

# Assessment of Abattoir Waste Management: Evidences from Kano central Abattoir, Northwestern Nigeria

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## Abstract

*Abattoir waste disposal in many developing countries like Nigeria, has been a very serious challenge over the years. In most cases, waste materials are disposed of without regard to sound environmental management practices; which makes it harmful to humans and other terrestrial and aquatic life. Thus, the major aim of the study was to assess the waste management practices in Kano central abattoir. A total number of 100 respondents primarily butchers were randomly selected from the population. A structured questionnaire was designed and served as the primary source of information on the management of abattoir in Kano central abattoir. 70% of the respondents described the management of waste in the abattoir good, 20% of the respondents described it as moderate while 10% evaluated it as a poor process. The wastes are treated prior to storage in sanitary bin before final disposal which is conducted most frequently. However, there was provision and utilization of protective gadgets with a relative magnitude of recycling technology despite the constraints from level of education. Hence, the waste management practice in Kano central abattoir is critically important and considered good. It can be recommended that, sensitization and adoption of recent best practices of waste management by the abattoir personnel should be encouraged.*

**Keywords:** Abattoir; Assessment; Monitoring; Waste; Waste management

## INTRODUCTION

The main objectives of abattoir are to obtain the suitable and eatable parts of animals slaughtered for human consumption. Relative amount of waste materials is discharged which include organic and inorganic solid. The solid wastes comprise primarily of bones, non-digested food and sometimes aborted fetuses while the liquid wastes include water, blood, dissolved solids, urine, and gut contents (Nwachukwu, 2014).

Through the Federal Ministry of Health in Nigeria, strategies of good hygiene regulatory guidelines in the meat industry were provided by the food safety management (Federal Ministry of Health, 2020). Moreover, the mechanisms of quality control within the abattoir premises, the butchers' workspace in particular, must optimally operate to prevent any form of bacterial/zoonotic contamination (Prabhakar *et al.*, 2017; Bersisa *et al.*, 2019).

Management of abattoir wastes has been of great concern in Nigeria. Almost every day in all the urban and rural markets in Nigeria, animals are slaughtered while the meats are sold to the public for consumption (Ezeohaa and Ugwuishiwu, 2011).

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The constant dumping of abattoir waste without adequate treatment in our markets has led to the outbreak of diseases in the society. The upsurge in the prevalence of communicable and zoonotic diseases such as tuberculosis within the society today makes abattoir waste as disease surveillance points (Nwanta *et al.*, 2008). Studies have also shown that lack of proper abattoir waste disposal are responsible for the pollution of surface and underground waters as well as air quality which indirectly affect the health of residents living within the vicinity of abattoirs (Odoemelan and Ajunwa, 2008).

Abattoir waste disposal in many developing countries like Nigeria, has been challenging over time. Mostly, waste materials are discarded with no concern to sound environmental management practices and thus pose harm to aquatic and terrestrial life including humans. Many studies in developing nations including Nigeria have shown that many abattoirs either deposit waste materials in the direct environment or dispose their wastes directly into water bodies. Some also argued that the practice is majorly due to lack of or inadequate waste recovery and treatment facilities (Okpala *et al.*, 2021). In Nigeria, increasing demand for animal products especially meat has led to increase in the volume of abattoir waste generation and the concerns about this situation is growing rapidly. Thus, the major aim of the study was to assess the waste management practices in Kano central abattoir, Northwest Nigeria.

## MATERIALS AND METHODS

### Study site

Kano central abattoir is located in Kano, the capital of Kano State, which is in the North Western part of Nigeria. Within the city of Kano the central abattoir is located at Wambai quarters along IBB way with longitude of 12.0144°N and latitude of 8.5184° E respectively as shown in Figure 1.

