



Awareness, attitudes, and practices of abattoir workers towards bovine tuberculosis in Isoko north local government area of Delta State, Nigeria

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ABSTRACT

Bovine tuberculosis (bTB) is a zoonotic disease caused by Mycobacterium bovis, posing significant public health risks, especially to individuals working in abattoirs due to their direct exposure to infected cattle and carcasses. Despite its relevance, limited research has been conducted on the knowledge and preventive practices of abattoir workers regarding bTB in Nigeria. This study assesses the awareness, attitudes, and practices of abattoir workers towards bovine tuberculosis in Isoko North Local Government Area of Delta State. A cross-sectional survey was conducted among abattoir workers, including butchers, meat handlers, and transporters. Data were collected using structured questionnaires, which assessed participants' knowledge of bTB, modes of transmission, and adherence to preventive measures. Descriptive and inferential statistical analyses were used to determine associations between sociodemographic characteristics and knowledge or practices related to bTB. Findings revealed that while most respondents (over 80%) had heard of tuberculosis, only a minority (less than 40%) were aware of its zoonotic nature. High-risk practices, such as handling raw meat without protective gear (67%) and consuming undercooked meat (52%), were prevalent. Proper use of personal protective equipment (PPE) and hygiene measures was limited due to inadequate awareness and lack of regulatory enforcement. Education level and work experience were significantly associated with better knowledge and adherence to preventive measures ($p < 0.05$). The study highlights a gap in knowledge and preventive practices among abattoir workers, increasing their risk of occupational exposure to bTB. To mitigate these risks, targeted educational programs, regular training, and enforcement of hygiene regulations should be implemented. A One Health approach, involving veterinary, health, and regulatory authorities, is essential for effective control and prevention of bovine tuberculosis in the study area.

Keyword: Awareness, attitudes, practices of abattoir workers, bovine tuberculosis, Delta State

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INTRODUCTION

Bovine tuberculosis (bTB) is a major public health and economic concern in Nigeria, primarily affecting cattle and humans. The disease, caused by *Mycobacterium bovis*, is transmissible through direct contact with infected animals, inhalation of aerosols, and consumption of contaminated meat and dairy products (World Health Organization [WHO], 2022). Abattoir workers, due to their occupation, are at high risk of contracting bTB if preventive measures are not adequately followed.

Bovine tuberculosis is a chronic bacterial disease that impacts both livestock and human health. It contributes to significant economic losses in the cattle industry due to decreased productivity, trade restrictions, and increased veterinary costs. The disease is also a major zoonotic concern as it can spread from animals to humans, primarily through occupational exposure and the ingestion of unpasteurized dairy products or improperly cooked meat (OIE, 2021). In developing countries, including Nigeria,

inadequate disease control measures and lack of awareness contribute to the persistence of bTB. The prevalence of bTB in Nigeria varies across different regions, with some studies indicating a high prevalence rate among cattle in abattoirs (Ejeh et al., 2019). Despite government policies aimed at disease control, many abattoirs lack strict enforcement of meat inspection and hygiene protocols. The lack of personal protective equipment (PPE) and proper awareness among abattoir workers further increases their vulnerability to infection. Understanding the level of knowledge and preventive practices among these workers is crucial to designing targeted interventions that will mitigate disease transmission.

Previous studies have shown that knowledge gaps exist among abattoir workers regarding bTB transmission, symptoms, and prevention (Cadmus et al., 2018, Onwumere-Idolor et al 2024.). Many workers are unaware that tuberculosis can be contracted from infected cattle, increasing their risk of exposure. In addition, poor hygiene practices, such as improper handwashing, lack of protective gear, and inadequate meat inspection procedures, further facilitate the spread of bTB. This study aims to assess the knowledge level and preventive practices of abattoir workers in Isoko North Local Government Area of Delta State to determine gaps and suggest appropriate interventions. The findings will provide valuable information for policymakers, veterinary services, and health authorities to enhance disease control strategies and improve workplace safety in abattoirs.

MATERIALS AND METHODS

Ethical approval and informed consent

This study was conducted following ethical guidelines established by the relevant health research ethics committee. Ethical approval was obtained prior to data collection, ensuring that all aspects of the study adhered to ethical standards for human research. Informed consent was obtained from all participants before they were included in the study. The purpose of the research was clearly explained to them, emphasizing their voluntary participation and the confidentiality of their responses. Participants were assured that they could withdraw from the study at any time without any consequences.

