Journal of Animal Environment
(E-ISSN 2717-1396, ISSN 2717-1388)
Journal homepage: https://aejournals.org/

Original Research Paper

Human Animal Interactions and their Role in Zoonotic Disease Emergence and Wildlife Conservation in Rural Communities

Dr. Abhishek Kumar Gupta[1*], Suresh Chandra Yadav[2], Dr. Kamal Kundra[3]

[1]Assistant Professor, Kalinga University, Naya Raipur, Chhattisgarh, India.*
Email: abhishekkumargupta@kalingauniversity.ac.in, ORCID: https://orcid.org/0009-0001-5653-9932
[2]Assistant Professor, Kalinga University, Naya Raipur, Chhattisgarh, India.
Email: ku.sureshchandrayadav@kalingauniversity.ac.in, ORCID: https://orcid.org/0009-0005-5061-7353
[3]Professor, New Delhi Institute of Management, New Delhi, India. Email: kamal.kundra@ndimdelhi.org, ORCID: https://orcid.org/0009-0003-2040-4176

Key Words

Zoonotic diseases, Human–animal interactions, Wildlife conservation, Rural communities, One health approach.

Abstract

The risk of zoonotic disease transmission has risen in rural communities due to human-animal interactions associated with farm expansion, keeping livestock in their habitats, encroachment, and reliance on forests. The purpose of this research was to explore the links among human-animal interface, the emergence of zoonotic diseases, and wildlife conservation in rural ecosystems from a "One Health" perspective. A field-based cross-sectional study was conducted in 6 rural villages, with a sample of 180 participants. Structured questionnaires, interviews, and direct ecological observations of wildlife interactions, awareness of zoonotic diseases and wildlife conservation, livestock management, and sanitation practices were used to collect data. To assess interaction patterns and related disease risks, descriptive and inferential statistics were used. The study showed that the activities of interaction with livestock mostly involved grazing in the vicinity of forests (72%), shared water use (65%), and animal waste management (58%). The home's proximity to wildlife was reported by 47% of participants, and hunting or trapping by 21%. The respondents' perception of zoonotic disease was at a moderate level (54%), while their attitude towards wildlife conservation programs was relatively high (68%). Villages close to the forest edge had greater exposure to wildlife interactions and potential pathways for pathogen transmission. The study shows that zoonotic disease emergence in rural landscapes is largely driven by close human-livestock-wildlife interactions, insufficient awareness, and habitat disturbance. To sustainably manage livestock, wildlife conservation, environmental protection and public health education to minimize disease risks and stabilize ecosystems in an integrated and "One Health" approach.

* Corresponding Author's email: abhishekkumargupta@kalingauniversity.ac.in
Received: 25th May, 2026; Revised: 6th June, 2026; Accepted: 8th June, 2026; Available Online: 07th August, 2026
(DOI): 10.70102/AEJ.2026.18.3s.48

Introduction

In rural areas, escalating human–animal conflicts are linked to the encroachment of human habitats on wildlife habitats, livestock farming, dependence on natural resources for livelihood, deforestation, and agricultural expansion. Close contact between humans, domestic animals, and wildlife can occur during these interactions, increasing the risk of zoonotic disease transmission. Recent zoonotic diseases, such as rabies, avian influenza, Ebola, and COVID-19, have brought the importance of understanding the ecological and social drivers of pathogen spillover to the forefront (Magouras et al., 2020). High-risk populations in rural areas are especially vulnerable due to sub-optimal health care coverage, inadequate sanitation, and poor disease surveillance, as well as due to the high prevalence of hunting, agriculture, and forestry activities that expose them to wildlife reservoirs (Kurian & Sultana, 2024; Balasubramaniam et al., 2022). However, wildlife also play important roles in maintaining ecosystem stability, biodiversity, and nutrient cycling, and their conservation is critical to environmental sustainability and health (Dixit & Raje, 2024) (Gamble et al., 2023).