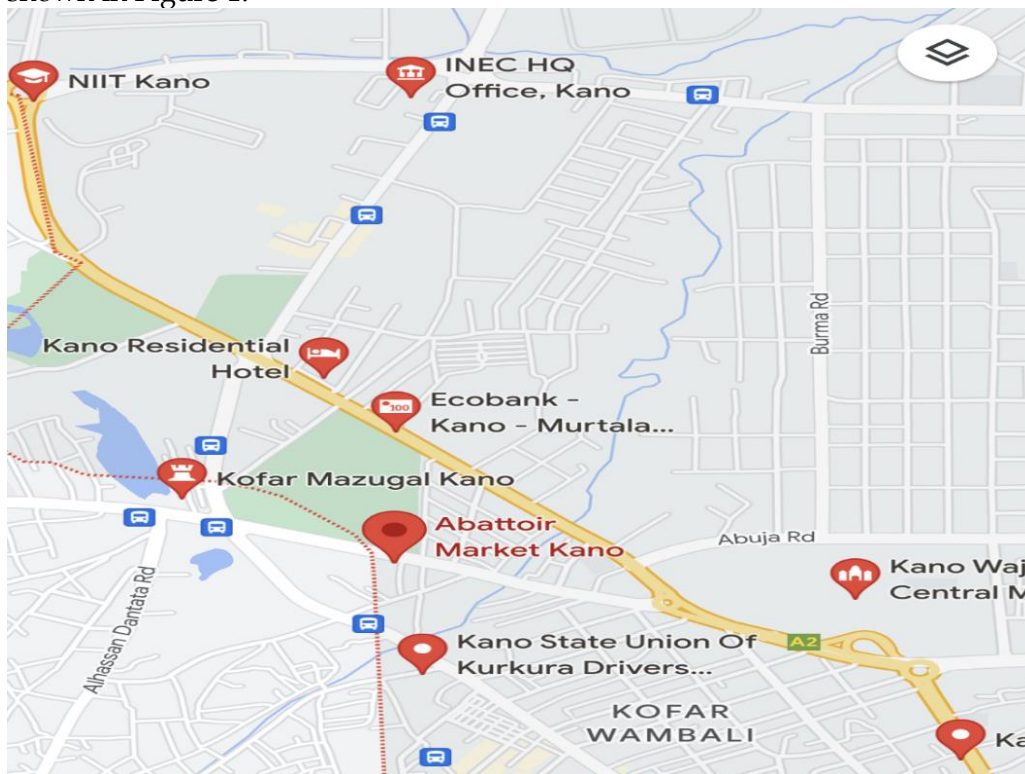


Figure 1: Map showing the location of Kano central abattoir

### **Ethical clearance**

The researcher visited the abattoir for introductory purposes and secured permission, ethical clearance and consent to conduct the research from authorities of Kano central abattoir and State Ministry of Health. Moreover, the study adhered to the ethics code of the World Medical Association Declaration of Helsinki (World Medical Association, 2013).

### **Population of the study**

The population used in this study was butchers in the slaughterhouse of Kano central abattoir. A total number of 100 respondents were randomly selected from the population (Okpala *et al.*, 2021). The study was conducted from 1<sup>st</sup> to 29<sup>th</sup> October, 2019.

### **Research instrument and instrumentation**

Data for this study was collected from primary sources. The primary source of data collected was mainly the use of a structured questionnaire which was designed to elicit information on the management of abattoir in Kano central abattoir.

### **Validity of questionnaire**

The questionnaire of this study was subjected to face validation. Face validation tests the appropriateness of the questionnaire items. In subjecting the questionnaire for face validation, copies of the initial draft of the questionnaire was validated by specialist on the subject matter and the supervisor. The process of validation of the questionnaire involved a specialist veterinarian and a senior butcher, together having combined significant years of animals' slaughter and slaughterhouse experience. During the process, the research instruments' questions were studied and improved where deemed necessary thus strengthened the relevance of the research instrument and representation to the targeted research context (Adeyemo, 2010; Taherdoost, 2016).

### **Reliability of questionnaire**

As suggested by Taherdoost (2016), validation of questionnaire was applied to ensure that the interview questions were genuine and reliable. The coefficient of 0.9 was considered a reliability coefficient as a test-retest coefficient of 0.5 will be enough to justify the use of a research instrument. Pearson correlation coefficient formula was used to calculate the reliability of the questionnaire (Adeyemo, 2010; Taherdoost, 2016).

### **Method of data collection**

This study is based on the primary source of data which was generated from responses to questionnaires and interview by the respondents.

### **Statistical analysis**

The results of the analysed data are presented in frequencies, percentages, and p-values. Chi square was conducted. The level of statistical significance was taken at  $p < 0.05$ . All statistical tests were performed using Sigma Stat v.3.5.

