

Article

Assessment of Knowledge Attitude and Practice of Raw Meat Hygiene among Value Chain Personnel from Major Slaughter Slabs in Kebbi State, Nigeria

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Abstract: This study assessed the knowledge attitude and practice of raw meat value chain personnel from major slaughter slabs in Kebbi State, Nigeria. A total of 460 personnel were interviewed using an interview schedule. Data on knowledge, attitude and practice was collected and analyzed using descriptive statistics and T-test at 5%. Results on demographic characteristics of the respondents indicated that male were predominant (96.3%) in the raw meat business. Married respondents constituted (62.8%) and the predominant age distribution was 15-20 years (35%). Occupationally, meat business accounts for the major work (84.7%) with between 5 – 10 years of experience (55%) in the business. The T-test result shows significant difference ($P < 0.05$) indicating that there is knowledge of meat hygiene. The T-test conducted for attitude of personnel on meat hygiene have showed no significant difference ($P > 0.05$) implying that the attitude of personnel in slaughter slabs towards meat hygiene is neutral. The T-test for practices of meat hygiene indicated that there is significant difference ($P < 0.05$) indicating a poor practice. The study concluded that there is a significant knowledge of meat hygiene among personnel in the raw meat value chain. Also, the attitude of personnel towards meat hygiene at slaughter slabs is neutral. However, the practice of meat hygiene in the major slaughter slabs in Kebbi state has been shown to be very poor according to the findings of this research. This could pose serious food safety

issues. Hence, training in health education of the operators on modern, more hygienic and safer abattoir practices is advocated.

Keywords: Knowledge, Attitude, Practice, Hygiene, Raw Meat Value Chain, Slaughter Slabs

1. Introduction

According to FAO (2011), meat is all parts of an animal that are intended for or have been judged as safe and suitable for human consumption. But in more precise term, meat is mostly the muscle tissue of an animal containing about 75% water, 22.3% protein, 5% fat, carbohydrates and assorted proteins and about 27.7 KCals of energy which is regarded as food for human being (FAO, 2007).

Meat is the most perishable of all staple foods since it contains sufficient nutrients needed to support the growth of microorganisms (Huda *et al.*, 2010). Due to the potential hazard of these pathogenic bacteria, it is necessary to put more emphasis on meat hygiene. In the last years, global surveillance data indicated that the incidences of foodborne diseases has increased in developing countries mainly associated with the consumption of raw or undercooked meat and dairy products (Katayama *et al.*, 2013; Samiullah, 2013). It was also reported that the surveillance of potential contaminant bacteria in different kinds of meat is crucial to safeguard public health is practically limited in the developing countries and constant control work and research has to be done to maintain a high level of meat hygiene and safety (Mahangaiko *et al.*, 2015). Also, transport facilities are often inadequate and unhygienic as urban food distribution chains are frequently long and involve different intermediaries, which render controls difficult and ultimately expose meat to undue contamination (Olugasa *et ai.*, 2000).

It was reported by Bernard *et al.* (2007) that in Nigeria, majority of the meat comes from the abattoirs where animals are handled and slaughtered by traditionally skilled butchers and vended in the daily markets thereby exposing meat to risks of contamination. Dada (2020) observed that it is common for abattoirs to dispose waste directly into streams and rivers. There is no disposal management or treatment system, according to research Meat sellers sell meat in various forms from raw to processed meat and meat products. It is well documented that contamination of meat with pathogens constitutes a major public health concern (Cohen *et al.*, 2007). In Nigeria, processing procedures and monitoring of critical points in the meat production are not fully developed. Hence, meat hygiene cannot be assured since the abattoir has become potential source of infection and pollution, attracting domestic and wild carnivores, and rodents as a result of inadequate slaughtering and disposal facilities (Adeyemo, 2002).

