods

Study Area

This study was conducted in Bodija Abattoir, Ibadan, Oyo state. Oyo State has a landmass of 27, 247 square kilometres. It is bounded by Kwara state in the North, Ogun state in the South, Osun state in the Eastand the Republic of Benin in the West. Oyo state has a population of approximately 5,580,894 based on the 2006 National Population Census (NPC, 2006). Ibadan is the largest city in West Africa and the second largest in Africa. The city is located on geographic grid reference longitude $3^0$5E, latitude $7^0$20N.

Bodija abattoir is the busiest and major abattoir located within the Bodija Market in Ibadan North Local Government Area of Ibadan, Oyo state, Nigeria. It is the main recipient and distributor of cattle moved from different parts of northern states to Ibadan metropolis and some parts of the Yoruba land south west Nigeria (Filani, 2005).

Animals slaughtered in Bodija abattoir alone accounts for 65.93% of the total animal in Oyo state (Abiola, 1995). The abattoir has designated sections differentiated for the slaughter of various animal species such as cattle, pig and sheep and goats.

Study Design and Sampling technique

The study design is a cross-sectional study. The study population are the government and private workers in Bodija abattoir, Ibadan. The study participants include meat processors, meat sellers, butchers, abattoir cleaners and animal health technologists/veterinarians.

A stratified sampling technique was used to select the study participants. The respondents were stratified into six groups of meat sellers, butchers, abattoir-cleaners, meat-carriers, meat-processors and animal health technologists/ veterinarians. Using a proportional allocation technique, the abattoir workers were randomly selected from each of workers population using a proportion of 0.8 on the basis of the sample size calculated. A total of 97 out of 122 meat sellers, 93 out of 117 butchers, 21 out of 25 abattoir cleaners, 12 out of 15 meat carriers, 29 out of 36 meat processors and 6 out of 8 animal health technologists/ veterinarians were selected.

Instrument of data collection

This study employed the use of pretested interviewer administered questionnaires which had both open and close ended questions. The questionnaires were adequately translated into Yoruba language and back translated into English language to ensure validity.Information to be obtained from the questionnaires were categorized into socio-demographic characteristics respondents, knowledge of zoonoses; practices related to meat handling; risk perceptions - perceived susceptibility, perceived severity, perceived barriers to prevention; self-efficacy and cues to action.

Data management

Data collected were analysed using Statistical Package for Social Sciences (SPSS) IBM version 20. Descriptive statistics such as mean, standard deviation and percentages were used to summarize quantitative variables. Differences in categorical variables were examined using chi-square test. Practices of meat handling were cross tabulated with variables such as age groups, occupation, gender, income and educational status using logistic regression with a 95% confidence interval (CI). A probability level of $p<0.05$ was accepted as statistically significant.

Ethical consideration

Ethical approval for this study was obtained from the Oyo State Ministry of Health Ethics Review Board. The Participants were informed about what the study entailed. Assent was obtained from each intending respondent with informed consent form duly signed. Privacy and confidentiality were strictly maintained.

Results

Socio-Demographic Characteristics

Table.1 shows the socio-demographic characteristics of the respondents. The mean age of the respondents was 40.1 ± 12.2. Majority of the respondents were males (69.8%). Most of the respondents (89.1%) were of Yoruba ethnic group. More than half of the respondents (51.2%) had secondary education and above.

Table 1: Socio-Demographic Characteristics of Respondents

	Variable	Frequency	Percentage
Age	24yrs and below	26	10.1
	25-34 yrs	76	29.5
	35 - 44 yrs	71	27.5
	45 - 54 yrs	41	15.9
	55 yrs and above	44	17.1
Sex	Male	180	69.8
	Female	78	30.2
Marital Status	Single	55	21.3
	Married	181	70.2
	Divorced	15	5.8
	Widowed	7	2.7
Religion	Christianity	49	19
	Islam	202	78.3
	Traditional	7	2.7
Ethnic Group	Yoruba	230	89.1
	Hausa	14	5.4
	Igbo	3	1.2
	Others	11	4.3
Education	No formal education	63	24.4
	Primary	63	24.4
	Secondary and above	132	51.2
Years of Work Experience	5 yrs and below	35	14.0
	6 - 9 yrs	47	18.8
	10- 14 yrs	55	22.0
	15 - 19 yrs	37	14.8
	20yrs and above	76	30.4
Job Description	Meat seller	97	37.6
	Butcher	93	36.0
	Abattoir cleaner	21	8.1
	Meat carrier	12	4.7
	Meat processor	29	11.2
	Animal Health Technologist/Veterinarian	6	2.3

