

Research Article

Assessment of Abattoir Procedures and Zoonotic Diseases Common in Cattle Slaughtered in Lokpanta Cattle Market

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Abstract

Zoonotic diseases pose significant public health risks in abattoir settings, necessitating effective practices to prevent transmission. This study assessed abattoir procedures and zoonotic diseases common in cattle slaughtered at the Lokpanta cattle market in Abia State, Nigeria, from 2021 to 2024. A mixed study approach was employed, utilizing secondary data from abattoir records, veterinary reports and observational study. About eleven thousand eighty eight (11088) cattle were slaughtered from 2021-2024. The study revealed significant gaps in hygiene, sanitation, and personal protective equipment (PPE) usage. Only one hand-washing facility was available, and equipment cleaning was irregular. PPE usage was alarmingly low, with only a small proportion of workers using gloves, protective clothing, or face masks. Waste management practices were inadequate, with no wastewater treatment system in place. However, regular ante-mortem and post-mortem inspections were conducted. Tuberculosis was the most prevalent zoonotic disease, with rates ranging from 14.3% to 18.4% across the study period. Brucellosis prevalence remained relatively low at around 1.0%, while cysticercosis ranged from 1.0% to 1.11%. Dermatophytosis was detected in 1.5% to 3.0% of cattle. Seasonal variations were observed, with the highest disease prevalence during the dry season (November-March) and the lowest during the rainy season (April-October). The study identified a clear relationship between poor hygiene practices and the prevalence of zoonotic diseases. Recommendations include improving sanitation practices, enforcing PPE usage, implementing proper waste management systems, and enhancing worker training. These findings underscore the urgent need for coordinated efforts between abattoir management, public health authorities, and policymakers to create safer and more sustainable abattoir practices in Nigeria.

Keywords

Meat, Hygiene, Abattoir, Water, Zoonoses

1. Introduction

An abattoir is a facility where livestock animals are humanely slaughtered for meat production. Abattoir practices

are integral to ensuring the health and safety of meat products derived from cattle. According to the Food and Agricultural

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Organization (FAO), the objective of an abattoir is to create sanitary meat by humanely managing animals and employing sanitary slaughtering and dressing processes [1, 2]. These practices encompass a range of activities designed to maintain hygiene and prevent contamination throughout the slaughtering and meat processing stages. Key elements include the rigorous cleaning and sanitization of equipment, facilities, and vehicles. Workers are required to adhere to strict hygiene standards, such as wearing protective clothing and undergoing regular health checks, to prevent the introduction and spread of pathogens [2]. The layout and design of abattoirs are also critical, with designated clean and dirty areas to prevent cross-contamination. Implementing these measures helps to uphold food safety and protect public health [3]. The implementation of Hazard Analysis and Critical Control Points (HACCP) systems is a cornerstone of modern abattoir practices. The global meat industry relies heavily on abattoirs for the production of safe and healthy meat products. However, the presence of zoonotic diseases in livestock, particularly cattle, poses a significant threat to public health. These diseases, transmitted from animals to humans, can lead to a wide range of illnesses, some with severe consequences, including death. Despite stringent measures implemented in abattoirs to control zoonotic diseases, their prevalence remains a pressing concern. This is particularly true in developing countries like Nigeria, where abattoir practices may not always meet international standards.

In Nigeria, the Lokpanta cattle market in Abia State is a major livestock trading hub, attracting cattle from various parts of the country. The market's abattoir plays a crucial role in ensuring the safety and quality of meat products derived from these cattle. However, the effectiveness of the abattoir's practices in controlling zoonotic diseases is not well documented. Inadequate hygiene, improper handling of animals and carcasses, and insufficient veterinary inspections can contribute to the spread of zoonotic pathogens, putting both abattoir workers and consumers at risk. Moreover, the lack of proper waste management systems and wastewater treatment facilities in many Nigerian abattoirs can lead to environmental contamination and the further spread of zoonotic diseases. Untreated abattoir waste containing pathogenic organisms can contaminate water sources and soil, creating additional pathways for disease transmission. This not only affects the immediate vicinity of the abattoir but can also have far-reaching consequences for public health in surrounding communities.