**RESULTS AND DISCUSSION**

**Table 1: Demographic information of the respondents**

Questions	Responses					
Sex	Male	Female				
Age	18-24	25-44	45-above			
Education	10(20%) Primary	20(40%) Secondary	20(40%) NCE	Diploma	HND	B.Sc
Religion	3(6%) Muslim	38(76%) Christian	3(6%)	4(8%)	0(0%)	2(4%)
Marital status	Single	Married				
	10(20%)	40(80%)				

**Table 2: Adoption of waste management practices in Kano central abattoir**

Questions	Strongly Agree	Agree	Partially Agree	Disagree	Strongly Disagree	P value
Wastes in your abattoir are stored in sanitary waste bin before final disposal?	6 (12%)	39 (78%)	1(2%)	2(4%)	2(4%)	<0.05
Wastes should be treated before final disposal?	20 (40%)	23 (46%)	2(4%)	5(10%)	0(0%)	<0.05
Wastes are treated before final disposal in your abattoir?	20 (40%)	25 (50%)	1(2%)	3(6%)	1(2%)	<0.05
Wastes in your abattoir are recycled?	7 (14%)	15 (30%)	20(40%)	6(12%)	2(4%)	<0.05

P>0.05 indicates no significant difference between columns

P<0.05 indicates a significant difference between columns

**Table 3: Adoption of waste management practices in Kano central abattoir**

Questions	Yes	Partially Yes	No	P value
Does your abattoir have proper waste collection bin?	42(84%)	5(10%)	3(6%)	<0.05
Do you have knowledge on abattoir waste management?	15(30%)	25(50%)	10(20%)	>0.05
Have you been education waste recycling methods?	10(20%)	34(68%)	6(12%)	<0.05

P>0.05 indicates no significant difference between columns

P<0.05 indicates a significant difference between columns

**Table 4: Adoption of waste management practices in Kano central abattoir**

Questions	Hours intervals	Daily intervals	Weekly intervals	P value
How often do you dispose of wastes?	32(64%)	9(18%)	9(18%)	<0.05

P>0.05 indicates no significant difference between columns

P<0.05 indicates a significant difference between columns

**Table 5: Adoption of waste management practices in Kano central abattoir**

Questions	Good	Moderate	Poor	P value
How can you describe or evaluate the waste management in your abattoir?	35(70%)	10(20%)	5(10%)	<0.05

P>0.05 indicates no significant difference between columns

P<0.05 indicates a significant difference between columns

**Table 6: Adoption of waste management practices in Kano central abattoir**

Questions	Very Important	Less important	Not Important	P value
What is your response on the need for training on proper abattoir waste management?	49(98%)	1(2%)	0(0%)	<0.05

P>0.05 indicates no significant difference between columns

P<0.05 indicates a significant difference between columns

**Table 7: Adoption of health management practices in Kano central abattoir**

Questions	Strongly Agree	Agree	Partially Agree	Disagree	Strongly Disagree	P value
First aid services are available in your work place.	4 (8%)	43 (86%)	2(4%)	0(0%)	1(2%)	<0.05
All necessary protective gadgets are provided in the working environment	8 (16%)	40(80%)	1(2%)	0(0%)	1(2%)	<0.05
Do you always put on your protective gadgets in the working environment?	9 (18%)	38(76%)	2(4%)	1(2%)	0(0%)	<0.05
Welfare services such as cloak room accommodation, sanitary convinces and means of transportation are provided in the abattoir	6 (12%)	30(60%)	2(4%)	7(14%)	5(10%)	<0.05
Working condition affects you in the work environment such as heat, cold, noise and smell	10 (20%)	32(64%)	3(6%)	4(8%)	1(2%)	<0.05

P>0.05 indicates no significant difference between columns

P<0.05 indicates a significant difference between columns

**Table 8: Adoption of health management practices in Kano central abattoir**

Questions	Heat	Cold	Norse	Smell	None	P value
What condition affects you most from the conditions in question (5) part C above?	3(6%)	10(20%)	10(20%)	22(44%)	5(10%)	<0.05

P>0.05 indicates no significant difference between columns

P<0.05 indicates a significant difference between columns

**Table 9: Adoption of health management practices in Kano central abattoir**

Questions	Strongly Agree	Agree	Partially Agree	Disagree	Strongly Disagree	P value
The identified condition causes health effect to exposed workers	6(12%)	26(52%)	10(20%)	1(2%)	7(14%)	<0.05
Education can reduce the incidence of occupational hazard.	23 (46%)	24 (48%)	1 (2%)	0 (0%)	2 (4%)	<0.05

P>0.05 indicates no significant difference between columns

P<0.05 indicates a significant difference between columns

Demographic information of the respondents showed that 100% of all the respondents were males and age group proportion was 1:2:2 for 18-24, 25-44, 45yrs & above respectively. Secondary school certificate holders were 76% which is the highest percentage of educational level amongst the respondents and by virtue of religion all the respondents were Muslims (Table 1). The respondents' level of education might not have been sufficient enough to make them aware of the best practices in management of waste. Proper and adequate education serves as the key to avoiding environmental contamination (Ezeoha and Ugwuishiwu, 2011). Most of the respondents were married and a small proportion of the respondents were found to be single with 20% while the married respondents have 80% of the total respondents.