This study aims to explore the connections among human–animal interactions, the emergence of zoonotic diseases, and wildlife conservation in rural communities. The aim is to record interactions between wildlife and humans and livestock, quantify community awareness of zoonotic risks, and assess the effectiveness of conservation measures for disease prevention and biodiversity conservation. Several studies have focused on zoonotic diseases, zoonotic pathogens, and wildlife conservation alone, but only a few that have combined these subjects in rural socio-ecological systems. In past studies, however, emphasis has focused primarily on local cultural traditions, the importance of the livelihoods on which communities rely, and community-based conservation programs in driving the emergence and sustainability of disease and wildlife populations.

This study proposes that the greater interaction between humans and wildlife in rural areas creates a higher risk of zoonotic disease emergence, while holistic wildlife conservation awareness and sustainable resource management practices can minimize zoonotic disease transmission and benefit biodiversity conservation (Debnath et al., 2021; Namusisi et al., 2021).

The integrated approach (One Health) that brings together public health, animal health, and ecosystem conservation is the main contribution of this research. The results will offer guidance to policymakers, conservationists, and public health officials in developing sustainable, community-based approaches to zoonotic disease control and wildlife conservation in rural environments.

This article is organized into six major sections. In section 1, the Introduction highlights the importance of human–animal relationships, the emergence of zoonotic diseases, and wildlife conservation in rural communities. The Literature Review summarizes the previous research and recognizes existing gaps in knowledge in Section 2. In section 3, the Methodology section discusses the study area,

data collection, and analysis. The Results are included in section 4 and include key findings and statistical observations. The findings are explained in the context of One Health in section 5, the Discussion. In the final step, the major outcomes, implications, and future directions of the research were emphasized in section 6 of the Conclusion.

Literature Review

Zoonotic disease emergence and wildlife conservation in rural communities are primarily about human–animal interactions. Livestock and agricultural activities, as well as forests and natural resources, are the primary livelihoods of rural communities and increase their interaction with domestic animals and wildlife. These interactions can increase the risk of spilling over to other species (pathogen spillover) and affect biodiversity conservation and ecosystem sustainability (Magouras et al., 2020; Marrana, 2022). Agricultural expansion, habitat fragmentation and deforestation has increased the likelihood of contact between wildlife and humans, raising the possibility of emerging infectious diseases (Magouras et al., 2020; Debnath et al., 2021).

Human activities have been demonstrated to be a major cause of ecological disruption that is a significant factor in zoonotic disease transmission. Loss of habitat, urbanization, and resource use can alter wildlife movement and activity and increase the risk of disease outbreaks (Esposito et al., 2023). Domestic animals and peri-domestic wildlife also interact in ways that are critical to pathogen circulation and can act as bridges between wildlife reservoirs and human populations (Gamble et al., 2023). In studies conducted in rural areas of high biodiversity, people, animals, and livestock have been reported to often live in close proximity, underscoring the need for surveillance and preventive measures at the human–wildlife interface (Namusisi et al., 2021).

The concept of One Health has been widely adopted as an effective way to tackle the interconnections of human, animal, and ecosystem health (Magouras et al., 2020; Marrana, 2022). The involvement of the community and local ecological knowledge are also key to sustainable conservation and disease management. One of these is informed practice of resource management, which can contribute to environmental resilience and to the protection of biodiversity, via traditional ecological knowledge (TEK) (Kurian & Sultana, 2024). The use of indigenous knowledge coupled with in-line technologies like Geographic Information Systems (GIS) has enhanced habitat monitoring and conservation planning (Iyer & Verma, 2023). Community-based conservation programs also complement wildlife management by encouraging local stewardship and minimizing the human–wildlife conflict (Alvarez, 2023).

Over the past few years, GIS and machine learning technologies have been enhanced to better support disease forecasting and ecosystem monitoring, enabling proactive approaches to address environmental and health challenges (Alibekova et al., 2025). But additional interdisciplinary studies are needed to incorporate the ecological, epidemiological, technological and social aspects in the context of

sustainable wildlife conservation and zoonotic disease prevention in the rural landscape (Dixit & Raje, 2024; Patil, 2018).