Another critical aspect of the problem is the limited

knowledge and awareness among abattoir workers regarding zoonotic diseases and their prevention. Inadequate training on proper hygiene practices, safe animal handling techniques, and the use of personal protective equipment can increase the risk of occupational exposure to zoonotic pathogens. This lack of awareness can also lead to the underreporting of potential zoonotic disease outbreaks, hindering early detection and control efforts. Furthermore, the absence of robust surveillance systems and regular monitoring of zoonotic diseases in abattoirs can contribute to the persistence and spread of these infections. Without accurate data on the prevalence and trends of zoonotic diseases in slaughtered cattle, it becomes challenging to develop targeted interventions and allocate resources effectively. This lack of surveillance also hampers the ability to detect emerging zoonotic threats and respond to them in a timely manner.

2. Methodology

2.1. Area of Study

Lokpanta cattle market is located in Abia State, Nigeria. It was established by former Governor Orji Uzor Kalu as a source of revenue for the state. The market serves as a hub for cattle trading and is an important economic centre in the region. Lokpanta cattle market is situated in the Umunneochi Local Government Area of Abia State, Nigeria. It is located along the Enugu-Port Harcourt Expressway, making it easily accessible for traders and buyers from different parts of the country. The cattle market covers a significant area and is designed to accommodate a large number of cattle and traders. It consists of various sections, including cattle-holding areas, auction grounds, administrative offices, and facilities for traders and visitors. The market is equipped with basic infrastructure such as roads, drainage systems, and water supply to ensure smooth operations. There are designated areas for loading and offloading cattle, as well as holding pens for temporary storage. Auction grounds are available for buyers and sellers to negotiate and finalize transactions. Lokpanta cattle market is known for its vibrant cattle trade activities. Traders from different parts of Nigeria, including Hausa/Fulani cattle merchants, converge at the market to buy and sell cattle. The market serves as a major source of livestock for the region, supplying cattle to local communities, butchers, and other markets.



Figure 1. Plate A. Map of Nigeria Showing Abia State in Red. Plate B Map of Umuneochi in Abia State showing the cattle market at Ngodo.

2.2. Design

The study focused on all cattle slaughtered at the Lokpanta Cattle Market Abattoir in Abia State, Nigeria, between 2020 and 2024. It also included the abattoir workers and veterinarians who were actively involved in the slaughtering process during this period. These groups were selected to allow for a thorough assessment of slaughter practices and the potential risks of zoonotic disease transmission.

Since the study involved both retrospective and observational design, the sample was composed of all available cattle slaughter records within the defined time frame, as well as data gathered from abattoir personnel who participated in the slaughtering operations. The final sample size was determined by the accessibility and completeness of relevant records, alongside the voluntary participation of workers and veterinarians in the data collection process.

To gather data, the researchers adopted a non-probability sampling technique, specifically convenience sampling. This method was chosen due to its practicality, allowing the inclusion of data based on ease of access. It was particularly

suitable for this study as the researchers relied heavily on retrospective data, direct observations, and structured surveys. All available records from 2020 to 2024 that met the study criteria were reviewed and analyzed.

Data collection was carried out using a structured proforma, which served as the main research instrument. This tool was designed to extract detailed information on abattoir practices such as animal handling, cleaning routines, inspection procedures, facility hygiene, personal protective practices among workers, and waste disposal methods. In addition, it included sections to document the occurrence of zoonotic diseases as detected during post-mortem examinations. The structured format of the proforma ensured uniformity in data extraction, contributing to the reliability and accuracy of the findings in addressing the study’s objectives.

3. Results

Only 12 butchers and 1 veterinary were found at the time of the survey and the data presented were based on availability.