Respondents' Knowledge of Zoonoses and Meat Slaughter House Practices

Table 2 shows the respondents percentage distribution of responses to knowledge of zoonoses. Majority of the respondents (71.3%) had good responses to if they can tell if an animal has zoonosis by just looking at the animal as compared to 28.7% who had incorrect responses. The word zoonosis had only been heard by 48.1% of the respondents while 51.9% had not heard of the word. Half of the abattoir workers agreed that zoonoses could be transmitted to humans. Fewer people (24.0%) agreed to eating raw meat on slaughter slab compared to 76.0% who did not eat raw meat. A larger percentage (79.8%) of respondents did not go for medical screening for potential zoonoses unlike 20.2% who went for medical screening for potential zoonoses.

Table 2 :Respondents' Knowledge of Zoonoses and Meat Slaughter House Practices

	Response (No. and %)	
Knowledge related questions	**Correct**	**Incorrect**
Possibility of transmitting diseases from animals to humans?	149 (57.8)	109 (42.2)
Have you ever heard of the word zoonosis?	124 (48.1)	134 (51.9)
Can zoonosis be transmitted to humans?	129 (50.0)	129 (50.0)
Knowledge of animals which transmit zoonosis?	130(50.4)	128(49.6)
Knowledge of tell-tale signs of zoonosis in an animal	184 (71.3)	74 (28.7)
Practices related questions		
Eating on the slaughter slab	135 (52.3)	123 (47.7)
Eating raw meat especially on the slaughter slab	196 (76.0)	62 (24.0)
Handwashing after handling carcasses	181 (70.2)	77 (29.8)
Response to identification of infected animal	124 (48.1)	134 (51.9)
Knowledge of knife hygiene during slaughtering	56 (21.7)	202 (78.3)
Attendance at medical screening for potential zoonoses	52 (20.2)	206 (79.8)
Regularity of wearing protective overalls at work	163 (63.2)	95 (36.8)
Regularity of wearing protective boots at work	111(43.0)	147 (57.0)
Regularity of wearing protective goggles at work	38 (14.7)	220 (85.3)
Regularity of wearing protective gloves at work	105 (40.7)	153 (59.3)
Regularity of wearing	33 (12.8)	225 (87.2)

Respondents' Perceived SusceptibilityTo Zoonosis and Its Severity

Table 3 shows the respondents percentage distribution of responses to perceived susceptibility. Most of the respondents (54.7%) perceived that they have increased chance of contracting zoonoses because of their work compared to 45.3% who did not perceive themselves to have increased chance of contracting zoonoses because of their work. More than half of the respondents (57.8%) agreed to have an increased risk of contracting zoonoses when they eat raw meat especially on the slaughter slab compared to 42.2% who did not.

Table 3 also shows the respondents percentage distribution of responses to perceived severity. Most of the respondents (55.0%) had perception that zoonoses can cause death while 45.0% do not. Similarly, Most of the respondents (55.0%) had perception that contracting zoonoses scare them unlike 45% who do not.

Table 3: Respondents' Perceived Susceptibility to Zoonosis and its Severity

	Response (No and %)	
Statements of perceived susceptibility	**Correct**	**Incorrect**
I have an increased chance of contracting zoonoses because of my work.	141 (54.7)	117 (45.3)
I am at increased risk of contracting zoonoses when I use bare hands to handle meat.	129 (50.0)	129 (50.0)
I am at increased risk of contracting zoonoses when I eat raw meat especially on the slaughter slab.	149 (57.8)	109 (42.2)
I am at increased risk of contracting zoonoses when I eat and drink on the slaughter slab.	119 (46.1)	139 (53.9)
I am at increased risk of contracting zoonoses when I don't wash my hands with soap and water after handling carcasses.	113 (56.2)	145 (43.8)
I am at risk of contracting zoonoses when I don't wear protective clothing.	124(48.1)	134(51.9)
Having a cut on my hand cannot stop me from handling meat.	107 (41.5)	151(58.5)
Severity of Zoonosis		
Contracting zoonoses can prevent me from coming to work for a long time.	116 (45.0)	142(55.0)
Contracting zoonoses can keep me in bed for an extended period of time.	110 (42.6)	148 (57.4)
Contracting zoonoses can reduce my daily income.	118 (45.7)	140(54.3)
Contracting zoonoses scares me.	142 (55.0)	116 (45.0)
Zoonoses can cause death.	142 (55.0)	116(45.0)