The study concludes that strong linkages among people, livestock, and wildlife in rural communities are associated with higher zoonotic disease risks, especially in settings where wildlife habitat is disturbed and resources are shared. Practices such as community awareness, sustainable livestock management, and wildlife conservation significantly reduce the risk of disease transmission and ensure long-term ecosystem health and biodiversity conservation.

Methodology

Study Area Selection

The study will be carried out in selected rural communities close to agricultural production areas, forests, and areas where livestock are grazed. Wildlife, reliance on livestock and forest resources by local populations, and zoonotic disease and human–wildlife conflict reports will serve as criteria for selecting study sites. Selected villages will be described using geographic and environmental attributes, such as vegetation types, land-use patterns, and water sources, to understand the ecological factors that influence the emergence of disease and interactions with wildlife.

Study Design

A cross-sectional study design will be used in the field to examine the relationships among human–animal interactions, zoonotic disease risks, and wildlife conservation practices. Qualitative and quantitative data will be gathered through an integrated study that includes ecological observations, questionnaire-based surveys, and community-level assessments. The study will be conducted in the context of the "One Health" approach, which connects human health, animal health, and the environment.

Data Collection from Rural Communities

Structured interviews and questionnaires with community members, forest-dependent people, livestock owners, farmers, and community leaders will be used to gather primary data from the local community. Details on livestock husbandry, wildlife interactions, hunting, sanitation, waste disposal and knowledge of zoonotic diseases will be captured. Other demographic information like age, occupation, level of education, and dependency on natural resources in the household will also be recorded.

Observation of Human–Animal Interactions

The frequency and nature of human-livestock-wildlife interactions will be evaluated in the field. Observations will cover grazing patterns, animal movement close to forests, presence of wildlife in and around settlements, sharing of water sources and processing of animal products. Seasonal influences that affect movement of wildlife and human activities will also be documented.

Wildlife Conservation Assessment

The effectiveness of community involvement in wildlife conservation activities will be assessed using interviews and community records. Data concerning issues of habitat protection, sustainable resource utilization, attitudes to wildlife and awareness of

biodiversity conservation programs will be analysed. Current conservation concerns including habitat loss and fragmentation, illegal hunting and land-use change will also be evaluated.

Data Analysis

The data collected will be statistically analyzed by descriptive and inferential method. Associations between human–animal interactions and zoonotic disease risk factors will be determined using frequencies, percentages and correlation analyses. Thematic coding of the qualitative responses from the community interviews will be undertaken, to see if there are common perceptions and conservation concerns shared across the group. Results will be analyzed and interpreted using a "One Health" framework to gain insights into interconnections between the ecological and health landscape.

Results

Demographic Characteristics of Rural Communities

Demographic Characteristics of Rural Communities. The study was carried out on 180 rural villagers from six villages. The majority of participants were engaged in agriculture and livestock rearing activities and were often reliant on local forest resources for firewood, grazing and for collecting water. Some households did not have a good knowledge of zoonotic diseases or wildlife conservation practices.

Human–Animal Interaction Patterns

Crops were observed to be in close proximity to wildlife and livestock in the fields, and and many agriculture related survey questions were answered with a response of contact between human and wildlife or livestock. Close proximity between livestock and wildlife habitats and common water use greatly increased potential for disease spread. The seasonal drought conditions increased the movement of the wildlife towards villages, thus exposing people and livestock to wild animals.

The frequency of activities that involve human–animal contact in rural communities and the zoonotic disease risks associated with these activities are summarized in table 1. Livestock grazing, either close to forests or common water sources, was most prevalent, providing potential exposure for wildlife and for the spread of pathogens. Hunting activities were less common, but were also high risk for zoonotic exposure. Understanding of zoonotic diseases.

Table 1: Human–Animal Interactions and Risk Activities Associated with each, and their Frequency

Interaction Type	Percentage of Participants (%)	Major Risk Observed
Livestock grazing near forests	72	Increased wildlife contact
Shared water sources	65	Pathogen contamination
Handling animal waste	58	Poor sanitation exposure
Wildlife sightings near homes	47	Direct wildlife encounters
Hunting or trapping activities	21	High zoonotic exposure

Awareness of Zoonotic Diseases

The level of awareness of community about zoonotic diseases was varied. Some knew that some diseases could be spread by animals but there was a lack of understanding about prevention, vaccines and risks of diseases from wild animals. The education level and previous exposure to public health programs had a positive effect on the awareness of the communities studied about the practices of zoonotic disease prevention.