Table 1. Abattoir Procedures Employed at Lokpanta Cattle Market Abattoir.

Animal Handling and slaughter	Pre-slaughter holding facility present	Stunning method used	Bleeding method	Time between stunning and bleeding
	None	Non-stunning method	None	None
Hygiene and Sanitation	Hand washing facilities available	Frequency of equipment cleaning	Type of disinfectants used	Separate clean and dirty areas present
	Only one available	Irregular	Descol	Available
Personal protective equipment (PPE)	Gloves worn by workers	Protective clothing worn	Face masks used	Boots worn
	None	None	None	Inconsistent
Waste management	Method of solid	Wast water treatment	Frequency of waste	

Inspection procedures	waste disposal	system present	removal
	Burning	None	Irregular
	Ante-mortem inspection conducted	Post-mortem inspection conducted	Frequency of veterinary inspection
	Regular	Regular	Regular

The abattoir procedures reveal significant gaps in both animal welfare and operational hygiene. In terms of animal handling and slaughter, there is no pre-slaughter holding facility, meaning animals are brought directly to the slaughter area without time to rest, which could negatively impact both animal welfare and meat quality. Additionally, the abattoir does not employ any stunning method, suggesting animals are slaughtered without prior stunning, which raises ethical concerns. The bleeding method is unspecified, and with no standard process in place, there may be inconsistencies that could affect the safety and quality of the meat.

When it comes to hygiene and sanitation, the situation is concerning. There is only one hand-washing facility, which is likely insufficient for the number of workers, and equipment cleaning is conducted irregularly, raising the risk of cross-contamination. Although the disinfectant "Descol" is used, the irregular cleaning schedule reduces its effectiveness. The presence of separate clean and dirty areas is a positive sign, but overall poor sanitation practices limit the benefits of this setup.

The use of personal protective equipment (PPE) is severely

lacking. Workers do not wear gloves, protective clothing, or face masks, which greatly increases the potential for contamination during meat processing. Boots are worn inconsistently, which indicates a general lack of adherence to safety protocols.

In terms of waste management, the abattoir primarily disposes of solid waste through burning, which may have negative environmental consequences. There is no wastewater treatment system in place, meaning untreated wastewater is likely to be discharged into the environment, posing health and ecological risks. Waste removal occurs irregularly, which could lead to the buildup of waste, further compounding sanitation issues.

However, the inspection procedures stand out as a positive aspect. Ante-mortem and post-mortem inspections are conducted regularly, ensuring that animals are healthy before slaughter and that the meat is inspected for any issues. Veterinary inspections also occur frequently, providing oversight to ensure the health of the animals. Despite these inspections, the poor hygiene and waste management practices undermine the safety of the meat produced at the facility.

Table 2. Prevalence of Zoonotic Diseases Detected in Cattle Slaughtered.

Year	Total no of cows slaughtered	Tuberculosis cases (%)	Brucellosis cases (%)	Cysticercosis cases (%)	Dermatophytosis cases (%)
2024	1582	184(11.6)			
2023	1680	240(14.3)	15(1.0)	17(1.01)	50(3.0)
2022	2352	432(18.4)	21(1.0)	26(1.11)	35(1.5)
2021	3024	528(17.5)	16(1.0)	17(1.0)	14(1.0)
2020	4032	626(15.5)	10(0.2)	23(1.0)	-

The data on disease prevalence in cows from 2020 to 2023 highlights key trends in the occurrence of tuberculosis, brucellosis, cysticercosis, and dermatophytosis among the cattle population. In 2023, a total of 1680 cows were slaughtered, with tuberculosis being the most prevalent disease, affecting 14.3% of the cattle (240 cases). Brucellosis was found in 1.0% of the cows (15 cases), while cysticercosis and dermatophytosis affected 1.0% and 3% of the cattle (17 and 50 cases, respectively). In 2023, out of 1,680 cows examined, tuber-

culosis remained at 14.3% (240 cases), showing consistency with the previous year. Brucellosis was less common, occurring in 1.0% of the cattle (15 cases). Cysticercosis and dermatophytosis were also found in low percentages-1.01% (17 cases) and 3% (50 cases), respectively.

