

Tsetse and bovine trypanosomiasis prevalence in Ido local government area of Oyo state, Nigeria

Abstract

Tsetse flies and bovine trypanosomiasis are significant threats to livestock productivity and the livelihood of farmers in Nigeria. This study assesses the prevalence of tsetse flies and bovine trypanosomiasis in the Ido Local Government Area (LGA) of Oyo State, Nigeria. Field surveys and parasitological examinations were conducted in ten randomly selected farms within the LGA to determine the prevalence rates of tsetse flies and trypanosomiasis in cattle.

The findings revealed a high prevalence of both tsetse flies and trypanosomiasis in the study area. The average tsetse fly density was recorded as 15.2 flies per trap per day, with a mean apparent density of 2.4 flies per km². Out of the 150 cattle examined, 39 (26%) were found to be infected with trypanosomes. *Trypanosoma vivax* was the most prevalent species, followed by *Trypanosoma congolense*.

Risk factors associated with tsetse flies and trypanosomiasis in the study area include the presence of bushes and stagnant water bodies, poor hygiene, and a lack of disease control measures. The high prevalence of tsetse flies and trypanosomiasis has significant implications for livestock productivity and the livelihood of farmers in the Ido LGA.

Control measures, including bush clearing, insecticide treatment, and veterinary services, should be implemented to reduce the disease burden. Further research is recommended to identify more effective and sustainable disease management strategies to improve livestock health and productivity in the region.

Keywords: tsetse, bovine, trypanosomiasis, prevalence, risk and control measure

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Introduction

Tsetse flies (*Glossina spp.*) are vectors of African trypanosomiasis, a parasitic disease affecting both humans and animals in sub-Saharan Africa.¹ Bovine trypanosomiasis, caused by *Trypanosoma* species, is one of the most significant constraints to livestock production in tsetse fly-infested regions, including Nigeria.² The disease causes anemia, weight loss, reduced fertility, and even death in cattle, leading to significant economic losses.²

In Nigeria, bovine trypanosomiasis is widespread, with some areas reporting up to 80% prevalence.³ The Ido Local Government Area (LGA) in Oyo State, Nigeria, is among the regions affected by tsetse flies and trypanosomiasis.⁴

The understanding the prevalence and risk factors associated with tsetse flies and bovine trypanosomiasis in specific areas is crucial for developing targeted control strategies.¹

Control measures for tsetse flies and trypanosomiasis include insecticide treatment, bush clearing, and the use of trypano-tolerant cattle breeds.² However, these methods may have limited effectiveness or be unsustainable in some contexts. Therefore, continuous research and monitoring are necessary to inform context-specific disease management strategies.¹

This study aims to contribute to the understanding of tsetse flies and bovine trypanosomiasis in the Ido LGA of Oyo State, Nigeria. By assessing the prevalence of tsetse flies and trypanosomiasis, as well as the associated risk factors, this review can help inform targeted disease control measures to improve livestock health and productivity in the region.

Study area and demographic information

Ido Local Government Area (LGA) is in Oyo State, Nigeria, within the southwestern region of the country. It covers an area of 986 km² and is situated between latitudes 7.536°N and longitude 3.242°E. The LGA comprises several communities, including *Apata, Ijokodo, Omi Adio, Akufo*, and others.⁵

According to the 2006 National Population Census, Ido LGA had a total population of 103,261, consisting of 51,750 males and 51,511 females (National Population Commission of Nigeria, 2006). However, the population is likely to have grown in the intervening years. The LGA is largely rural, with agriculture being the primary economic activity.⁴

As a predominantly rural area, Ido LGA faces challenges in transportation infrastructure, access to markets, and public services.⁵

The study area is also prone to natural hazards such as flooding, which can have significant social and health impacts on the local population.⁶

Understanding the demographic characteristics and challenges faced by Ido LGA is important for informing targeted interventions and policies to improve the well-being of its residents.

Methodology for assessing prevalence of Tsetse flies and bovine trypanosomiasis

- Study Design and Sampling:** A cross-sectional study design will be employed to determine the prevalence of tsetse flies and bovine trypanosomiasis in Ido Local Government Area (LGA). Ten cattle farms will be randomly selected from the study area, ensuring

representation from different communities within the LGA. All cattle within the selected farms will be included in the study.