Abattoir Workers' Knowledge, Practices, Perceptions of Severity and Susceptibility To Zoonoses

Table 4 shows the knowledge related to zoonosis among the respondents. More than three quarters (76.1%) of the respondents knew Tuberculosis disease, about half (53.0%) knew Bird flu and knowledge of Brucellosis was the least (11.9%). A higher proportion of the respondents (49.6%) did not know which type of animal transmits zoonoses while 34.1%, 7.0% and 9.3% believed that domestic, wild and domestic and wild animals respectively transmit zoonoses. The major source of their information regarding knowledge of zoonoses was from media.

Majority of the abattoir workers representing 50.8% had poor knowledge of zoonoses and 49.2% had good knowledge of zoonoses. More than three quarters (75.6%) of the respondents had poor practices as against 24.4% who had good practices. With respect to risk perception of the respondents' work, 48.1% had high susceptiblity to zoonoses and perceived severity of zoonoses was observed to be 50% among the respondents.

Table 4: Abattoir Workers' Knowledge, Practices, Perceptions of Severity and Susceptibility to Zoonoses

	Variables	Frequency	Percentage
Type of Zoonoses known	Tuberculosis	102	76.1
	Taeniasis	46	34.3
	Brucellosis	16	11.9
	Bird flu	71	53.0
	Ebola	33	24.6
Which animal transmit zoonoses	Domestic animals	88	34.1
	Wild animals	18	7.0
	Domestic and wild animals	24	9.3
	Don’t know	128	49.6
Sources of Information	Fellow workers/family	41	30.4
	Media	67	49.6
	Health workers	21	15.6
	Schools	6	4.4
Knowledge of Zoonoses	Poor	131	50.8
	Good	127	49.2
Practices of Abattoir workers	Poor	195	75.6
	Good	63	24.4
Perceived Susceptibility	Low	134	51.9
	High	124	48.1
Perceived Severity	Low	129	50.0
	High	129	50.0

Table 5: Percentage Distribution of Usage of Personal Protective Equipment (PPE)

	Use of PPE	Frequency	Percentage (%)
Overall	Never	95	36.8
	Always	86	33.6
	Sometimes	77	30.1
Boots	Never	147	57.0
	Always	50	19.4
	Sometimes	61	23.6
Goggles	Never	220	85.3
	Always	17	6.6
	Sometimes	21	8.1
Gloves	Never	153	59.3
	Always	57	22.1
	Sometimes	48	18.6
Face mask	Never	225	87.2
	Always	16	6.2
	Sometimes	17	6.6

Usage of Personal Protective Equipment (PPE)

Table 5 highlights the frequency of use of personal protective equipment (PPE) among the respondents. The percentage of respondents who always wore overalls was 33.6%, those who sometimes did were 30.1% and those who never wore overall were 36.8%. The highest proportion of the respondents (57.0%) never wore boots, 19.4% always wore boots and 23.6% sometimes wore boots. In addition to this, most of the abattoir workers (59.3%) never wore hand gloves while 22.1 % always did and 18.6 % sometimes did.

Logistic Regression of Abattoir Workers' Knowledge of Zoonoses Related To Meat Handling and Some Selected Independent Variables

Table 6 describes the logistic regression of abattoir workers' knowledge of zoonoses with some selected independent variables The table shows that male abattoir workers were approximately two times more likely (OR = 2.35, 95% C.I. = 1.13 – 4.76) to have good practices of meat handling compared to the female workers. Similarly, the practices related to meat handling were significantly associated with the knowledge of zoonoses. Those who had good practices related to meat handling were approximately eight times (OR = 7.60, 95% C.I. = 2.95 – 19.57) more likely to have good good knowledge of zoonoses compared to those who had poor knowledge of zoonoses. Furthermore, workers with high perceived severity of zoonoses were approximatelyfour times more likely to have good knowledge of zoonoses (OR = 1.82, 95% C.I. = 1.82 – 7.05). However, there was no significant association in the effect of age group, education and animal keeping on the knowledge of zoonoses among the respondents.

