

One Health in Tribal India

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Tribal communities in India have close relationships with livestock, wildlife, forests and natural resources, making their health strongly connected to the human-animal-environment interface. This article highlights the importance of a One Health approach in addressing infectious and zoonotic disease risks, with examples of brucellosis, tuberculosis, rabies and anthrax from tribal regions. These risks are influenced by livestock dependence, animal contact, environmental exposure, traditional practices and gaps in healthcare and disease awareness. Tribal communities also possess valuable Indigenous Technical Knowledge (ITK) related to animal care, disease recognition and natural-resource management. Integrating scientifically validated ITK with modern veterinary and public-health measures through community participation can improve the relevance, acceptability and sustainability of One Health interventions.



Introduction

India is a vast and culturally diverse country, characterized by remarkable variation in its languages, traditions, ecological settings and indigenous knowledge systems. This diversity is also reflected in the country's tribal population, which represents a substantial and socially diverse section of Indian society. According to the Census 2011, India had a Scheduled Tribe population of approximately 10.45 crore, constituting 8.6% of the country's total population (Ministry of Tribal Affairs 2023). At the time of the 2011 Census, 705 individual ethnic groups were notified as Scheduled Tribes, distributed across diverse geographical and ecological settings ranging from forests and hills to plains and other rural landscapes (Ministry of Statistics and Programme Implementation 2019). The distribution and characteristics of these communities are highly heterogeneous, with considerable differences in livelihood systems, socioeconomic conditions, cultural practices, access to healthcare and relationships with local natural resources (Xaxa Committee, 2014). For many tribal communities, livelihoods remain closely associated with agriculture, livestock rearing, forests and other natural resources, resulting in frequent interactions among people, domestic animals, wildlife and the surrounding environment. Such interactions provide important nutritional, economic and cultural benefits, but they can also create opportunities for exposure to infectious and zoonotic diseases, making tribal settings particularly relevant for a One Health perspective (Riley *et al.*, 2021; Durrance-Bagale *et al.*, 2021).

Therefore, strengthening One Health at the grassroots level requires more than clinical treatment of sick animals or humans; it requires prevention, surveillance, health education, appropriate livestock management, environmental hygiene and collaboration among communities and different professional sectors (WHO, 2026).



Why Tribal Communities Matter in One Health

Tribal communities are important to the One Health approach because their health and livelihoods are closely connected with livestock, wildlife, forests, water and other natural resources. These close interactions can influence the transmission of zoonotic diseases and other health risks, while also shaping local food security and livelihoods (Durrance-Bagale *et al.*, 2021). At the same time, tribal communities possess valuable Indigenous Technical Knowledge (ITK) related to animal care, disease recognition and natural-resource management. Therefore, involving communities as active partners and knowledge holders, rather than viewing them only as vulnerable populations, can make One Health interventions more locally relevant and sustainable (Riley *et al.*, 2021).

Zoonotic Diseases: A Shared Health Challenge- Zoonotic diseases represent an important health challenge at the interface of humans, animals and the environment. In tribal communities, close contact with livestock, wildlife and natural resources may increase opportunities for exposure to zoonotic pathogens. Limited awareness, healthcare access and preventive practices can further complicate disease control in some settings. A One Health approach that combines human health, animal health and environmental management is therefore essential for effective prevention and control.

Brucellosis: A Hidden Risk at the Human-Livestock Interface- Brucellosis is an important zoonotic disease that can quietly affect communities living in close contact with livestock. This risk is particularly relevant in tribal regions, where livestock often play a central role in household nutrition and livelihoods. In Odisha, where around 80% of the livestock-rearing population studied belonged to tribal communities, Parai *et al.* (2022) reported an overall 16.65% anti-*Brucella* IgG seroprevalence, indicating substantial exposure to the infection. Further evidence from the Similipal Biosphere Reserve region of Odisha showed *Brucella* seroprevalence of approximately 1.1% in cattle and 11.2% in goats, with goats showing a comparatively higher level of exposure. These findings highlight how

frequent human–animal contact and everyday livestock practices can create opportunities for zoonotic transmission. Strengthening community awareness, hygienic animal handling, safe disposal of abortion and birth materials, livestock vaccination, and consumption of safe milk and dairy products can therefore help protect both tribal families and their animals from brucellosis.

Tuberculosis, Health Concern among Vulnerable Tribal Communities- Tuberculosis (TB) continues to pose a serious health challenge in several tribal communities of India, with the Saharia tribe of Madhya Pradesh being one of the most affected groups. A study among the Saharia tribe in Shivpuri district reported a pulmonary TB prevalence of 3,294 per 100,000 population, with a considerably higher prevalence among males (5,497 per 100,000) than females (1,376 per 100,000). A subsequent prospective cohort study in the same tribal population estimated an incidence of bacteriologically positive pulmonary TB at 1,504 per 100,000 population, with males again showing a substantially higher incidence than females. More recently, a 2026 study covering seven Saharia-dominated districts of Madhya Pradesh screened over 57,000 individuals and reported an overall TB incidence of 1,865 per 100,000 population, with considerable variation between districts. Other tribal groups have also shown substantial variation: a national tribal survey reported 803 per 100,000 in Odisha, while an earlier study among the Baiga tribe of Madhya Pradesh reported 146 per 100,000. These findings show that TB burden can vary considerably between tribal communities and underline the need for tribe-specific screening, early diagnosis, nutritional support, treatment adherence, and community-based TB control strategies.