The principles of meat hygiene from slaughter to consumption which are crucial for meat processing operations include: prevention of microbial contamination of raw materials, intermediate goods and final products during meat product manufacture through absolute cleanliness of tools, working tables, machines as well as hands and outfits of personnel; minimize microbial growth in raw materials, semi-manufactured goods and final products by storing them at a low temperature; reduce or eliminate microbial contamination by applying heat treatment at the final processing stage for extension of shelf life of products (Enem, 2017).

Empirical studies of the slaughterhouses have shown that a large number of the meat markets lacked basic facilities and were operating under insanitary conditions (The Nation, 2017). Failures in slaughter hygiene, meat cutting and meat handling, transportation and in the hygiene of by-products and additives will all contribute to quality losses and deterioration of the final processed meat products. Highly contaminated raw meat is unsuitable for further processing (Enem, 2017). Final products made from hygienically deficient raw meat materials are unattractive in colour, tasteless or untypical in taste with reduced shelf life due to heavy microbial loads. Moreover, there is also the risk of presence of food poisoning microorganisms, which can pose a considerable public health hazard (James *et al.*, 2005).

According to Adesiji *et al.* (2011), in most parts of Nigeria, fresh meat is usually hawked on trays or displayed on tables in open market without hygienic precautions and often kept at ambient temperatures. Also, distribution and transport facilities are often inadequate and unhygienic as urban meat distribution chains are frequently long and involve different intermediaries, which render controls difficult (Olugasa *et al.*, 2000). However, in a report by News Agency of Nigeria (NAN, 2017), the Federal Government of Nigeria has commenced the process of enacting a 'Meat Hygienic Act' to regulate the operations of abattoirs and slaughter slabs in the country. Fasanmi *et al.* (2018) opined that avoiding meat contamination at slaughterhouses is crucial for food safety; consumers' awareness and concern for the type of food they eat has attracted global attention and redirected research interests towards food safety. The practical hygiene in the slaughterhouse operations play key role in the safety and wholesomeness of meat (Fasanmi *et al.*, 2018; Enem, 2017; Kingsley *et al.*, 2013).

Food borne diseases remain an important public health problem worldwide and one of the most significant food safety hazards associated with foods from animals (Maripandi and Al-Salamah, 2010). According to Miner *et al.* (2020), abattoir workers operating with poor hygienic practices coupled with a poor state of the abattoirs or meat processing plants and ineffective meat inspection service lead to increased risk of consuming unwholesome meat with a significant impact on the health and quality of life. Sameeha, *et al.* (2021) reported that working conditions have a vital role to play in determining health and disability. Therefore, given the lack of researches that has been conducted in this field in Kebbi State, it was important to highlight the most significant the work conditions in the small slaughter

houses, because unsafe and inadequate working conditions at slaughterhouses can result in contamination of meat, spread of disease, environmental hazards, and occupational hazards to workers so work must be done to provide a safe work environment for workers and raise efficiency of preventive measures and their use to reduce occupational, environmental risks, injuries and diseases resulting from them. Hence, this research is initiated to attempt at addressing the problem. The research is aimed to conduct hygiene assessment on raw meat value chain personnel (butchers, transporters, attendants, retailers and processors) from selected major slaughter slabs in Kebbi state.

2. Materials and Methods

2.1. Study Area

The study will be conducted in Kebbi State. Kebbi State (Fig. 1) is located between Latitudes 11°30'N and 11°50'N, to Longitudes 4°00'E and 4°00'E and covers the total land mass of 36,800km² (KBSG, 2017). The state lies between the Guinea and Sudan Savanna vegetational zone. Agricultural activities predominates the occupation of the vast population in the state due to and the area is known for its abundance of livestock especially the popular cattle commonly called Sokoto *Gudali*, *Uda* and *Yankasa* sheep breeds, Sokoto red goat and many other breeds of poultry which provides a means of livelihood (Roger, 1999). The state has a great variety of animal products of which meat products predominates. Evident from the many ready-to-eat (RTE) meat joints sighted along major roads in both urban and rural areas of the region suggests that there are many people involved in meat value chain (Muhammad and Umar, 2010).