Table 6: Logistic Regression of Abattoir Workers' Knowledge of Zoonoses Related to Meat Handling and Some Selected Independent Variables

	Variable	OR	95% C.I.	P- value
Age	24yrs and below(ref)	1.00		
	25-34 yrs	1.13	0.35 - 3.67	0.839
	35 - 44 yrs	1.39	0.41 - 4.72	0.601
	45 - 54 yrs	1.39	0.38 - 5.15	0.622
	55 yrs and above	2.43	0.62 - 9.50	0.200
Sex	Male (ref)	1.00		
	Female	2.35	1.13 - 4.76	0.022**
Education	No formal education	1.00		
	(ref)	2.33	0.95 - 5.76	0.066
	Primary	2.27	0.97 - 5.33	0.060
	Secondary and above			
Practices related	Poor (ref)	1.00		
to meat handling	Good	7.60	2.95 -19.57	<0.001**
Perceived	Low (ref)	1.00		
Severity	High	3.58	1.82 -7.05	<0.001**
Perceived	low (ref)	1.00		
Susceptibility	High	2.08	1.07 - 4.05	0.030**
Do you keep	No	1.51		
animal pets?	Yes(ref)	1.00	0.69 - 3.32	0.306

** Significant at P-value < 0.05

Logistic Regression of Abattoir Workers' Practices Related To Meat Handling and Some Selected Independent Variables

Table 7 describes the logistic regression of abattoir workers' practices with some selected independent variables. The table shows that male abattoir workers were approximately three times more likely (OR = 2.93, 95% C.I. = 1.11 – 7.76) to have good practice of meat handling compared to the female workers. Similarly, the knowledge of zoonoses was significantly associated with the meat handling practices. Those who had good knowledge of zoonosis were approximately eight times (OR = 7.93, 95% C.I. = 3.08 – 20.46) more likely to have good practices related to meat handling compared to those who have poor knowledge of zoonoses. Besides, workers with primary school education were eight times less likely to have good practices related to meat handling (OR = 0.12, 95% C.I. = 0.04 – 0.38). On the other hand, there was no significant association in the effect of age group, education, perceived susceptibility to zoonoses, perceived severity of zoonoses and animal keeping on the practice of meat handling among the respondents.

Table 7: Logistic Regression of Abattoir Workers' Practices Related to Meat Handling and Some Selected Independent Variables

	Variable	OR	95% C.I.	P- value
Age	24yrs and below	1.67	0.38 – 7.37	0.500
	25-34 yrs	1.24	0.40 – 3.83	0.711
	35 - 44 yrs	1.60	0.52 – 4.91	0.413
	45 - 54 yrs	2.60	0.71 – 9.54	0.149
	55 yrs and above (ref)	1.00		
Sex	Male	2.93	1.11 – 7.76	0.030**
	Female (ref)	1.00		
Education	No formal education	0.43	0.15 – 1.23	0.015
	Primary	0.12	0.04 – 0.38	<0.001**
	Secondary and above (ref)	1.00		
Knowledge of Zoonoses	Poor (ref)	1.00		
	Good	7.93	3.08 – 20.46	<0.001**
Perceived Severity	Low (ref)	1.00		
	High	2.18	0.89 – 5.32	0.086
Perceived Susceptibility	low (ref)	1.00		
	High	2.22	0.98 – 5.02	0.055
Do you keep animal?	No (ref)	1.00		
	Yes	1.27	0.53 – 3.04	0.598

** Significant at P-value < 0.05

Discussion

This study examined the risk perception, knowledge and practices related to meat handling among the abattoir workers and the attendant zoonotic risks in Bodija abattoir, Ibadan, Oyo state. It focused on assessment of perception and knowledge of zoonoses, assessment of meat handling related practices, and association between socio-demographic factors and knowledge of zoonoses. This study equally investigated the association between socio-demographic factors and abattoir practices as well as the factors influencing the knowledge of zoonoses and practices associated with meat handling of abattoir workers. The findings of this work revealed that there was an overall poor level of knowledge and practices among the abattoir workers. A poor level of knowledge and awareness of existence of diseases is likely to generate an attitude for behaviour change that will help in the prevention of diseases and while its absence reduces the perceived threat of the disease as well as prioritization and dedication of resources to the prevention and control of disease (Agampodi *et al.,* 2010).