For 2022, the total number of cows examined increased to 2,352. Tuberculosis had a higher prevalence this year, affecting 18.4% of the cattle (432 cases), the highest rate was observed in this period. Brucellosis remained steady at 1.0%

(21 cases), while cysticercosis affected 1.11% of the cows (26 cases). Dermatophytosis affected 1.5% of the cattle (35 cases).

In 2021, out of 3,024 cows examined, tuberculosis affected 17.5% (528 cases), while brucellosis was present in 1.0% (16 cases). Cysticercosis was found in 1.0% (17 cases), and dermatophytosis was found in 1.0% (14 cases).

Furthermore, in 2020, a total of 4032 cows were slaughtered with Tuberculosis having the highest prevalence, affecting 15.5% of the cattle (626 cases). Brucellosis was detected in 0.2% of the cattle (10 cases), the lowest rate was

observed during this period. Cysticercosis remained steady at 1.0% (23 cases). There was no record of Dermatophytosis in this year.

The data shows a clear pattern of seasonal variation in disease prevalence. The dry season (November to March) is associated with the highest prevalence of diseases, while the rainy season (April to October) shows the lowest disease prevalence. This could be attributed to environmental factors like temperature and humidity, which may affect the transmission and spread of these diseases among cattle.

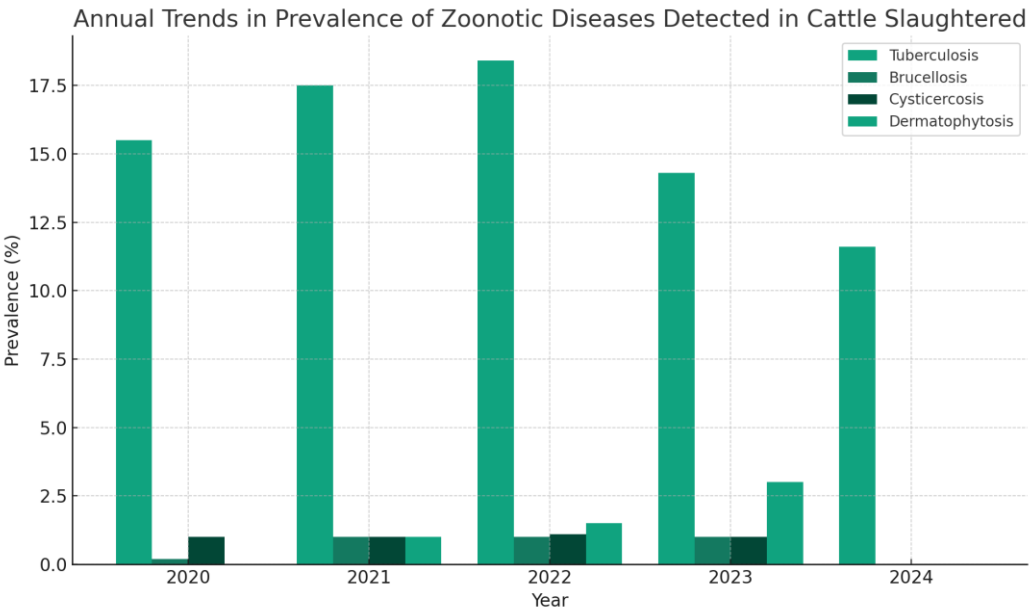


Figure 2. Bar graph showing annual trends in prevalence of Tuberculosis, Brucellosis, Cysticercosis, and Dermatophytosis in cattle slaughtered (2020–2024).

Table 3. Risk Factors Affecting Workers' Health.