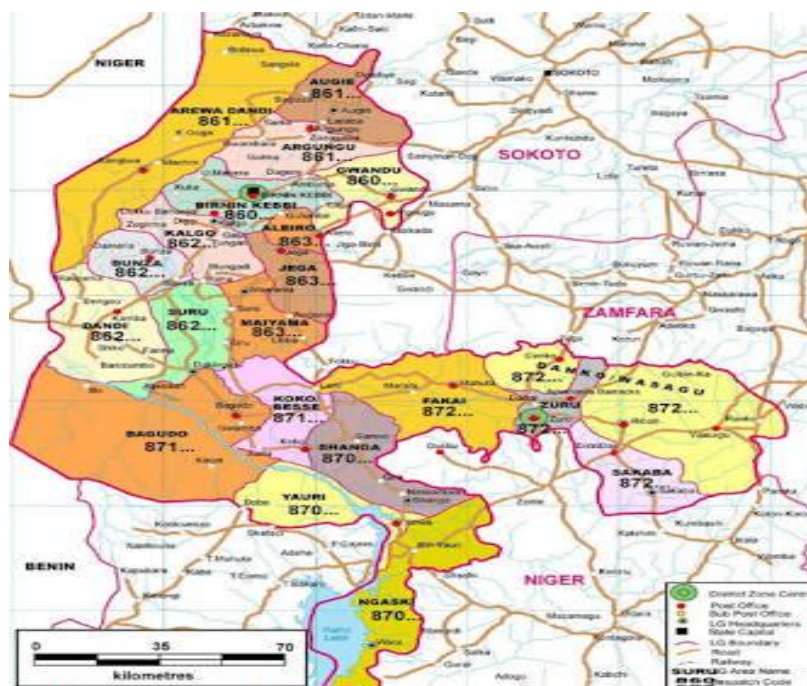


Figure 1. Map of Kebbi State showing showing Local Government Head Quarters.

Source: www.googlemaps.com/kebbiistate (2017).

2.2. Study Plan

The study Field survey on meat hygiene assessment Describe the demographic composition of raw meat value chain personnel (butchers, transporters, attendants and processors) and to determine the general knowledge, attitude and practice of meat hygiene at major slaughter slabs.

2.3. Sampling Locations and Sample Size

For the purpose of this research, Kebbi State was divided into four sampling zones according to the Kebbi State Agricultural zones, comprising of Zuru, Yauri, Bunza and Birnin kebbi Zones represented by (Zone A, B, C and D, respectively). The research covered all the 21 Local Government Areas (LGA) of Kebbi state. Sampling locations mainly comprised of Local Government Headquarters and some important towns known for meat business in the zone. Information on number of personnel was obtained from the Unions of the raw meat value chain personnel leaders of each location. Simple random sampling was then used to select a total of 115 raw meat value chain personnel from each sampling location and interviewed using a structured Interview Schedule. Hence, 460 raw meat value chain personnel were covered for the whole study as indicated in Table 1. A structured interview schedule was used to obtain information from individual respondents.

Table 1. Sampling locations and sample size

S/no	Sampling Zone	Sampling Location	Number of Respondents
1	Zone A	Fakai, Zuru, Sakaba, Danko/wasagu,	115
2	Zone B	Ngaski, Yauri, Koko, Shanga	115
3	Zone C	Bagudo, Suru, Dandi, Bunza	115
4	Zone D	Maiyama, Jega, Kalgo	115
Total			460

2.4. Data Collection

Data were collected on demographic characteristics as well as the general knowledge, attitude and practice of meat hygiene through the responses gathered from the respondents using a structured interview schedule.

2.5. Data Analyses

Data collected from Phase I on demographic characteristics of raw meat value chain personnel and was analyzed using simple descriptive statistics.

Data that were collected on the general knowledge, attitude and practice of meat hygiene were analyzed using descriptive statistics and Student T-test.