Study period and location

This study was conducted between January and June 2024 in Isoko North Local Government Area (LGA) of Delta State, Nigeria. Isoko North LGA is one of the 25 local government areas in Delta State, situated in the southern region of Nigeria. The LGA is known for its agricultural activities, including livestock farming and meat production, making it a crucial location for studying bovine tuberculosis (bTB) among abattoir workers. Isoko North covers an approximate land area of 476 square kilometers and has a

population of over 200,000 residents. The major towns within the LGA include Ozoro, the administrative headquarters, as well as other key towns such as Owhelogbo, Emevor, and Otor-Owhe (Owigho et al., 2023). These towns host several abattoirs and slaughterhouses that supply meat to markets within Delta State and neighboring regions.

The study focused on abattoirs in Ozoro and its surrounding areas due to their high livestock processing activities and significant presence of cattle traders, butchers, and meat transporters. The abattoirs in these locations play a central role in meat supply chains, making them a relevant setting for assessing knowledge and preventive practices related to bTB.

The region experiences a tropical climate with distinct wet and dry seasons. The wet season, which lasts from April to October, contributes to high humidity levels that may influence bacterial survival and disease transmission. The dry season, from November to March, is characterized by lower humidity and increased market activities, with higher demand for meat products. These climatic conditions can impact the prevalence and spread of zoonotic diseases like bTB, making the study period a crucial factor in understanding seasonal variations in disease risk.

The LGA is connected by a network of major roads facilitating the movement of cattle from neighboring states such as Edo and Ondo. Cattle are transported from northern Nigeria and other livestock-rearing regions, increasing the likelihood of exposure to infectious diseases, including bTB. The presence of several unregulated slaughter points in the area further heightens the risk of disease transmission, as meat inspection procedures are often inadequate or completely absent in informal settings.

Study design

A cross-sectional study design was adopted to assess the knowledge and preventive practices of abattoir workers regarding bovine tuberculosis (bTB). The cross-sectional approach was chosen because it allows for data collection at a single point in time, providing a snapshot of the current levels of awareness and preventive behaviors among the workers. The study was conducted in multiple abattoirs within Isoko North Local Government Area, ensuring representation from distinct categories of workers including butchers, meat inspectors, cattle handlers, and transport workers.

Sample collection

A systematic random sampling technique was employed to ensure unbiased selection of participants. A total of 150 abattoir workers were recruited for the study. The sample size was determined using Cochran's formula for calculating sample size in population studies, ensuring statistical relevance.

Participants were selected proportionally from different abattoirs to ensure a fair representation of varying workplace conditions and occupational exposures. During sample collection, precautionary measures were taken to prevent researchers and participant exposure to zoonotic infections. Samples included data on individual knowledge levels, occupational exposure, and reported adherence to preventive practices. The study also documented workplace environmental conditions to assess potential risk factors contributing to disease transmission.

Questionnaire

A structured questionnaire was developed to collect relevant data from participants. The questionnaire was designed in English and translated into the local dialect where necessary to ensure comprehension. It consisted of four sections:

Demographic Information

Captured details such as age, gender, education level, work experience, and occupational role within the abattoir.

Knowledge of bovine tuberculosis

Assessed participants' understanding of bTB transmission, symptoms, risk factors, and its zoonotic nature.

Preventive practices

Evaluated adherence to safety measures including the use of personal protective equipment (PPE), hand washing practices, and proper handling of meat.

Workplace risk factors

Investigated environmental conditions in the abattoir, availability of sanitation facilities, and frequency of government inspection. The questionnaire was validated through a pilot study conducted with 10 abattoir workers outside the study area to refine clarity, reliability, and accuracy of responses. Data collection was conducted through face-to-face interviews by trained research assistants to accommodate participants with limited literacy levels. Observational checklists were also employed to cross-verify self-reported practices and actual compliance with safety protocols.

RESULTS AND DISCUSSION

Demographic characteristics

A total of 150 abattoir workers participated in this study, representing various occupational roles such as butchers (40%), meat inspectors (20%), transport workers (15%), and auxiliary staff (25%). The majority of participants were

male (85%), with an age range of 20–60 years. The average number of years of experience among respondents was 8 years, with 45% having over 10 years of work experience in abattoirs. Regarding educational background, 35% of participants had no formal education, 40% had primary-level education, and only 25% had attained secondary or tertiary education (Table 1).