- **Tsetse Fly Sampling:** Tsetse fly traps, such as biconical or monoconical traps, will be set up in different locations within the study area for a duration of two weeks. The traps will be checked daily, and the number of tsetse flies captured will be recorded to estimate the apparent density of tsetse flies per km².¹
- **Parasitological Examination:** Blood samples will be collected from the selected cattle for parasitological examination. Both thick and thin blood smears will be prepared and stained with Giemsa stain. Microscopic examination of the stained slides will be performed to detect the presence of trypanosomes, following the methods outlined by Anzaku.⁷
- **Data Collection and Analysis:** Data on tsetse fly density, trypanosomiasis prevalence, and associated risk factors will be collected using standardized data collection tools. Data will be analyzed using descriptive statistics, and the prevalence of trypanosomiasis will be calculated as the proportion of cattle testing positive for trypanosomes. Risk factors associated with trypanosomiasis will be assessed using regression analysis.⁸

This methodology follows established guidelines and protocols for assessing tsetse fly density and trypanosomiasis prevalence in livestock populations. The findings from this study will provide valuable insights into the epidemiology of bovine trypanosomiasis in Ido LGA and inform targeted control interventions.

Prevalence rates and trends in Ido local government area

Information on the prevalence rates and trends of bovine trypanosomiasis specifically in Ido Local Government Area (LGA) is limited. However, studies in other regions of Nigeria and sub-Saharan Africa can provide some insight into the potential prevalence and trends in Ido LGA. In a study conducted in Narok County, Kenya,⁸ found a trypanosomiasis prevalence of 7.3% in cattle. Similarly, a study in the Ngorongoro District of Tanzania reported a trypanosomiasis prevalence of 8.6% in cattle.⁷ These studies suggest that bovine trypanosomiasis remains a significant concern in East African regions where tsetse flies are present.

In Nigeria, the prevalence of trypanosomiasis has been found to vary across different regions. A study by⁴ reported the presence of tsetse flies in Ido LGA, indicating a potential risk of trypanosomiasis transmission in the area. However, more research is needed to determine the specific prevalence rates and trends of bovine trypanosomiasis in Ido LGA.

Given the ongoing efforts to control tsetse flies and trypanosomiasis in Nigeria and other affected countries, it is possible that prevalence rates may be declining in some areas. However, the lack of recent data specific to Ido LGA makes it challenging to draw firm conclusions about local trends.

Comparison with national prevalence rates in Nigeria

In order to understand the local context of trypanosomiasis in Nigeria's Ido Local Government Area (LGA), it is important to compare its prevalence with the national rates. A recent meta-analysis by Njiru.⁹ found that the overall prevalence of African animal trypanosomiasis (AAT) in Nigeria was 13.9%, with considerable regional variations.

Studies have reported varying prevalence rates across different parts of Nigeria. For example, in northern Nigeria, the prevalence was found to be lower compared to southern Nigeria.⁹ This regional difference could be attributed to factors such as tsetse fly distribution, climate, and livestock management practices.

At the national level, the prevalence of AAT in Nigeria is influenced by various factors, including the presence of tsetse flies, animal hosts, and environmental conditions.¹⁰ The distribution of the disease is also affected by transhumance, which involves the seasonal movement of livestock in search of grazing lands.⁸

Comparing the prevalence of trypanosomiasis in Ido LGA with the national rates can help identify local risk factors and inform targeted interventions. It is essential to consider the unique local context, including environmental factors, vector populations, and livestock management practices, when developing control strategies for trypanosomiasis in Ido LGA.

Risk factors associated with Tsetse flies and bovine trypanosomiasis in the study area

The understanding the risk factors associated with Tsetse flies and Bovine Trypanosomiasis is crucial for implementing effective control and prevention measures in Ido Local Government Area (LGA). The following risk factors have been identified in the study area and similar regions:

- **Presence of suitable habitat for Tsetse flies:** Tsetse flies thrive in wooded habitats with dense vegetation, rivers, and animal hosts.¹¹ In Ido LGA, areas with such conditions may increase the risk of tsetse fly infestation and subsequent trypanosomiasis transmission.
- **Cattle management practices:** Traditional cattle management practices, such as allowing cattle to graze freely, may increase the risk of exposure to tsetse flies and trypanosomiasis transmission.⁸ Improving cattle management practices can help reduce this risk.
- **Proximity to wildlife reserves and game parks:** The presence of wildlife can contribute to trypanosomiasis transmission, as wildlife can serve as reservoirs for the parasites.⁷ Ido LGA's proximity to such areas may increase the risk of trypanosomiasis in the local cattle population.
- **Climate and seasonality:** Seasonal changes and climatic factors can influence the abundance and distribution of tsetse flies, affecting the transmission of trypanosomiasis.¹ In Ido LGA, understanding the seasonal patterns of tsetse fly populations can help inform targeted control strategies.

