

## Preliminary investigation of food safety practices and environmental hygiene in Uyo central abattoir, Uyo, Nigeria

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### ABSTRACT

Hygienic processing of meat and sanitary conditions of abattoirs play a vital role in preventing food contamination and subsequent outbreaks of foodborne illnesses. The lack of strict hygienic measures in Nigerian abattoirs poses a great risk to food safety, serving as an excellent source of microbial contamination of meat. This study aimed to assess the sanitary condition and meat hygiene practices at the central abattoir, Uyo, to describe and highlight the inadequacies and provide recommendations. The assessment was carried out through direct personal observations documented pictorially and use of textual notes over repeated abattoir visitations for a period of one week. Result from this assessment showed poor hygienic practices and nonadherence to food safety measures by the abattoir workers, poorly dressed personnels, poor waste disposal system, dilapidating facilities, and poor environmental hygiene. The unhygienic and poor sanitary conditions at the central abattoir, Uyo does not meet the ideal standard for food safety practices thus, there is a need to address this critical public health problem. The findings of unhygienic practices and handling of meat in the central abattoir suggest the need for interventions through training and education of abattoir personnels on food safety with the overall aim of protecting public health.

**Keywords:** Abattoir, environmental hygiene, food safety, meat hygiene, sanitary practices

### INTRODUCTION

Food safety entails measures taken in the processing and preparation of food that do not cause any form of harm when consumed (Mallhi *et al.*, 2018). Globally, the years of healthy life lost (YLL) is projected to be 33 million annually as a result of eating unsafe food, a figure that is likely underestimated (Miner *et al.*, 2020). Slaughtering of animals and handling of meat is an aspect of food processing that can lead to food contamination and the spread of food-borne illnesses (Al Banna *et al.*, 2021). Foodborne diseases are common public health threats in developed and developing countries although the burden is higher in developing countries (Miner *et al.*, 2020). A number of factors responsible for foodborne diseases include poor food handling, inadequate sanitary practices, obsolete food safety regulations, and weak regulatory systems, lack of training for individuals involved in food handling and processing, inadequate funding for protective equipment (Yenealem *et al.*, 2020; Gebeyehu & Tsegaye, 2022).

The abattoir is a critical control point in the food value chain as slaughtering and handling of meat is easily susceptible to microbial contamination and spread of foodborne diseases posing a risk to food safety (Al Bana *et al.*, 2021; Gebeyehu & Tsegaye, 2022). Improper handling of meat and lack of compliance to food safety and hygiene practices by meat handlers have been reported to be the cause of recurrent outbreaks of foodborne illnesses caused by *Staphylococcus aureus*, *Salmonella spp.*, *Escherichia coli* (Alimi *et al.*, 2022). Health risks for meat consumers arise due to contamination of meat from abattoir workers, the animal's body, and the environment where the meat is processed (Gebeyehu & Tsegaye, 2022). Food of animal origin such as beef, pork, fish, and chicken have been linked to high incidences of foodborne illness, where beef was reported to cause 119,000 cases out of the 1.7 million cases of foodborne illness that occurred in Wales and England between 1996 and 2000 (Miner *et al.*, 2020). Controlling hazards in meat production by improving hygiene and food safety are effective strategies for preventing and reducing the

public health burden caused by foodborne diseases of animal origin (Agu *et al.*, 2021).

Abattoirs generally offer facilities for the production and delivery of safe, wholesome meat and other meat products to the ever-rapidly increasing populace (Nwankwo *et al.*, 2023). Meat is highly perishable and poses a public health hazard to humans if food safety measures are not implemented (Gebeyehu & Tsegaye, 2022). In an abattoir setting, certain standards and food safety programs are prerequisites for providing fundamental environmental and operating conditions required for the production of safe meat and other livestock products (Adonu *et al.*, 2017). These food safety requirements include standard operating systems, good manufacturing, and hygienic and biosecurity practices (Gebeyehu & Tsegaye, 2022). The methods of slaughtering and handling meat by abattoir workers can negatively impact the quality and safety of meat (Yenealem *et al.*, 2020). Improper hygiene practices extend beyond slaughtering procedures to involve poor processing, poor environmental hygiene, and other operational systems (Gebeyehu & Tsegaye, 2022). These hygienic practices play a significant role in eliminating emerging/re-emerging zoonotic pathogens and producing safe, wholesome meat for human consumption (Gebeyehu & Tsegaye, 2022). Waste from slaughterhouses can have a negative impact both on people and the environment if not handled and disposed of properly resulting in the accumulation of solid matter in the environment and the generation of foul odour (Adonu *et al.*, 2017). Improper disposal of animal waste can cause pollution resulting in unsanitary conditions of the environment and spreading of diseases through flies or other vectors at the disposal site (Miner *et al.*, 2020). Abattoir waste and other effluents have been reported to be the source of multi-drug-resistant bacteria and other pathogens that have been implicated in food and water-borne infections (Ekpunobi *et al.*, 2024).