Rabies: A Persistent Risk in Tribal and Rural Communities- Rabies remains an important zoonotic threat in tribal communities, particularly because of frequent exposure to dogs and limited access to timely post-exposure care. In Mayurbhanj, a tribal district of northern Odisha, a cross-sectional study of animal-bite victims reported that 54.9% of victims had suffered dog bites, with the lower limb being the most common site of injury. The study also highlighted inadequate awareness regarding appropriate wound management, particularly among people from rural and tribal areas. Evidence from Rewa, Madhya Pradesh, similarly identified dogs as the predominant source of animal bites among 406 reported victims. These findings indicate that dog-mediated rabies exposure remains an important concern at the tribal–rural interface. Strengthening community awareness, responsible dog management, immediate wound washing, and timely access to rabies post-exposure prophylaxis is therefore essential for protecting vulnerable tribal populations.

Anthrax: A Distinctive Zoonotic Threat in Tribal Odisha- Anthrax represents a particularly important zoonotic threat in tribal communities of Odisha, where livestock dependence and traditional carcass-handling practices can increase exposure to *Bacillus anthracis*. In Koraput district, a major tribal and anthrax-endemic region, a 2020 community study found that only 20.26% of 2,670 respondents were aware of anthrax, while 71% kept livestock. Only 25.9% of livestock owners knew about anthrax vaccination, highlighting important gaps in community awareness and preventive practices. An earlier study specifically among tribal communities of Lamtaput block, Koraput, found that 52.98% of respondents reported consuming meat from animals that had died, while only 30.46% vaccinated their animals against anthrax; open disposal of carcasses was also reported by 45.69% of respondents. The risk was further demonstrated during a 2021 outbreak in a tribal village of Koraput, where four suspected human anthrax cases were identified after people handled and consumed meat from a dead bullock, with one subsequent death reported. These findings clearly demonstrate the importance of safe carcass disposal, livestock vaccination, avoidance of meat from animals that die suddenly, early disease reporting, and community-based One Health interventions in tribal areas.

From Disease Risks to Community Solutions

The evidence from brucellosis, tuberculosis, rabies and anthrax demonstrates that health challenges in tribal communities are closely linked to the human-animal-environment interface. Dependence on livestock and forests, frequent animal contact, traditional practices,

environmental exposure and limited access to veterinary and healthcare services can influence the emergence, transmission and management of infectious diseases. Studies from tribal regions of India, particularly Odisha and Madhya Pradesh, highlight how livestock management, animal bites, carcass handling, vaccination gaps and delayed healthcare access can contribute to disease risks. At the same time, tribal communities possess generations of Indigenous Technical Knowledge (ITK) related to animal care, disease recognition and natural-resource management. Integrating scientifically validated indigenous practices with modern veterinary and public-health measures, while involving communities as active partners, can make One Health interventions more locally relevant, culturally appropriate and sustainable. Thus, strengthening One Health at the grassroots requires not only better disease surveillance and healthcare services but also meaningful recognition of community knowledge and participation.

Bringing Indigenous Knowledge and Science Together

Indigenous Technical Knowledge (ITK) is a valuable community resource developed through generations of observation and practical experience. Traditional practices related to animal care, disease prevention and natural-resource management may offer useful insights, although their effectiveness and safety should be scientifically assessed. Integrating validated ITK with modern veterinary and public-health knowledge through a One Health approach can strengthen connections between human, animal and environmental health. Such collaboration can make health interventions more locally relevant, culturally appropriate and sustainable, while recognizing tribal communities as active partners and knowledge holders.

One Health at the Grassroots

For tribal regions, One Health should extend beyond hospitals and veterinary centres and reach the community level. Regular livestock health services, vaccination, early disease detection, safe animal handling, appropriate carcass disposal, rabies awareness and timely access to medical care are important preventive measures. Equally important is the participation of tribal communities themselves in disease surveillance and health education. Collaboration among tribal communities, veterinarians, healthcare professionals, forest personnel, local administration and researchers can help identify risks early and develop solutions suited to local conditions.

The Way Forward

The future of One Health in tribal India lies in creating a meaningful connection between scientific knowledge and community knowledge. Tribe-specific surveillance can identify locally important diseases and risk practices, while community-based education can translate scientific recommendations into practical and culturally appropriate actions. At the same time, documenting and scientifically evaluating Indigenous Technical Knowledge can help preserve valuable local knowledge while distinguishing useful practices from those that may require modification. Tribal communities are not merely beneficiaries of One Health interventions; they are important partners and knowledge holders within the One Health system. Their close relationship with livestock, wildlife and natural resources provides both unique opportunities and challenges for disease prevention. By bringing together Indigenous Technical Knowledge, modern veterinary science, public health and community participation, One Health can become more than a disease-control strategy- it can become a pathway towards healthier people, healthier animals, sustainable livelihoods and healthier ecosystem

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