Number of Workers	Number of Workers Under Each Butcher	Number of Workers that Use PPE (boots, gloves, facemasks)	Frequency of Worker Health checks	Reported Cases of Zoonotic Infections in Workers
Vet. Doctor	-	1	Regular	None
Butcher 1	12	2	Irregular	Dermatophytosis
Butcher 2	15	3	Irregular	Tuberculosis Dermatophytosis
Butcher 3	9	1	Irregular	Dermatophytosis
Butcher 4	13	2	Irregular	Dermatophytosis
Butcher 5	15	4	Irregular	Dermatophytosis
Butcher 6	10	2	Irregular	Dermatophytosis
Butcher 7	10	1	Irregular	Dermatophytosis
Butcher 8	12	2	Irregular	Dermatophytosis

Number of Workers	Number of Workers Under Each Butcher	Number of Workers that Use PPE (boots, gloves, facemasks)	Frequency of Worker Health checks	Reported Cases of Zoonotic Infections in Workers
Butcher 9	14	2	Irregular	Dermatophytosis
Butcher 10	15	3	Irregular	Tuberculosis Dermatophytosis
Butcher 11	12	1	Irregular	Dermatophytosis
Butcher 12	11	1	Irregular	Dermatophytosis

Table 4. Additional Abattoir Operations and Practices.

Meat Handling Practices

Storage temperature for meat 4 °C

Time between slaughter and distribution 2 hours

Consumer Awareness

Information provided to consumers about meat safety The information is provided to the consumers at the point of purchase

Traceability system in place A private health clinic within the facility

3.1. Workers' Health

The data on workers' health in the abattoir shows that there is one veterinary doctor overseeing operations, who uses personal protective equipment (PPE) regularly and undergoes regular health checks. There have been no reported cases of zoonotic infections in this role.

However, the situation is different for the butchers. There are 12 butchers, each managing between 9 and 15 workers, but PPE usage is very limited. Only a small proportion of workers use protective gear such as boots and gloves. For example, Butcher 1 oversees 12 workers, but only 2 of them use PPE. Across all the butchers, the use of PPE is inconsistent, with most having only 1 to 4 workers using PPE out of larger teams.

Health checks for the butchers are conducted irregularly, which raises concerns about occupational health standards. Several zoonotic infections have been reported among workers, including dermatophytosis (a fungal infection) in multiple workers and tuberculosis in some. Butcher 2 and Butcher 10 have reported cases of both tuberculosis and dermatophytosis, indicating a significant risk of infection transmission due to inadequate protective measures and irregular health checks.

3.2. Meat Handling Practices

The abattoir implements some measures to ensure proper

meat handling. Meat is stored at a temperature of 4 °C, which helps preserve its quality and safety. The time between slaughter and distribution is 2 hours, which aligns with recommended practices to reduce the risk of bacterial growth and ensure that the meat reaches consumers in a safe and timely manner.

Consumer Awareness

Consumers receive some information about meat safety at the point of purchase, ensuring that they are aware of the safety standards being followed. Additionally, there is a traceability system in place, which is managed through a private health clinic within the facility. This system likely helps track the source of the meat and monitor any potential issues related to meat safety, providing consumers with an additional layer of confidence in the product they are purchasing.

The abattoir practices employed at the Lokpanta cattle market reveal several critical issues, particularly regarding hygiene, sanitation, animal welfare, and personal protective equipment (PPE) usage. The study found that there were significant gaps in animal handling and slaughter practices. For instance, no pre-slaughter holding facility was available, and the abattoir did not use any stunning method before slaughtering the animals. The absence of a stunning method raises ethical concerns about animal welfare and may impact meat quality. This finding is consistent with previous studies, which observed that abattoirs in Southeast Nigeria also lacked proper animal handling facilities [4], leading to unnecessary stress on animals that could affect meat quality and disease transmission.