Despite the recent increase in consumer awareness and demand for food safety regulations including meat, unsanitary conditions of the meat market (abattoirs) continue to be a major concern, which could result in the possibility of unacceptably high levels of microorganisms in the meat (Asati *et al.*, 2024). Lack of cleanliness and unhygienic practices have become widespread in slaughterhouses in Nigeria as evidenced in various studies carried out across the country (Akpan *et al.*, 2024). Understudying the hygienic conditions and meat safety practices in abattoirs is of utmost importance in the protection of health and consumer safety to ensure appropriate interventions in areas that need attention by relevant governmental bodies and stakeholders. The public health impact of food safety risks elicited the need to observe and assess the hygiene practices in slaughter facilities to help provide long-lasting interventions to the

unsanitary management of slaughterhouses and its facilities across the country hence, the aim of this study. The objective of the present study was to assess the hygienic condition of the central abattoir in Uyo, Akwa Ibom State, Nigeria through direct personal observations and pictorial documentation.

## MATERIALS AND METHODS

This study was carried out in the Uyo central abattoir, Akwa Ibom State. Akwa Ibom State is located in the south-south geopolitical zone of Nigeria. The State has thirty-one Local Government Areas (LGAs) with three senatorial districts and a 2018 projected population of 5, 737, 270 million people according to the National Bureau of Statistics (NBS). The Uyo central abattoir which is owned and managed by the State government can house 300 cattle and an average of 950 cattle are slaughtered monthly (Bello *et al.*, 2023).

An observation of the condition and status of the abattoir was carried out for seven days between the early hours of 6.00 am to 9.00 am when slaughtering of animals takes place. The abattoir facility and premises were visually inspected, meat processing and waste management was observed in line with the basic requirements and hygienic practices which an ideal abattoir must follow.

Approval to access the abattoir to carry out this evaluation study was gotten through a written application to the Director of Veterinary Services, Uyo, Akwa Ibom State and permission obtained from the slaughterhouse management and veterinarian in charge to take photos for documentation.

## RESULT

### SLAUGHTERING AND MEAT PROCESSING PROCEDURES

The results of the observation in this study showed that the slaughter hall also served as meat processing room and even as sale points, with the carcass being placed on the floor where the slaughtering took place. Figure I showed that slaughtering of the animals and other post-slaughter operations such as flaying, evisceration, halving and quartering were seen being carried out on the same kill floor with the head, skin and offal kept on the floor of the slaughter house. The slaughter hall lacks a demarcated area for clean and dirty operations. Cattle brought in for slaughter were all placed on the bare floor with no proper immobilisation for restraint, slaughtered, and bled on the same floor with no provision for a hoist to lift the carcass to prevent it from making contact with the bare floor hence, all deboning, removal of extremities and splitting of the carcass were carried out on the dirty floor. Meat inspection is carried out by a veterinarian in this abattoir but since so many slaughtering activities all take place at once in the slaughterhouse, the meat inspection may not be efficient enough and will require more veterinary personnels.

## SANITATION AND HYGIENIC PRACTICES

Workers in the abattoir did not use any protective clothing such as helmets/scarves, gloves, aprons, or safety boots with figure I also showing a worker barefooted without any safety boot. There was no running water in the slaughter area either to wash off the dirt and blood after bleeding of the animal to reduce contamination or for the butchers to wash their knives before touching another carcass after handling a different carcass and washing of hands before touching meat. The floor of the slaughter hall was untidy with dirt and blood splashes on the wall. Environmental hygiene of the abattoir premises was poor due to presence of waste dump at the surroundings of the abattoir which can attract flies and other pests into slaughter hall, contaminating the meat being processed.

Unideal practices such as the selling of live chicken beside the slaughter hall as shown in figure II underscores the sanitary condition of the slaughter hall premises as the birds were also processed and dressed for sale at the same point for buyers who come into the abattoir to purchase meat. This could also pose a biosecurity threat to workers' health and safety as there can be cross-infection between the birds, animals and humans.

## WASTE DISPOSAL SYSTEM

Figure III shows the effluent disposal system of the abattoir where wastewater and blood are discharged into a stagnant drainage without any proper flow through and covering just beside the main slaughter hall. This stagnant drainage is capable of generating foul odour and attracting flies, rodents or other vermin to the slaughter hall.

Figure IV shows disposal of solid wastes including bones, hooves, mixed with plastics and other muddy waste in a dump site few metres away from the slaughter hall. This can result in environmental contamination and subsequent degradation posing as hazards to people working in the abattoir. The grasses surrounding this premises can attract rodents which can enter the slaughter hall, acting as source of meat contamination during meat processing in the slaughter hall.