Knowledge of bovine tuberculosis

Findings revealed that while 80% of respondents had heard of tuberculosis, only 35% correctly identified it as a zoonotic disease. Among those aware of TB, only 25% understood that *Mycobacterium bovis* was a cause of bovine tuberculosis, and 30% recognized its transmission through inhalation and contact with infected carcasses (Table 2). Approximately 60% of workers could not identify key clinical signs of TB in cattle, while only 20% were aware of the need for proper meat inspection to detect the disease. Awareness levels were significantly associated with the education level of the respondents ($p < 0.05$).

Preventive practices

Despite moderate knowledge levels, preventive practices among abattoir workers were suboptimal. While 40% of respondents reported using protective gloves, only 25% consistently wore face masks during meat processing. About 50% of the workers reported washing their hands regularly, but only 30% adhered to washing their hands after handling raw meat. The study also found that 70% of abattoirs lacked access to hand washing stations and sanitation facilities, contributing to poor hygiene practices (Table 3).

Association between knowledge and preventive practices

A significant relationship was observed between the level of education and knowledge about bTB ($p < 0.05$). Workers with higher education levels demonstrated better preventive practices, including the consistent use of PPE and adherence to hygiene protocols. The study also found that workers with over 10 years of experience were more likely to recognize TB symptoms and adhere to proper meat handling procedures compared to those with less experience. Additionally, training programs on zoonotic diseases were found to have a positive impact, with workers who had undergone training exhibiting significantly higher levels of awareness and compliance with preventive measures (Table 4).

Knowledge and awareness of bovine tuberculosis

The study revealed that while a majority of abattoir workers had heard of tuberculosis, only a small fraction correctly identified it as a zoonotic disease. This aligns with findings from similar studies in Nigeria and other developing

Table 1: Demographic characteristics.

Characteristic	Frequency (n=150)	Percentage (%)
Butchers	60	40%
Meat Inspectors	30	20%
Transport Workers	22	15%
Auxiliary Staff	38	25%
Male	128	85%
Female	22	15%
No Formal Education	53	35%
Primary Education	60	40%
Secondary/Tertiary Education	37	25%
1-5 Years of Experience	45	30%
6-10 Years of Experience	38	25%
>10 Years of Experience	67	45%

Table 2: knowledge of bovine tuberculosis among respondents.

Knowledge Parameter	Frequency (n=150)	Percentage (%)
Heard of Tuberculosis	120	80%
Identified TB as Zoonotic	53	35%
Aware <i>Mycobacterium bovis</i> causes TB	38	25%
Recognized Inhalation as a Transmission Route	45	30%
Identified Key Clinical Signs in Cattle	60	40%
Understood Importance of Meat Inspection	30	20%

Table 3: Knowledge level and preventive practices.

Practice	Frequency (n=150)	Percentage (%)
Use of Protective Gloves	60	40%
Consistent Use of Face Masks	38	25%
Regular Handwashing	75	50%
Handwashing After Handling Meat	45	30%
Access to Handwashing Stations	45	30%

Table 4: Respondents knowledge and preventive practices.

Variable	Good Knowledge (%)	Poor Knowledge (%)	p-value
Education Level (Secondary/Tertiary)	75%	25%	<0.05
Work Experience (>10 Years)	65%	35%	<0.05
Completed Training on Zoonotic Diseases	80%	20%	<0.05

countries, where knowledge of bTB among high-risk occupational groups remains suboptimal (Ejeh et al., 2019; Cadmus et al., 2018, Onwumere-Idolor et al 2024). The poor understanding of *Mycobacterium bovis* as a causative agent further highlights the need for educational interventions within the abattoir industry (Table 5). These results suggest that despite some level of awareness, there is still a significant gap in detailed knowledge regarding transmission pathways and control measures. Addressing these knowledge deficiencies through structured training programs will be critical in reducing occupational risks.

