

Sustainable Livestock Management Practices for Reducing Zoonotic Disease Transmission in Rural Areas

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Abstract- Developing and implemented adequate zoonotic preventive measures to protect public health and the health of the rural agricultural community is essential. Because of the high frequency of interaction with humans, rural communities and their livestock are at a higher zoonotic disease risk. This study identifies and documents sustainable livestock management practices to minimize the risk of zoonotic disease transmission in rural Nigeria. Data were collected from two hundred livestock farmers through a structured and pre-tested questionnaire. For the descriptive statistic, the response were summarized in frequency and percentage tables. The results of the study indicate that respondents using sustainable waste disposal practices is as low as 38% and 44% use practices of frequent vaccination, nevertheless, 70% are willing to accept training support and incentives to adopt enhanced biosecurity practices. The findings of the study indicate that although the absence of poorly implemented sustainable livestock management practices is due to lack of awareness, underdeveloped infrastructure and low economic capability. This study advocates for the embedding of community-focused livestock management practices that incorporate One Health in principle to promote the livestock sector in Nigeria.

Keywords: Sustainable Livestock Management, Zoonotic Diseases, Rural Communities, Nigeria, Descriptive Study, One Health.

I. INTRODUCTION

Zoonotic diseases, which are transmitted from animals to humans, constitute more than 60 percent of emerging infectious diseases worldwide (World Health Organization, 2023). Their effects are most destructive in rural settings, where people, domestic animals, and wildlife are in close contact (Grace et al., 2020). In livestock-dependent communities, anthrax,

brucellosis, rabies, and avian influenza continue to undermine livelihoods and threaten food security (Odeyemi et al., 2021). According to the Food and Agriculture Organization (2020), the social and economic viability of livestock management and the environmental and animal health sustainability, disease prevention, and safe livestock management are the components of sustainable livestock management. Waste management, vaccinations, controlled grazing, improved housing and biosecurity are some practices used to prevent disease transmission. In rural Nigeria, however, these practices are inadequately applied because low literacy, limited extension services, and inadequate resources are some of the prevailing challenges (Okeke et al., 2023).

This study aims to determine the extent rural livestock farmers implement practices of sustainable livestock management and how these practices impact the transmission of zoonotic diseases. The specific objectives are:

1. To determine the level of awareness of zoonotic diseases among rural livestock farmers.
2. To assess the adoption of sustainable livestock management practices.
3. To identify barriers to implementing such practices in rural settings.
4. To recommend strategies for promoting sustainable livestock management to prevent zoonotic diseases.

II. LITERATURE REVIEW

2.1 Concept of Sustainable Livestock Management

Sustainable livestock management (SLM) is an integrated approach to increasing productivity while safeguarding the environment and public health (FAO, 2020). It encompasses rotational grazing, efficient feeding, and environmentally safe waste management. SLM emphasizes disease prevention

using hygiene, veterinary care, and biosecurity (Nwokoro et al., 2022).

In low-income, rural communities, livestock contribute to income, nutrition, and social significance (Bello & Adebisi, 2021). However, poor management, such as overcrowding, poor sanitation, and uncontrolled movement of animals, increases the risk of zoonosis. Sustainable management aids in risk reduction by breaking transmission through the husbandry and waste management practices (Kamaruddin et al., 2021).

2.2 Zoonotic Disease Transmission in Rural Livestock Systems

In rural settings, zoonotic disease transmission is linked to direct animal contact, infected water, and poorly managed animal waste (Grace et al., 2020). *Brucella* spp. infection is spread through the consumption of unpasteurized milk, and anthrax spores are left in the soil when improperly disposed carcasses are buried (Odeyemi et al., 2021).

Disease persistence is significantly influenced by weak veterinary services, the absence of vaccination programs, and farmers' poor awareness (Onyango et al., 2023). However, integrating sustainable livestock management with community health has worked well in countries like Kenya and Ethiopia (Mwangi et al., 2022).

2.3 The One Health Approach and Sustainability

The One Health Initiative fosters collaboration among the veterinary, environmental, and human health professions to mitigate the risk of zoonotic diseases (Okeke et al., 2023). The sustainable management of livestock fulfills One Health by safeguarding the health of animals and humans and maintaining the environment (Bello & Adebisi, 2021).

Nevertheless, the rural implementation of these practices is constrained by poor financing, low educational attainment, and weak policy enforcement mechanisms (Grace et al., 2020). Thus, the practices and perceptions of the community must first be understood to create meaningful interventions.

III. METHODOLOGY

3.1 Research Design

A descriptive survey research design was adopted for the study. For the survey, primary data was collected by a structured questionnaire to prompt answers regarding the livestock management practices, awareness.

3.2 Population and Sampling Technique

Respondents from selected rural communities across Osun and Oyo States, Nigeria, were livestock farmers. 200 respondents were selected through purposive sampling. These respondents were also active cattle, goat, sheep, and poultry farmers.

3.3 Data Collection Instrument

The questionnaire was separated into four parts.

- Part A: Demographic information
- Part B: Zoonotic diseases awareness
- Part C: Sustainable management practices
- Part D: Constraints and suggestions

3.4 Data Analysis

Descriptive statistics was used, and the findings reported were frequencies and percentages. These findings are contained in tables and accompanying narratives explain core findings and signal important trends.