3. Results and Discussion

3.1. Demographic Attributes of Some Selected Raw Meat Value Chain Personnel at Major Slaughter Slabs in Kebbi State

The demographic characteristics of the respondents interviewed included sex, marital status, age, educational background and experience in meat business are shown in Table 2. The sex distribution of the respondents interviewed indicated that male respondents were more (96.3%) than the female respondents. Majority (62.8%) of the respondents were married as far as marital status is concerned. The age distribution that was found to be most prevalent is between the age of 15 and 20 years (35%), Most (51.7%) of the respondents had non-formal education with meat business (84.7%) accounting for the major occupation among respondents. Most (55%) respondents were found to have between 5 – 10 years of experience in the business and majority (54.1%) of the respondents did not inherit the business.

Table 2: Distribution of respondents according to demography and experience of meat hygiene at major slaughter slabs in Kebbi state

S/N	Demography	RESPONSE n(%)			
1	Sex			Male 443 (96.3)	Female 17 (3.7)
2	Marital status		Married 289 (62.8)	Single 151 (32.8)	Divorced 20 (4.4)
3	Age (Years)	15 – 20 161 (35)	21 – 25 148 (32.2)	26 – 30 101 (21.9)	>30 50 (10.9)
4	Education			Formal 222 (48.3)	Non formal 238 (51.7)
5	Primary Occupation	Farming 50 (10.9)	Trading 10 (2.2)	Butchery 390 (84.7)	Others 10 (2.2)
6	For how long have you been into meat business?		5 – 10 253 (55)	11 – 20 yrs 137 (29.8)	>20 yrs 70 (15.2)
7	Did you inherit meat business?			Yes 211 (45.9)	No 249 (54.1)

Source: Field survey, 2019.

3.2. Knowledge of Some Selected Raw Meat Value Chain Personnel on Meat Hygiene at Major Slaughter Slabs in Kebbi State

Table 3 shows the distribution of respondents according to knowledge of meat hygiene at major slaughter slabs.

Table 3: Distribution of respondents according to knowledge of meat hygiene at major slaughter slabs in Kebbi state (n=460)

S/N	QUESTION	RESPONSE n(%)	
		YES	NO
1	Are you aware of zoonotic diseases?	208(45.2)	252(54.8)
2	Do you know how standard abattoir operates?	168(36.5)	292(63.5)
3	Have you knowledge of abattoir inspection?	97(21.1)	363(78.9)
4	Do you know that improper handling of meat can be dangerous to health of consumers?	411(89.3)	49(10.7)
5	Do you know that insects and pests could be contaminants to raw meat and cause food poisoning?	398(86.5)	62(13.5)
6	Do you know some symptoms associated with food poisoning?	253(55)	207(45)
7	Are you aware that washing hands and utensils during meat processing can reduce risks of Contamination?	442(96.1)	18(3.9)
8	Do you know that people with open skin injuries, gastroenteritis, and ear or throat diseases should not be allowed to handle meat?	421(91.5)	39(8.5)
9	Do you know that washing and disinfection of working surfaces and tools are important to safety of meat?	449(97.6)	11(2.4)
10	Are you aware that regular rotation of disinfectants for cleaning can reduce the risk of meat contamination from working surfaces and cutting tools?	117(25.4)	343(74.6)
11	Do you know that the use of aprons, hand gloves and nose coverings reduces the risks of meat contamination?	433(94.1)	27(5.9)
12	Any awareness from government on operations of slaughter slabs?	19(4.1)	441(95.9)
13	Have you ever received any training on abattoir hygiene?	10(2.2)	450(97.8)
<i>T- test: Paired Two Sample for Means (Two tailed)</i>	Mean	263.54	196.46
	T-stat		0.713
	P-value		0.489*
	T- Critical		2.179

Source: Field survey, 2019; *(P<0.05)