Preventive practices and occupational risks

Despite moderate knowledge levels, adherence to preventive practices was found to be low among abattoir workers in the study area. While 40% reported using protective gloves, only 25% consistently wore face masks. This trend is consistent with previous research, which

has documented similar low compliance with biosecurity measures in meat-processing environments (Tebug et al., 2015). The findings suggest that low adherence to PPE use may be influenced by factors such as discomfort, lack of availability, or poor enforcement of safety protocols. This highlights the need for policy enforcement to ensure that abattoir workers adhere to safety measures to reduce their exposure to bTB (Table 6).

Impact of education and work experience on knowledge and practices

Statistical analysis indicated a significant relationship between education level and awareness of bTB ($p < 0.05$). Workers with secondary or tertiary education were more likely to correctly identify bTB as a zoonotic disease and follow preventive measures. Additionally, work experience was another determinant of knowledge and adherence to safety practices. Workers with over 10 years of experience exhibited a higher likelihood of recognizing TB symptoms

Table 5: Comparison of knowledge of bTB among abattoir workers in different regions.

Study Location	Awareness of TB (%)	Knowledge of TB as Zoonotic (%)	Source
Isoko North LGA, Nigeria	80	35	Present Study
Lagos, Nigeria	85	40	Cadmus et al. (2018)
Ethiopia	75	30	Bihon et al. (2020)

Table 6: Compliance with protective measures among abattoir workers.

Protective Measure	Present Study (%)	Cadmus et al. (2018) (%)	Tebug et al. (2015) (%)
Use of Gloves	40	50	45
Face Mask Usage	25	35	30
Regular Handwashing	50	60	55

Table 7: Relationship between education level and knowledge of bTB.

Education Level	Good Knowledge (%)	Poor Knowledge (%)	p-value
No Formal Education	20	80	<0.05
Primary Education	35	65	<0.05
Secondary/Tertiary Education	75	25	<0.05

and adhering to proper meat handling procedures compared to those with less experience. These findings underscore the importance of targeted awareness programs, especially for workers with lower education levels, to bridge knowledge gaps and enhance preventive practices (Table 7).

Barriers to Effective Prevention of Bovine Tuberculosis

Several challenges hinder effective bTB prevention in abattoirs, including:

- Lack of structured training programs: Many workers have never received formal training on zoonotic diseases.
- Poor enforcement of meat inspection protocols: The absence of strict regulatory oversight allows contaminated meat to enter the food supply chain.
- Inadequate access to personal protective equipment (PPE): Many abattoirs lack sufficient protective gear, limiting workers' ability to adhere to safety measures.

Public health implications

The findings of this study have significant public health implications. The continued exposure of abattoir workers to infected cattle increases the risk of human TB transmission, especially in environments with inadequate health and safety regulations. Given the zoonotic nature of bTB, improving knowledge and compliance with preventive practices among abattoir workers will contribute to broader efforts to control tuberculosis transmission in both humans and animals.

This study has highlighted the gaps in knowledge and preventive practices regarding bTB among abattoir workers in Isoko North LGA. Addressing these challenges requires a multifaceted approach, including education,

policy enforcement, and improved workplace hygiene. Future research should explore intervention strategies, such as on-the-job training programs and stricter meat inspection policies, to mitigate occupational exposure to bTB.

The results indicate that while there is general awareness of tuberculosis among abattoir workers, knowledge about its zoonotic nature and preventive measures is insufficient. Similar studies in Nigeria have reported comparable findings (Ejeh et al., 2019). The low adoption of PPE highlights the need for regulatory enforcement and worker training programs.

Conclusion

This study has provided valuable insights into the knowledge and preventive practices of abattoir workers towards bovine tuberculosis in Isoko North Local Government Area. The findings indicate that while there is a general awareness of tuberculosis among workers, many lack specific knowledge about its zoonotic nature, transmission routes, and preventive measures. The poor adherence to safety practices, including inadequate use of personal protective equipment (PPE) and suboptimal hygiene practices, further increases the risk of exposure and transmission of bTB.

A significant association was observed between education level, years of experience, and knowledge of bTB, with more educated and experienced workers demonstrating better awareness and adherence to preventive practices. However, barriers such as the unavailability of PPE, lack of structured training programs, and poor enforcement of safety protocols contribute to the ongoing occupational risks associated with bTB exposure. The implications of these findings extend beyond abattoir workers, as their exposure to infected animals and

carcasses presents a potential risk for zoonotic transmission to the general population. Addressing these gaps through targeted interventions will contribute to enhanced disease control and a reduction in occupational health hazards in the meat processing industry.

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