Figure V shows dumping of animal dung not far way from the entrance of the slaughter hall. Such improper method of disposal of animal waste in the abattoir premises causes air pollution and uncondusive inhalation of foul-smelling air to individuals working around these areas. Flies and vermin can breed in such dump site as dung provide favourable conditions for the multiplication of these vectors that act as disease carriers.

Waste in this abattoir is disposed around the surroundings and outside of the abattoir building (figures III, IV & V). This facility though built within the last seven years by the State government is rapidly deteriorating as it is the major abattoir serving the Uyo metropolis and surrounding areas.

The abattoir was mostly overcrowded with no form of controlled movement from buyers and other visitors. The observations from this study further showed a reasonable gap in knowledge of food safety by the abattoir workers as they did not adopt food safety practices

## DISCUSSION

Abattoirs play a significant role in the prevention of meat-borne diseases because of the high risk of meat contamination that can occur during meat processing, thus it is essential to maintain proper hygiene during meat handling (Siluma *et al.*, 2023). Microorganisms can contaminate meat during slaughtering, processing, and transportation which poses a serious threat to food safety (Asati *et al.*, 2024). The unhygienic condition of the abattoir reported in this study is also in agreement with reports of other studies about the poor state of hygiene in slaughterhouses in other parts of the country (Nwankwo *et al.*, 2023). Other studies have also reported a poor to fair level of meat hygiene practices among butchers (Miner *et al.*, 2020). General sanitation of the abattoir is inadequate and not up to standard as waste is disposed of at dumpsites near the slaughter hall with stagnant drainages. Pests such as rodents, insects, and rats are drawn to stagnant drainages and can serve as a source of contamination in meat processed in the slaughterhouse (Akpan *et al.*, 2024). Poor maintenance and overutilization can cause facilities to deteriorate, limiting the slaughterhouse's ability to ensure the safety of meat (Nwankwo *et al.*, 2023). This can be a contributing factor to non-compliance to sanitation and hygienic procedures by the abattoir workers. The efficiency of cleaning in a slaughterhouse may be compromised by poor physical infrastructure such as cracked walls and broken floors (Siluma *et al.*, 2023). Poor hygiene practices and lack of food safety compliance can affect the quality of meat according to Gebeyehu & Tsegaye (2022) and this has been reported to be a similar situation in Nigerian abattoirs (Adonu *et al.*, 2017). Lack of compliance with food safety practices can be attributed to poor level of knowledge and attitude of abattoir personnel towards food safety requirements (Nabwiire *et al.*, 2023). Therefore, the abattoir workers need consecutive sensitization with emphasis on having a positive attitude and not just a good knowledge of the importance of adherence to food safety standards (Gebeyehu & Tsegaye, 2022). Training has boosted capacity and led to improved hygiene practices among abattoir workers (Agu *et al.*, 2021). The use of disinfectants should be encouraged in the abattoir to reduce the level of contamination in the slaughter area and premises (Salama *et al.*, 2024).



**Figure I: Unhygienic slaughter practices with flayed skin, bovine head, gastrointestinal tracts being placed on the bare floor. The slaughterhouse is overcrowded and people are not making use of personal protective equipment with a worker even walking barefoot.**



**Figure III: Stagnant drainage at the side of the main slaughter house and heap of waste lying beside it**



**Figure V: Animal dung disposed in front of the slaughter house**



**Figure II: Selling of live birds beside the slaughter hall which poses a biosecurity risk**



**Figure IV: Improper waste disposal in the abattoir premises**

## CONCLUSION

The findings from this study showed that workers at the central abattoir, Uyo do not observe both personal and environmental hygiene indicative of poor hygienic status of the abattoir and uncleanness of the premises. In general, the butchers and meat handlers had a very poor level of hygiene which does not meet the standard food safety practices. Therefore, emphasis on food safety knowledge among abattoir workers, increased capacity building, and training of veterinarians and meat inspectors should be facilitated with adequate monitoring of the sanitary practices within and outside the abattoir premises. Further studies can be carried out on various microbiological indicators to determine the quality of meat and the hygienic status of meat processing and handling facilities. The current state of the abattoir

regarding sanitary practices and meat hygiene requires prompt attention by the government, and other regulatory bodies to improve the hygiene and food safety practices among abattoir workers. This will also help reduce the risk of zoonotic diseases. Recommendations such as active implementation of food safety regulations to monitor practices in the abattoir should be put in place. More waste management offices should be tasked with the role of ensuring compliance with proper waste disposal. The drainage system should be restructured for proper effluent disposal and the waste products from the abattoir can be used for biogas production.

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