Wildlife Conservation Practices

There was some level of participation in the wildlife conservation activities in the surveyed villages. Communities that had implemented controlled grazing, protection of habitats and lowering of the hunting activity reported the fewest wildlife conflict incidents. But the degradation of habitats due to agricultural expansion and deforestation was still a significant challenge that posed problems for biodiversity conservation and the balance of ecosystems in rural areas.

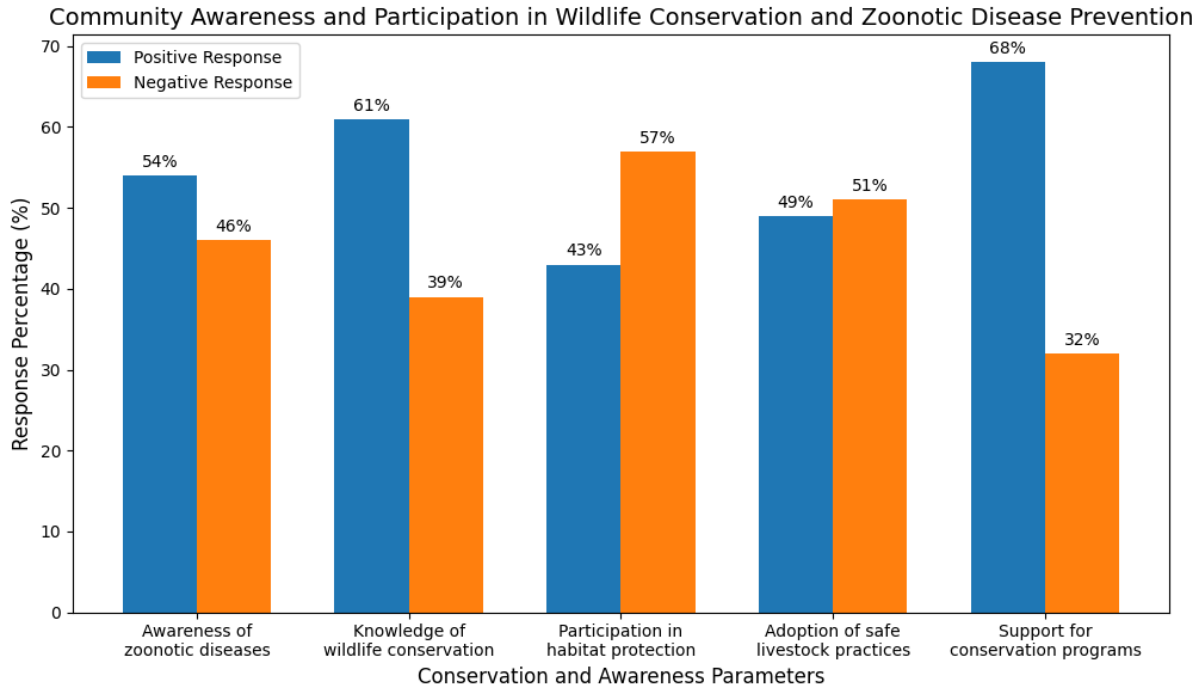

Figure 1: Shows that the Community is not Aware of the Importance of Wildlife Conservation and Zoonotic Disease Prevention

The data in figure 1 indicates that the community is not sensitized on the importance of wildlife conservation and zoonotic diseases prevention. Rural communities could be compared based on the percentage of positive and negative answers to the various conservation and awareness parameters in figure 1. The graph visually represents the state of public awareness on zoonotic diseases, knowledge about wildlife conservation, participation in habitat protection, safe livestock practices, and support of conservation programmes.