Only 12% of the respondents strongly agree that wastes are stored in sanitary waste bin before final disposal. However, 78% of the respondents agree, 2% partially agree while the remaining 8% of the respondents share a proportion of 1:1 between disagree and strongly disagree. The results thus implied that wastes are stored in sanitary bin before final disposal. Abattoir just like any other waste can be detrimental to humans and the environment if definite precautions are not taken as stated by Osibanjo and Adie (2007). Since abattoir waste materials are entirely organic, they could either be composted or recycled and used for various activities, where that couldn't happen, they would be left to degrade thereby producing bad stench (Fearon et al., 2014). The solid wastes were mainly; bones, horns, animal dung/faeces/droppings, paunch or Intestinal content. These are constantly heaped within the abattoir for further processing. Within the facility, it brings about nuisance as a result of the rodents, flies and odour (Ezeoha and Ugwuishiwu, 2011).

Among the respondents, 46% agree to treating of waste before final disposal, 40% strongly agree, 4% partially agree while 10% disagree to treatment of wastes before final disposal. Activities such as treatment, safe disposal, blood processing, rendering, burying, incineration, composting, and anaerobic digestion are equally vital to guarantee much benefits economically from abattoir wastes rather than managing public health risks and

environmental pollution (Bellow and Oyedemi, 2009). Treatment of waste before final disposal is a healthy and hygienic practice and, it is practiced in Kano Central Abattoir as it is stated below most of the respondents agreed that waste are treated in the abattoir before final disposal and they strongly believe it is a way to safety.

Amongst the respondents 40% strongly agree, 50% agree that wastes are treated in the abattoir before final disposal, 2% partially agree while 6% disagree, 2% strongly disagree. The abattoir facility possesses different waste generation stations and handling options, whereas in many countries the wastes generated in abattoirs are not treated prior to disposal. Also, the regulatory bodies are reluctant in monitoring the processing activities and the disposal of the waste, which in turn results to produce a negative impact to the environment (Mohammed and Musa, 2012). Out of the respondents, 14% strongly agree, 30% agree, 40% partially agree, 12% disagree and 4% strongly disagree that wastes in the abattoir are recycled. Some slaughter houses are littered with non-meat products and wastes treated and recycled into useful by-products for further agricultural and industrial uses (Osibanjo and Adie, 2007). The amount of solid waste and fluids generated from abattoir can be properly applied for the production of biogas. Further research to produce material equilibrium on the actual quantity of waste and economic viability as a feed for a biogas plant is a good turn (Omole and Ogiye, 2013).

84% of the respondents claimed that the abattoir possesses a proper waste collection bin, 10% says partially yes and 6% says no. inappropriate packaging of waste into bins can result to wastes fleeing around which could negatively affect agriculture, air quality, potable water supplies, and aquatic life which could ultimately results to various health risks (Adeyemi and Adeyemo, 2007). High level of consequences observed as environmental health problems have been demonstrated by many studies in which some species of pathogenic bacteria were observed in effluents and solid wastes from abattoirs (Adetosoye *et al.*, 2006). The quality of management of slaughter slabs and abattoirs, specifically, the compliance to standards of meat inspection and sanitation is a key to sound public health standard (Nwanta *et al.*, 2008), not only restricted to Kano central abattoir but for all slaughter houses in order to ensure smooth hygienic abattoir processes.

30% of the respondents said they have knowledge of abattoir waste management, 50% says partially yes and 20% says no. It can be deduced that most of the respondents are partially knowledgeable on abattoir waste management as can be testified from the level of their education where 76% were secondary school certificate holders. Knowledge is a vital portion in terms of waste management because lack of knowledge on how to practice good management wastes causes a detrimental effect to humans and the environment (Alonge, 2005).

20% of the respondents claimed positively they have been educated on waste recycling methods, 68% says partially yes while 12% says no. When wastes are recycled, used materials are converted into useful new products, reducing the need to consume natural resources (GDARD, 2009). Nigeria had a period of boost in agricultural activities with a great export program, animal rearing and cattle ranching projects were launched in several states. Such increased abattoir activities, should therefore be supplemented with proper environmental programs to avoid contamination of the environment where adequate education serves as the key (Ezeoha and Ugwuishiwu, 2011). If abattoir wastes are recycled, the ecosystem as a whole moves closer to safety and far away from the negative impacts of the waste products.