Male workers constituted the major work force in the abattoir. This larger population of males could be due to the strenuous activities

done in the abattoir as reported by Adesokan and Raji (2014). A larger proportion of the respondents practice Islam as a religion and this is in agreement with the study done by Adeyemo (2002), where it was reported that animals were mostly slaughtered using the Muslim technique of decapitation.

A minority of the abattoir workers were found to have good knowledge of zoonoses. This outcome is similar to studies done in Nigeria, Ghana, Tanzania and Italy where similar low level of knowledge about zoonoses was exhibited by abattoir respondents (Adeyemo 2002; Swai *et al.*, 2010;Ngbede *et al*., 2012; Cediel *et al*., 2012). Among the abattoir workers who agreed that diseases can be transmitted from animals to humans, most knew about Tuberculosis followed by Bird flu and Taeniasis in this order. However, the knowledge of brucellosis was the poorest with 11.9% of the respondents stating it as a type of zoonosis. In addition to this, just a few persons correctly agreed to the fact that both domestic and wild animals transmit zoonooses. This study further revealed that media was the major source of information for the abattoir workers. The implication of the findings is paramount. Discussion should be more detailed and communicative.

Findings from this study showed that the level of practices related to meat handling engaged by the abattoir workers was poor and this was similar to previous studies conducted in other abattoirs in Nigeria (Otolorin *et al*, 2014; Adesokan *et al,*2014). Also works done by Otupiri*et al*.,2000 in Ghana revealed similar findings. The poor practices exhibited by these abattoir workers could be attributed to the laxity in regulations concerning standard operating practices (SOPs) in abattoir activities (FAO, 2009). Furthermore, the number of government personnel working in the abattoir was grossly inadequate at the time of visit to the abattoir. Veterinarians and animal health technologists who were supposed to oversee the activities and ensure compliance of other abattoir workers to wholesome practices were very few in numbers at the abattoir. Eating of raw meat in the abattoir was not a regular phenomenon, nevertheless a few persons concurred to eating of raw meat in the abattoir. A vast proportion of the respondents had not gone for medical screening against potential zoonoses and this agrees with what Otolorin *et al.* (2014) reported.

The knowledge of zoonoses was significantly associated with the meat handling practices. Those who had good knowledge of zoonoses were approximately eight times more likely to have good practices related to meat handling when compared to those who have poor knowledge of zoonoses. In addition, workers with primary school education were eight times less likely to have good practices related to meat handling. This therefore showed that good knowledge had a positive influence on the practices engaged by the abattoir workers. On the other hand, there was no significant association in the effect of age group, education, perceived susceptibility to zoonoses, perceived severity of zoonoses and animal keeping on the practice related to meat handling among the abattoir respondents when subjected to logistic regression. Risk perceptions measured by the respondents' perception of susceptibility and perception of severity equally had a no effect on the good practices related to meat handling among Bodija abattoir worker. This implies that other means of ensuring compliance with meat handling practices need to be explored.

Bias could have been introduced into the study as a result of language barrier especially when questions on knowledge of zoonotic diseases were asked. In particular is brucellosis disease which does not have a Yoruba name or interpretation, even though, the Hausa name 'Bakali' was used as in place of the unknown Yoruba name. Furthermore, the capability of respondents to recall information or activities reduces as time elapses and therefore, there could be likelihood for better recall for more recent experiences among the respondents. In the light of this, questions based on how long a respondent has been in the field of work could suffer from this bias. Similarly, issues of culture and values were not taken into consideration. Launiala (2009) reported that questions related to safety behaviours and practices are interspersed with the person's knowledge, beliefs, emotions, and values, and they can be

either positive or negative. The risk perception and behaviour towards zoonoses can be influenced more by habits and customs than by specific knowledge on transmission mechanisms of zoonoses.

Based on the overall poor knowledge of zoonoses and poor practices of abattoir workers, it is recommended that there should be continuous public health education, food safety training and provision of educational material in the native language of the abattoir workers.

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