Hygiene and sanitation practices at the Lokpanta abattoir were found to be insufficient, with only one hand-washing facility available and irregular cleaning of equipment. The use of disinfectants, while present, was ineffective due to the sporadic cleaning schedule. These shortcomings in sanitation practices are supported by findings from the study in South West Nigeria [5] which examined a major abattoir in Abeokuta, Nigeria, and found similar issues, with high microbial loads in wastewater due to poor sanitation practices. These unsanitary conditions can facilitate the spread of zoonotic diseases, as pathogens can persist on surfaces and in the environment.

Moreover, the use of PPE by workers in the abattoir was alarmingly low. Only a small number of workers used gloves, protective clothing, or face masks, and the wearing of boots was inconsistent. This lack of PPE usage increases the risk of zoonotic disease transmission among abattoir workers. Fasanmi and his co-researchers [6] also highlighted the low use of PPE in Nigerian abattoirs, noting that this was a significant risk factor for zoonotic disease transmission. The irregular use of PPE observed in the Lokpanta cattle market mirrors the situation in other Nigerian abattoirs, where inadequate training and awareness among workers have been identified as major contributing factors to the poor adoption of safety practices.

The waste management practices at the Lokpanta abattoir were inadequate, with solid waste being disposed of primarily through burning, and no wastewater treatment system in place. The environmental implications of these practices are concerning, as untreated wastewater can contaminate local water sources and soil, facilitating the spread of zoonotic pathogens. Earlier findings reported similar cases [7] in their review of abattoir waste management in developing countries, emphasizing the need for proper waste treatment systems to mitigate the environmental and public health risks associated with abattoir operations.

In contrast, the regular ante-mortem and post-mortem inspections, as well as frequent veterinary inspections, were positive findings in this study. These inspections are crucial for identifying sick animals and detecting zoonotic diseases before the meat enters the food supply. This practice aligns with the recommendations on the importance of regular veterinary inspections in abattoirs to ensure food safety and prevent zoonotic disease transmission [8]. However, despite these inspections, the poor overall hygiene and sanitation practices at the Lokpanta abattoir undermine the effectiveness of the inspections in preventing disease spread.

The study identified several zoonotic diseases common in the cattle population slaughtered at the Lokpanta cattle market between 2020 and 2024. Tuberculosis was the most prevalent disease, with a steady rate of 14.3% to 18.4% across the years. This high prevalence of tuberculosis is consistent with previous studies. For example, a retrospective study at the Jos abattoir in Plateau State and found a tuberculosis prevalence rate of 11.2% among slaughtered cattle [9]. Similarly, a study in Southwest Nigeria [10] reported a prevalence rate of 6.5% for bovine tuberculosis, with seasonal variations in prevalence, particularly peaking during the wet season. The slightly higher prevalence observed in the Lokpanta cattle market may be attributed to inadequate hygiene practices, which facilitate the transmission of the disease among cattle.

Brucellosis was another zoonotic disease detected, although its prevalence remained relatively low at around 1.0% throughout the study period. This finding is similar to the 5.45% seroprevalence of *Brucella abortus* in cattle slaughtered at Bodija municipal abattoir in Ibadan, Nigeria [11]. Brucellosis is a significant public health concern due to its

potential to cause chronic health conditions in humans, including undulant fever and arthritis. The consistent detection of brucellosis in the Lokpanta cattle market, albeit at a lower prevalence, underscores the need for continued monitoring and control measures to prevent the spread of this disease.

Cysticercosis, a parasitic zoonotic disease caused by the tapeworm *Taenia saginata*, was also detected in the cattle population, with a prevalence ranging from 1.0% to 1.11%. This finding aligns with the results of 1.0% cysticercosis prevalence recorded in cattle slaughtered in the Nekemte municipality abattoir, Ethiopia [12]. The low but persistent presence of cysticercosis in cattle highlights the need for proper post-mortem inspections to identify and remove infected meat from the food supply chain. The consumption of undercooked or raw meat poses a significant risk of transmission to humans, leading to severe health complications such as seizures and headaches.