Results indicated that most (54.8%) respondents are not aware of zoonotic diseases. Most (63.5%) respondents do not know the operations of standard abattoirs. Majority (78.9%) of the respondents do not have knowledge of abattoir inspection. Majority (89.3%) of the respondents knows the dangers of improper handling of meat. Most (86.5%) respondents know that insects and pests can contaminate meat and also 55% knows some symptoms associated with food poisoning. Majority (96.1%) of respondents are aware that routine sanitation of hands and utensils can reduce risk of contamination. Most (91.5%) respondents know that sick and injured people are not supposed to handle meat. Most (97.6%) respondents are aware that washing, disinfecting of tools and surfaces are important

for meat safety, however, most (74.6%) respondents are not aware that rotation of disinfectants reduce the risk of contamination and infection. Majority (94.1%) of respondents are aware that use of aprons, hand gloves and nose coverings reduces the risks of meat contamination. 95.9% of respondents reported that they do not receive any awareness from government on operations of slaughter houses while majority (97.8%) reported that they had never undergone any training on abattoir hygiene. The T-test conducted to test the hypothesis that the correct and incorrect answers for knowledge of meat hygiene have the same means indicated that there is significant difference ($P < 0.05$). Therefore the hypothesis is rejected since the means are not the same implying that there is a significant knowledge of meat hygiene among personnel in the raw meat value chain.

3.3. Attitude of Some Selected Raw Meat Value Chain Personnel on Meat Hygiene at Major Slaughter Slabs in Kebbi State

Results for Distribution of respondents according to attitude of meat hygiene at some major slaughter slabs in Kebbi state are shown in Table 4. Result shows that majority of respondents reported that smoking (94.1%) and eating (100%) takes place in the slaughter slabs. However, regarding the cleanliness of butchers' cloths, there was a divided opinion with half (50.2%) of the respondents reporting that the cloths are clean while half (49.8) of the respondents opined that the clothes of the butchers are not always clean. Majority (78%) of respondents reported that most equipment for slaughtering and carcass preparations are not often cleaned before use, but all (100%) agreed that the equipment are cleaned after use. With respect to mode of processing, most (76.3%) respondents reported that the carcasses are not hung for processing. Most (69.6%) respondents indicated that carcasses are not hung to cut up. Majority (89.1%) respondents reported that first incision in the abdomen does not usually takes place immediately after bleeding the animal. Majority (74.1%) of respondents reported that visible contamination of the carcass with faeces is often observed after evisceration before carcasses are washed. Most (65.2%) respondents reported that pipe borne water is not available for operation. Most (56.1%) of the respondents do report cases of illness and injuries to the abattoir leadership. Majority (60%) of the respondents wore rings, wrist watches and jewelry while on operation. The T-test conducted to test the hypothesis that the correct and incorrect answers for attitude of personnel on meat hygiene have the same means indicated that there is no significant difference ($P > 0.05$). Therefore the hypothesis is accepted since the means are statistically the same indicating that the attitude of personnel towards meat hygiene at slaughter slabs is neutral.

Table 4: Distribution of respondents according to attitude of meat hygiene at major slaughter slabs in Kebbi state (n=460)

S/N	QUESTION	RESPONSE n(%)	
		Yes	No
1	Do butchers smoke in the meat processing area?	433(94.1)	27(5.9)
2	Do butchers eat in the meat processing area?	460(100)	0(0)
3	Are the clothes of butchers and meat-sellers on the slab clean?	231(50.2)	229(49.8)
4	Are all equipment for slaughtering and carcass preparation cleaned before use?	101(22.0)	359(78.0)
5	Are all equipment for slaughtering and carcass preparation cleaned after use?	460(100)	0(0)
6	Are animals always hung to be processed?	109(23.7)	351(76.3)
7	Are carcasses hung to be cut up?	140(30.4)	320(69.6)
8	Is the first incision in the abdomen immediately started after killing/bleeding the animal?	50(10.9)	410(89.1)
9	Do you often observe any visible contamination of the carcass with faeces?	341(74.1)	119(25.9)
10	Is pipe borne water available for operations?	160(34.8)	300(65.2)
11	Do you report illness and injuries to the abattoir leaders?	258(56.1)	202(43.9)
12	Do you wear rings, wrist watches and jewelry while on operation?	276(60)	184(40)
<i>T- test: Paired Two Sample for Means (Two tailed)</i>	Mean	251.58	208.47
	T- Stat		0.513
	P value		0.618*
	T-Critical		2.201