Relationship Between Human Activities and Disease Risk

The results showed a significant positive correlation between frequent human–wildlife interactions and zoonotic disease risk factors by statistical analysis. Village groups that had more encounters with wildlife and greater potential for disease transmission pathways had villages closer to the forest areas. Those communities that have successfully introduced sustainable resource management and conservation practices demonstrated relatively low ecological disturbance and low disease vulnerability.

Ecological and Public Health Implications

The results showed that unsustainable human activities, habitat disturbance and lack of awareness play significant role in the emergence of zoonotic diseases in the rural environment. The study also highlighted the importance of the "One Health" concept for integrated wildlife conservation, environment management, and public health education to minimize disease threats and guarantee the stability and diversity of ecosystems.

Discussion

The study showed high levels of human-animal contact in the rural communities, including through grazing of livestock near forests (72%), common water sources (65%) and the management of animal waste (58%). Near the homes, 47% reported seeing wildlife and 21% reported hunting. The level of awareness in the community was moderate for zoonotic disease (54%) while that of conservation programs was comparatively high (68%). Overall, the results indicate that in rural landscapes, there are opportunities for zoonotic disease outbreaks to occur because of close contact between people, livestock, and wildlife. Proximity of livestock to forested areas expands potential wildlife reservoir hosts. However, moderate awareness suggests that there is limited knowledge of rural people about preventive health and ecological risks. The communities that had high percentage of participation in the conservation practices had relatively low ecological disturbance and low exposure to activities that relate to the disease. These findings highlight the need to adopt One Health as the approach for public health, livestock management and wildlife conservation. Community awareness and promotion of sustainable land-use can be helpful in controlling zoonotic disease emergence and in conserving biodiversity. Overall, the findings highlight the critical need for health education in rural areas, sanitation projects, habitat conservation and systems for monitoring wildlife, in order to minimize ecological and public health hazards. The findings of the study are restricted to the selected rural communities and might not be representative of all ecological regions and cultural setting. The sources of data were mainly questionnaires and field observations, which can have reporting bias and seasonal variations. No laboratory confirmation of zoonotic pathogens was performed and therefore laboratories were not utilized for direct identification of disease agents. Future studies should involve molecular surveillance of zoonotic pathogens in humans, livestock and wildlife, larger geographic areas and seasonal monitoring. Also, long-term ecological research and community-based

intervention research are suggested to acquire knowledge of the disease dynamics and effectiveness of conservation in rural landscapes.

Conclusion

The study focused on the emerging issue of human–animal interactions and the impact these have on the emergence of zoonotic diseases and wildlife conservation in rural communities. The speedy habitat changes, livestock grazing near the forests, dependence on natural resources and lack of awareness about zoonotic diseases have created an opportunity for zoonotic diseases to be transmitted to livestock and human beings from wildlife. The study was conceived to evaluate interactions, awareness and conservation activities of the rural ecosystems in the context of "One Health". The results indicated that livestock grazing near forests (72%) and shared water resources (65%) also occurred, which could have resulted in pathogen exposure and wildlife contact. Fifty-eight percent noted animal wastes being handled and 47 percent saw wildlife around their homes. Moderate understanding about zoonotic diseases (54%), and relative level of support for wildlife conservation programs (68%). The findings indicate that ecological disturbances and low level of awareness on prevention have significant impacts on the risks of zoonotic diseases in rural areas. Overall, this study underscores the importance of the interconnection of human well-being, animal health, and environmental health. The message is that sustainable wildlife conservation, improved livestock management, community education and integrated public health interventions are important to reduce the risk of zoonotic disease emergence and/or to prevent or reduce the loss of biodiversity and ecosystem stability in rural areas.

Author Contribution

Conflict of Interest

The authors declare no conflict of interest.

Funding

This research received no external funding.

Ethical Consideration

Prior informed consent will be obtained from all study participants before conducting interviews and surveys. Confidentiality of participant information will be maintained throughout the study. The study will ensure that wildlife observations are conducted without disturbing animals or damaging their habitats. Necessary permissions from local authorities and environmental agencies will be obtained before field investigations.

