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Empowering rural Maharashtra: A holistic approach to rabies control and one health perspective

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Abstract

Rabies, a grave threat in rural areas with limited healthcare access, poses significant global concern due to its near 100% fatality rate in humans and animals. The shift to intradermal vaccines highlights cost-effectiveness. Maharashtra, India's one of largest states, faces unique challenges in rabies prevention and management, despite efforts, owing to poor awareness and limited healthcare access. In India, Maharashtra stands out due to challenges in rabies prevention and management despite ongoing efforts.

This study proposes transformative strategies grounded in community engagement, education and vaccination campaigns to reduce rabies incidence. Emphasizing community empowerment, it advocates for integrating traditional knowledge with modern interventions. Globally, 330,000 people face rabies risk annually, with India accounting for 36% of cases. Limited vaccine access perpetuates transmission risks, necessitating collaborative efforts to enhance awareness and intervention, particularly in rural Maharashtra.

The study emphasizes removing stray dogs and implementing widespread vaccination as key prevention strategies.

The success of Goa's One Health program exemplifies human rabies elimination feasibility and cost-effectiveness, aiming to eradicate canine-mediated human rabies deaths by 2030. Targeted interventions can effectively reduce rabies incidence, safeguarding both human and animal populations. By targeting these key areas, communities can effectively reduce the incidence of rabies and protect both human and animal population.

Keywords: Rabies control; Community management; Rural Maharashtra; Holistic approach; One health

1. Introduction

Rabies, caused by the lyssavirus, primarily affects mammals, including dogs, cats and wildlife. Despite being preventable through vaccination, it claims an estimated 59,000 human lives annually worldwide, with a significant portion of fatalities occurring in low-resource settings. In rural Maharashtra, the prevalence of free-roaming dogs, inadequate vaccination coverage, and limited awareness exacerbate the risk of rabies transmission, posing a significant threat to public health.

1.1. Community-Centered Approach

This research emphasizes the active participation of communities in rabies prevention and control. By fostering partnerships with local stakeholders, including community leaders, healthcare providers, and animal welfare organizations, sustainable solutions are co-created to resonate with the cultural and socioeconomic context of rural Maharashtra.

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Community mobilization efforts aim to empower individuals with the knowledge and resources necessary to mitigate the risk of rabies transmission while promoting responsible pet ownership and animal welfare practices.

1.2. Background

Rabies, stemming from the rabies virus, is a significant public health concern, especially in rural areas of developing nations like India. Maharashtra, one of India's largest states, faces challenges in rabies prevention and management due to limited healthcare access, low awareness, and cultural practices increasing exposure to rabid animals. Urban rabies is the most common form of rabies in India. It primarily spreads through unvaccinated domestic or street dogs and cats, with wildlife such as primary reservoirs. Bat rabies prevalent in Latin America, poses additional risks. Over the past two years (2022-2023), Maharashtra has reported significant number of human rabies cases with domestic dogs contributing to over 90% of incidents. Notably, the islands of Andaman and Lakshadweep remain rabies-free territories in India. In rural Maharashtra, human-animal interactions are prevalent, making rabies a persistent threat disproportionately affecting vulnerable populations. Despite advancements in vaccination and control measures, the burden of rabies still persists, highlighting the need for innovative and community-centered approaches to its management.

This research endeavors to elucidate transformative strategies aimed at mitigating the impact of rabies in rural Maharashtra through a comprehensive and inclusive framework.

Countries recognized as rabies-free include Australia, New Zealand, Japan, Taiwan, Hong Kong, Singapore, Fiji, UK, Ireland, Norway, Sweden, Jamaica and Barbados.

1.3. Current Rabies Prevention and Control Programs in Rural Maharashtra

- National Rabies Control Programme (NRCP) 2018



Figure 1 Rabies Control Programme

- State-level initiatives
- Rabies surveillance and reporting
- Training and capacity building
- Community engagement and awareness

1.4. Case Study

Goa, India The One Health Program in Goa, India demonstrated the feasibility and cost effectiveness of human rabies elimination at state level, offering a tangible example of success in the quest to eliminate canine-mediated human rabies deaths by 2030. Drawing inspiration from such initiatives, Maharashtra can tailor its interventions to suit local contexts while leveraging lessons learned from successful programs.

2. Methodology

Study Design: This research employs a mixed-methods approach, incorporating quantitative and qualitative techniques to evaluate the effectiveness of removing stray dogs and vaccination as the primary strategy for managing rabies in rural Maharashtra, India.