Source: Field survey, 2019; *(P>0.05)

3.4. Practice of Some Selected Raw Meat Value Chain Personnel on Meat Hygiene at Major Slaughter Slabs in Kebbi State

Results for distribution of respondents according to practice of meat hygiene at major slaughter slabs in Kebbi State are shown in Table 5. Results indicated that Majority (98.7%) of respondents reported that carcasses are washed after evisceration. Almost all (98%) of the respondents agree that equipment are not sanitized during use. Most (72.6%) of the respondents reported that the floors of processing meat had cracks. Majority (73.3%) of the respondents pointed out that butchers practice hand washing before and after meat processing. Majority (96.1%) of the respondents reported that equipment is not rested on dirty surfaces during meat processing. Majority (71.1%) of the respondents reported that no inspection of animals is usually carried out before slaughter. 66.1% of the respondents reported inadequate waste disposal provision in most slaughter slabs with gross (97.2%) lack of storage facilities. Majority (96.3%) of the respondents indicated that most slaughter slabs and equipment are not disinfected after use. For those that do disinfect slaughter slabs, almost all (99.3%) of the respondents indicated that they do not rotate the disinfectants they use. All (100%) respondents indicated both killing

and skinning of the animals is not carried out mechanically. Majority (87.2%) of the respondents reported that no inspection of slaughter operations is usually carried out in majority of slaughter slabs by regulatory bodies. The T-test conducted to test the hypothesis that the correct and incorrect answers for practices of meat hygiene have the same means indicated that there is significant difference ($P < 0.05$). Therefore the hypothesis is rejected since the means are not the same implying that the practice of meat hygiene in the major slaughter slabs is very poor.

Table 5: Distribution of respondents according to practice of meat hygiene at major slaughter slabs in Kebbi state (n=460)

S/No	QUESTION	RESPONSE n(%)	
		YES	NO
1	Is washing of carcass practiced after evisceration?	454(98.7)	6(1.3)
2	Are equipment sanitized during use?	9(2)	451(98.0)
3	Are the floors for processing smooth without cracks?	126(27.4)	334(72.6)
4	Do butchers practice hand washing before and after processing?	337(73.3)	123(26.7)
5	Are equipment rested on dirty surface during processing?	18(3.9)	442(96.1)
6	Are animals to be slaughtered duly inspected and certified healthy?	133(28.9)	327(71.1)
7	Is there adequate provision for disposal of dung and water used for cleaning?	156(33.9)	304(66.1)
8	Is there storage facilities for excess meat?	13(2.8)	447(97.2)
9	Do you disinfect slaughter slab and equipment after use?	17(3.7)	443(96.3)
10	Do you rotate the use of disinfectants?	3(0.7)	457(99.3)
11	Is the killing of the animal mechanical?	0(0)	460(100)
12	Type of skinning and evisceration mechanical?	0(0)	460(100)
13	Are your operations inspected by regulatory bodies?	59(12.8)	401(87.2)
<i>T- test: Paired Two Sample for Means (Two tailed)</i>	Mean	135.92	324.08
	T- Stat		2.000
	P value		0.069
	T-Critical		2.179

Source: Field survey, 2019

4. Conclusions

The study concluded that there is a significant knowledge of meat hygiene among personnel in the raw meat value chain. Also, the attitude of personnel towards meat hygiene at slaughter slabs is neutral. However, the practice of meat hygiene in the major slaughter slabs in Kebbi state has been shown to be very poor according to the findings of this research. Therefore, training in health education of the operators on modern, more hygienic and safer abattoir practices is advocated.

Potential Conflicts of Interest

The authors declare no conflict of interest.

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