Of the respondents, 64% okay that wastes are being disposed off in hrs intervals, 18% said daily intervals and 18% said weekly intervals. As we are of course a part of environment, the

benefits of effective waste disposal are also extremely beneficial for our general health and safety (Chukwu et al., 2011). Majority of the respondents testified that if wastes are kept for a long period of time within the vicinity of the abattoir, an offensive odour circulates which makes the working environment unfavourable.

70% of the respondents described the management of waste in the abattoir as good, 20% described it as moderate while 10% evaluated it as a poor process. From the results, the waste management practice is considered good.

98% of the respondents said training on proper abattoir waste management is very important and only 2% of the respondents says it is of less importance. This goes in line with study by Osibanjo and Adie (2007) whereby abattoir waste management tends to be more effective if training for abattoir workers is taken very important.

Among the respondents, 86% agreed that first aid services are provided in the abattoir, 8% strongly agree, 4% partially agree while 2% strongly disagree. First aid services are provided in the abattoir and they help prevent accidental transmission of diseases, and prevent workers from occupational accidents, alleviate suffering and promote recovery (Alonge, 2005). Abattoirs most often encounter hindrances in disposing, treating and processing of their wastes in an environmental friendly manner. These led to high risk of air pollution, soil pollution, underground water pollution, nuisance, odour, and public health risks via the transmission of zoonotic diseases to humans (Osibanjo and Adie, 2007), and when this happens through occupational accidents, abattoir workers stand in the front lines of getting affected.

80% of the respondents agree that all necessary protective gadgets are provided in the working environment, 16% strongly agree, 2% partially agree and 2% strongly disagree. 76% of the respondents agree that they always put on their protective gadgets in the working environment, 18% strongly agree, 4% partially agree while 2% disagree. Protective equipments reduce employee exposure to occupational hazard (GDARD, 2009). Proper manufacturing with good hygienic practices; effective solid, liquid, and gaseous waste management practices are very vital in reducing the negative impact of abattoir wastes. Safe treatment, disposal, and processing methods such as composting, rendering, anaerobic digestion, incineration, burying, and blood processing are also highly important to guarantee economic benefits from abattoir wastes rather than controlling public health risks and environmental pollution (Bello and Oyedemi, 2009).

60% of the respondents agree that welfare services are provided in the abattoir, 12% strongly agree, 4% partially agree, 14% disagree and 10% strongly disagree. Toilets, clock room, should be appropriately maintained in order to prevent disease transmission and meat spoilage. Transportation of meat and wastes in the abattoir or outside the abattoir should be carried out in environment friendly manner (RMAA, 2010).

64% of the respondents agree that working conditions such as heat, cold, noise and smell affects in the working environment, 20% of the respondents strongly agree, 6% partially agree, 8% disagree while 2% strongly disagree. The results showed that working conditions can affect workers in the abattoir, 44% of the respondents are affected by smell, 20% are affected by noise, 20% are affected by cold and 6% are affected by heat. Noise and smell affects the workers most. Epidemiological and laboratory studies involving workers exposed to occupational noise, and the general populations (including children) that resides in noisy



areas around airports, industries and noisy streets, shows that noise have both temporary and permanent impacts on physiological functions in humans. It has been postulated that noise serves as an environmental stressor (Basner *et al.*, 2014).

52% of the respondents agreed that the identified conditions in Table 8 causes health effects to exposed workers, 12% strongly agree, 20% partially agree, 14% strongly disagree and 2% disagree. Effects from working conditions can adversely cause health defects (Meadows, 2005).

Among the respondents, 46% strongly agree that education can reduce the incidence of occupational hazard, 48% agree, 2% partially agree and 4% strongly disagree. Education together with trainings critical elements for informing workers and managers about health hazards associated with workplace and controls so that the work can be done more effectively, safely and more productive (GDARD, 2009).

When wastes are generated in high quantity the management of abattoir becomes a critical action that deserves serious attention (Alonge, 2005). From the charts above it clearly shows that waste production in Kano central abattoir is high and therefore needs standard practices of wastes management.

## CONCLUSION

The results from the present study implied that wastes are treated prior to storage in sanitary bin before final disposal which is conducted most frequently. However, there was provision and utilization of protective gadgets with a relative magnitude of recycling technology despite the constraints from level of education. Hence, the waste management practice in Kano central abattoir is critically important and considered good. It can be recommended that, sensitization and adoption of recent best practices of waste management by the abattoir personnel should be encouraged.

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