2.1. Quantitative Analysis

- **Epidemiological Data Analysis:** Collection and analysis of existing epidemiological data on rabies cases in rural Maharashtra, including incidence rates, demographic patterns, and spatial distribution.
- **Impact Assessment:** Evaluating the reduction in rabies cases and associated morbidity and mortality following the implementation of vaccination drives and stray dogs removal initiatives.
- **Vaccination Coverage Assessment:** Quantifying the coverage and effectiveness of mass vaccination campaigns targeting free-roaming dogs and community owned animals.

2.2. Qualitative Analysis

- **Case Studies:** Documenting and analyzing case studies of successful implementation of vaccination programs and stray dog management initiatives in selected rural communities
- **Stakeholder Interviews:** Conducting semi-structured interviews with key stakeholders, including local community members, healthcare workers, veterinary professionals, and government officials to understand perceptions, challenges, and opportunities related to the strategy of removing stray dogs and vaccination.
- **Focus Group Discussions:** Organizing focus groups discussions to explore community attitudes towards rabies prevention, responsible pet ownership, and the effectiveness of vaccination campaigns.

2.3. Community Engagement

- **Participatory Approaches:** Engaging local communities through participatory research methods, including community mapping, participatory rural appraisal, and community-based surveillance, to foster ownership and sustainability of rabies efforts.
- **Capacity Building:** Providing training and capacity-building workshops for community members, healthcare workers, and veterinary professionals on rabies awareness, vaccination techniques and post-exposure prophylaxis.

2.4. Data Collection

- **Primary Data Collection:** Field surveys, interviews, focus group discussions and participatory exercises conducted in collaboration with local partners and community representatives.
- **Data Analysis:** Quantitative data analyzed using statistical software packages, while qualitative data subjected to thematic analysis to identify recurring themes, patterns and insights.

2.5. Ethical Considerations

- **Informed Consent:** Obtaining informed consent from all participants involved in interviews, focus group discussions, and data collection activities.
- **Confidentiality:** Ensuring the confidentiality and anonymity of participants identities and responses throughout the research process.
- **Ethical Approval:** Obtaining ethical approval from relevant institutional review boards and adhering to ethical guidelines for research involving human subjects.

2.6. Proposed Transformative Strategies

- **Integrated One Health Approach:** Improve the availability and accessibility of rabies vaccines and medical resources, particularly in rural areas.
- **Community engagement and education:** Raise awareness about rabies prevention and control among local communities, including the importance of vaccination and responsible pet ownership.
- **Vaccination campaigns:** Implement widespread vaccination programs for dogs, targeting free roaming populations and promoting pet ownership.
- **Infrastructure enhancement:** Improve the availability and accessibility of rabies vaccines and medical resources.
- **Political prioritization:** Advocate for increased political prioritization of rabies control and elimination efforts, including sustained funding and resources.
- **Enhanced medical intervention:** Promote prompt medical intervention for rabies exposure, including pre and post exposure prophylaxis, to reduce risk of human rabies.
- **Traditional knowledge integration:** Combine traditional knowledge with modern interventions to develop culturally sensitive and effective rabies prevention strategies.

Table 1 Strategies

Strategy	Description
Community Engagement	Involving local communities in rabies awareness programs, fostering community participation
Education	Educating residents about rabies transmission, prevention, and treatment
Vaccination Campaigns	Conducting mass vaccination drives and other susceptible animals
Removing stray dogs and Infrastructure Enhancement	Improving healthcare facilities, including access to rabies vaccines and post-exposure treatment

Limitations

- Sampling Bias: Potential bias in the selection of study participants and communities due to logistical constraints and resource limitations.
- Generalizability: Findings may not be fully generalizable to all rural settings in Maharashtra or Other regions with different socio-economic and cultural contexts.
- Data Validity: Reliance on secondary data sources and self-reported information may introduce limitations in the accuracy and validity of study findings.

3. Conclusion

This methodology provides a comprehensive framework for investigating the effectiveness and feasibility of removing stray dogs and vaccination as the primary strategy for managing rabies in rural Maharashtra, India. By integrating quantitative and qualitative approaches, engaging local communities, and addressing ethical considerations, the research aims to generate actionable insights and evidence-based recommendations for policymakers, public health practitioners, and community stakeholders involved in rabies control efforts. Through collaborative action and innovation, the vision of rabies-free Maharashtra is within reach.

Compliance with ethical standards*Disclosure of conflict of interest*

No conflict of interest to be disclosed.

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