References

[1] Alibekova, Zilola, H. Ohameed, Umida Avezova, M. Muthazhagu, K. Kahorova, R. Udayakumar, and S. Chuponov. "Unified GIS-based machine learning method for effective forecasting of disease propagation and resistance in aquatic farming." *Int. J. Aquatic Res. Environ. Stud.* 5, no. 1 (2025): 39-49. https://doi.org/10.70102/ijares/v5s1/5-s1-05

[2] Alvarez, Ricardo. "Integrating Precision Livestock Farming Technologies for Early Detection of Zoonotic Disease Outbreaks." *National Journal of Animal*

Health and Sustainable Livestock 1, no. 1 (2023): 17-24. https://doi.org/10.17051/NJAHSL/01.01.03

[3] Balasubramaniam, Krishna N., Nalina Aiempichitkijkarn, Stefano SK Kaburu, Pascal R. Marty, Brianne A. Beisner, Eliza Bliss-Moreau, Malgorzata E. Arlet, Edward Atwill, and Brenda McCowan. "Impact of joint interactions with humans and social interactions with conspecifics on the risk of zooanthroponotic outbreaks among wildlife populations." *Scientific reports* 12, no. 1 (2022): 11600. https://doi.org/10.1038/s41598-022-15713-6

[4] Debnath, Falguni, Debjit Chakraborty, Alok Kumar Deb, Malay Kumar Saha, and Shanta Dutta. "Increased human-animal interface & emerging zoonotic diseases: An enigma requiring multi-sectoral efforts to address." *Indian Journal of Medical Research* 153, no. 5-6 (2021): 577-584. https://doi.org/10.4103/ijmr.IJMR_2971_20

[5] Dixit, A., and N. Raje. "Using Multiple Objective Impact Analysis to Track Sustainable Rehabilitation of Ecosystems." *International Academic Journal of Science and Engineering* 11, no. 3 (2024): 31-34. https://doi.org/10.71086/IAJSE/V11I3/IAJSE1158

[6] Esposito, Michelle Marie, Sara Turku, Leora Lehrfield, and Ayat Shoman. "The impact of human activities on zoonotic infection transmissions." *Animals* 13, no. 10 (2023): 1646. https://doi.org/10.3390/ani13101646

[7] Gamble, Amandine, Ximena A. Olarte-Castillo, and Gary R. Whittaker. "Backyard zoonoses: The roles of companion animals and peri-domestic wildlife." *Science Translational Medicine* 15, no. 718 (2023): eadj0037. https://doi.org/10.1126/scitranslmed.adj0037

[8] Iyer, Sneha, and Rahul Verma. "Integrating Indigenous Knowledge with GIS for Biodiversity Conservation in Sub-Saharan Africa." *International Journal of SDG's Prospects and Breakthroughs* (2023): 4-7.

[9] Kurian, Naveen, and Zainab Sultana. "Traditional Ecological Knowledge and Demographic Resilience in Marginalized Societies." *Progression Journal of Human Demography and Anthropology* (2024): 17-21.

[10] Magouras, Ioannis, Victoria J. Brookes, Ferran Jori, Angela Martin, Dirk Udo Pfeiffer, and Salome Dürr. "Emerging zoonotic diseases: should we rethink the animal–human interface?." *Frontiers in veterinary science* 7 (2020): 582743. https://doi.org/10.3389/fvets.2020.582743

[11] Marrana, Mariana. "Epidemiology of disease through the interactions between humans, domestic animals, and wildlife." In *One Health*, pp. 73-111. Academic Press, 2022. https://doi.org/10.1016/B978-0-12-822794-7.00001-0

[12] Namusisi, Shamilah, Michael Mahero, Dominic Travis, Katherine Pelican, Cheryl Robertson, and Lawrence Mugisha. "A descriptive study of zoonotic disease risk at the human-wildlife interface in a biodiversity hot spot in South Western Uganda." *PLoS neglected tropical diseases* 15, no. 1 (2021): e0008633. https://doi.org/10.1371/journal.pntd.0008633

[13] Patil, P. J. “An Ecological Analysis of Forest Accounting.” *International Academic Journal of Innovative Research* 5, no. 1(2018): 109–127. https://doi.org/10.9756/IAJIR/V5I1/1810010