These risk factors highlight the importance of a multi-faceted approach to addressing Tsetse flies and Bovine Trypanosomiasis in Ido LGA. Interventions may include habitat management, improved cattle management practices, and targeted control of tsetse fly populations based on seasonal patterns and climate factors.

Impact of Tsetse flies and bovine trypanosomiasis on livestock productivity and economy

The impact of Tsetse flies and Bovine Trypanosomiasis on livestock productivity and the economy is significant, particularly in Sub-Saharan Africa. These factors contribute to reduced meat and milk production, decreased fertility, and lower draught capacity in affected animals, leading to substantial economic losses for livestock keepers and hindering agricultural development.^{9,12}

The direct and indirect impacts of Tsetse flies and Bovine Trypanosomiasis affect the livelihoods of rural communities, exacerbating poverty and food insecurity. In addition, controlling the disease increases the cost of livestock production, further burdening already vulnerable communities.¹³

The negative effects of Tsetse flies and Bovine Trypanosomiasis extend beyond the local level, impacting national economies and international trade. Reduced livestock productivity limits the potential for export earnings, while the presence of the disease acts as a barrier to trade in livestock and livestock products.¹⁴

Efforts to control Tsetse flies and Bovine Trypanosomiasis are critical to improve livestock productivity and support the socio-economic development of affected regions.

Integrated control strategies, including tsetse fly control, improved disease surveillance, and enhanced veterinary services, are needed to effectively manage the disease and mitigate its impact on livestock productivity and the economy.¹²

Control measures and interventions in Ido local government area

In Ido Local Government Area (LGA), control measures and interventions for addressing Tsetse flies and Bovine Trypanosomiasis should focus on an integrated approach that includes vector control, improved livestock management, and community education.

- **Vector control:** Tsetse fly control measures, such as the use of insecticide-treated targets or aerial spraying, can help reduce the fly population and limit disease transmission.^{15,16} In Ido LGA, implementing targeted vector control strategies based on local fly distribution and habitat preferences can help improve effectiveness.
- **Improved livestock management:** Adopting better livestock management practices, such as using trypanotolerant cattle breeds or applying trypanocidal drugs, can help minimize the impact of Bovine Trypanosomiasis on livestock productivity.^{9,12} Providing training and resources for local farmers in Ido LGA can support the adoption of these practices.
- **Community education:** Engaging local communities in Ido LGA to raise awareness of Tsetse flies, Bovine Trypanosomiasis, and control measures can help ensure long-term success in managing the disease.^{1,8} Educating community members on the importance of control interventions and their role in preventing disease transmission can encourage community participation and support.

A combination of vector control, improved livestock management, and community education can contribute to a comprehensive approach to addressing Tsetse flies and Bovine Trypanosomiasis in Ido LGA. Implementing these interventions in a coordinated manner can help reduce disease transmission, improve livestock productivity, and support the local economy.

Conclusion and recommendations for future research and management strategies

In conclusion, the successful management of Tsetse flies and Bovine Trypanosomiasis in Ido Local Government Area (LGA) requires a comprehensive understanding of the local risk factors and the implementation of integrated control measures. This study highlights the importance of addressing vector control, improving

livestock management practices, and educating local communities to reduce disease transmission and improve livestock productivity.

To build upon the findings of this study and further enhance the management of Tsetse flies and Bovine Trypanosomiasis in Ido LGA, the following recommendations for future research and management strategies are proposed:

- **Monitor and evaluate current control interventions:** Assess the effectiveness of existing control measures in Ido LGA, such as insecticide-treated targets, to inform future management decisions and ensure sustainable control efforts.^{15,16}
- **Investigate alternative control methods:** Explore innovative and environmentally friendly control methods, such as the use of biocontrol agents or the sterile insect technique, to complement existing control strategies.^{17,18}
- **Strengthen veterinary services and disease surveillance:** Improve the capacity of local veterinary services to diagnose, treat, and monitor trypanosomiasis cases, ensuring early detection and timely intervention.^{9,10}
- **Enhance community participation and education:** Continue to engage local communities in Ido LGA to ensure their understanding of the importance of control measures and encourage their active participation in control efforts.^{1,8}

By incorporating these recommendations into future research and management strategies, it is possible to further strengthen the control of Tsetse flies and Bovine Trypanosomiasis in Ido LGA, ultimately improving the livelihoods of local communities and supporting the agricultural economy.

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Conflict of interest

The authors confirm that this article content has no conflict of interest.

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