IV. FINDINGS AND INTERPRETATION

Table 1: Awareness of Zoonotic Diseases among Respondents

Awareness Level	Frequency	Percentage (%)
High awareness	60	30.0%
Moderate awareness	90	45.0%
Low awareness	50	25.0%

The figures indicate that a significant portion, 75%, of respondents (comprising those with high and moderate awareness) possess some understanding of zoonotic diseases, mainly acquiring knowledge through informal means and during veterinary consultations. However, the fact that 25% have low awareness points to persistent knowledge gaps that may contribute to inaction on zoonotic diseases. The observation made by Okeke et al. (2023) coincides with this finding, as the lack of understanding of

zoonotic disease transmission among poorly educated farmers is a documented issue.

Table 2: Adoption of Sustainable Livestock Management Practices

Practice	Frequency (Yes)	Percentage (%)
Regular vaccination	88	44.0%
Proper waste disposal	76	38.0%
Controlled animal movement	54	27.0%
Clean water and feed provision	102	51.0%
Use of protective gear	60	30.0%

Less than half of respondents and the lowest of all was 51% are constant in the provision of clean water and feed, and only 44% follow the vaccination schedule. Other disease control practices like requirements of regulated animal movement, use of protective clothing, and fet protective clothing are poorly observed. This points to partly the existence of some sustainable practices but lack of widespread. As pointed out by Mwangi et al. (2022), the presence of poorly observed hygiene and waste disposal practices represent an increased risk of diseases such as anthrax and leptospirosis.

Table 3: Perceived Barriers to Sustainable Practices

Barrier	Frequency	Percentage (%)
Lack of veterinary access	130	65.0%
Financial constraints	150	75.0%
Limited training opportunities	140	70.0%
Poor infrastructure (water, roads)	110	55.0%
Cultural resistance	90	45.0%

The primary barriers to implementation include financial constraints (75%) and insufficient training (70%) which limit farmers' ability to incorporate more sustainable practices like improved housing and vaccinations. Cultural resistance is described by 45% of respondents which suggests traditional and risky

rearing methods may still be dominant. Similar sentiments were expressed by Bello and Adebisi (2021), reinforcing the need for change to be motivated through behaviorally focused campaigns.

Table 4: Willingness to Adopt Improved Sustainable Practices

Response	Frequency	Percentage (%)
Strongly willing	90	45.0%
Somewhat willing	50	25.0%
Undecided	30	15.0%
Not willing	30	15.0%

The 70% of respondents willing to adopt improved management practices (70% willing and 70% strongly willing) shows promise for the anticipated support intervention. Farmer willingness is aligned with the One Health approach which advocates for integrated action (Grace et al., 2020).

V. DISCUSSION

As noted by the rural farmers, there is moderate to high awareness of zoonotic diseases; however, the adoption of sustainable practices is still low. This situation may be attributable to the absence of veterinary services, infrastructural challenges, and economic limitations.

Sustainable livestock management, as highlighted by prior studies, hinges on the availability of enabling factors, such as provision of extension services, training, and access to loans, as documented by Okeke et al. (2023) and Mwangi et al. (2022). Grace et al. (2020) further noted the absence of waste management and other protective measures to be a critical factor in the lack of environmental sanitation, which significantly increases the risk of zoonotic disease transmission.

Positive responses to the adoption of sustainable practices is an area that could be explored by designing participatory approaches, which could be complemented by the use of contemporary control techniques alongside traditional methods to improve acceptability as noted in rural contexts, as stated by Bello and Adebisi (2021).

CONCLUSION

This study finds that sustainable livestock management significantly helps to mitigate the risk of zoonotic disease transmission in rural areas. While farmers know about zoonotic diseases, the more sustainable practices—like vaccination, biosecurity, and responsible waste management—have yet to be fully incorporated. Limited implementation stems from economic factors, training gaps, and poor infrastructure.

While prevention of zoonotic diseases requires interventions more complex than an individual behavior focus, it also requires the strengthening of institutions and core infrastructural elements. Sustainable interventions in One Health community programs that integrate the sectors of animal and human and environmental health will provide the enduring interventions.

RECOMMENDATIONS

1. Capacity Building: Organize training on sustainable livestock management and the prevention of zoonotic diseases for farmers as an ongoing activity for government and NGO partnerships.
2. Subsidized Veterinary Services: Mobile veterinary clinics should be established to improve access to veterinary services for rural farmers and to help meet their cost.
3. Infrastructure Development: Development of rural areas and their hygiene animal rearing will require the provision of rural water systems, roads, and waste management.
4. Financial Support: Sustainable practices would be more widely adopted if microcredits and subsidies were available to help meet the cost of investment.
5. Public Awareness Campaigns: Use local media and community leaders to promote the One Health concept and benefits of sustainable livestock practices.
6. Policy Integration: Incorporate sustainable livestock management into rural development and agricultural policies at both state and federal levels.
7. Monitoring and Evaluation: Develop community-based surveillance systems to track disease trends

and evaluate the impact of management interventions.

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