Additionally, dermatophytosis, a fungal infection, was detected in some of the cattle, with a prevalence of 1.5% to 3.0% across the study period. Dermatophytosis is not as commonly studied as bacterial or parasitic zoonoses in abattoir settings, but it can still pose a risk to both workers and consumers through direct contact with infected animals or meat. The presence of this fungal infection in the Lokpanta cattle market suggests that fungal zoonotic diseases should not be overlooked in abattoir surveillance efforts.

The relationship between abattoir practices and the prevalence of zoonotic diseases in cattle at the Lokpanta market is evident in the findings of this study. Poor hygiene and sanitation practices, inadequate use of personal protective equipment (PPE), and lack of proper waste management were identified as key risk factors contributing to the transmission of zoonotic diseases. For instance, the irregular cleaning of equipment and the limited availability of hand-washing facilities create an environment conducive to the spread of pathogens. This finding is supported by earlier study which reported that inadequate hygiene practices in abattoirs contributed to the high prevalence of zoonotic diseases such as tuberculosis and dermatophilosis in cattle [13].

The lack of PPE usage among workers further exacerbates the risk of zoonotic disease transmission. The use of PPE is critical in preventing the spread of zoonotic diseases in abattoirs, particularly during the handling of infected animals and carcasses [14]. The low PPE compliance observed in the Lokpanta abattoir likely contributed to the reported cases of zoonotic infections among workers, including tuberculosis and dermatophytosis.

Regular veterinary inspections were one of the few positive practices identified in this study, and they were associated with the detection of zoonotic diseases such as tuberculosis and brucellosis. Studies have emphasized the importance of regular inspections in identifying zoonotic diseases early and preventing their spread through the food supply chain [6]. However, the effectiveness of these inspections is undermined by the poor overall hygiene and waste management practices

at the Lokpanta abattoir, which allow pathogens to persist in the environment and continue to pose a risk to both workers and consumers.

The relationship between sanitation practices and disease prevalence, poor waste management and inadequate cleaning practices in abattoirs contributed to high microbial loads in wastewater, leading to the spread of zoonotic pathogens [5]. In the case of the Lokpanta cattle market, the lack of a wastewater treatment system and the irregular removal of waste likely played a role in the persistence of zoonotic diseases such as tuberculosis and cysticercosis among the cattle population.

Based on the findings of this study, several recommendations can be made to improve abattoir practices and reduce the risk of zoonotic disease transmission at the Lokpanta cattle market.

First, there is an urgent need to improve hygiene and sanitation practices within the abattoir. This includes increasing the number of hand-washing facilities, ensuring regular cleaning and disinfection of equipment, and using effective disinfectants. Maintaining strict hygiene standards in abattoirs is critical for preventing the spread of zoonotic pathogens and ensuring food safety [2].

Second, the use of personal protective equipment (PPE) must be enforced among abattoir workers. Training programs should be implemented to educate workers on the importance of PPE in preventing zoonotic disease transmission. Comprehensive training and the proper use of PPE significantly reduced the risk of zoonotic infections among abattoir workers [14]. Regular health checks for workers should also be conducted to ensure early detection and treatment of zoonotic infections.

Third, waste management practices at the Lokpanta abattoir need to be improved. The implementation of a wastewater treatment system is essential to prevent environmental contamination and reduce the risk of zoonotic pathogens spreading through water sources. Proper waste management in abattoirs to mitigate the environmental and public health risks associated with untreated waste [7]. In addition, solid waste disposal methods should be improved, and waste should be removed regularly to maintain a clean and safe working environment.

Finally, the regular veterinary inspections observed in this study are a positive practice that should be continued and expanded. These inspections play a crucial role in detecting zoonotic diseases and ensuring that infected animals are not allowed to enter the food supply. The importance of veterinary oversight in abattoirs for maintaining food safety and preventing zoonotic disease transmission [8]. However, to maximize the effectiveness of these inspections, they must be supported by improved hygiene, sanitation, and waste management practices.

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Conflicts of Interest

The authors declare no conflicts of interest.

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