

BARRIERS TO EFFECTIVE RABIES SURVEILLANCE AND TREATMENT IN RURAL INDIA: A SYSTEMATIC REVIEW OF COMMUNITY AND HEALTH-SYSTEM FACTORS

Student Name: Muhammad Hussain Al Huzaibi Hashmi
Student No: 2429364
Programme: MSc Public Health and Social Care in Practice
Supervisor: Dr. Diola Bijlhout
Module: LCHS7008 Practice Based Research

01 PREVALENCE

- Rabies kills around 59,000 people every year all over the globe, with 36% of all rabies fatalities worldwide being based in India (Janekunte, Ninganna, and Hadya Palaksha, 2025).
- In India, 5,726 human deaths and 9.1 million animal bites were estimated and were the findings of a national survey of rabies (Thangaraj et al., 2024).
- Geospatial analysis indicates that the number of cases of dog bite reached a climax in 2018 and 7.57 million, but now has fallen to 2.76 million in 2023, with the greatest contribution by Uttar Pradesh, Bihar and Maharashtra (Janekunte, Ninganna and Hadya Palaksha, 2025).
- Fatalities due to rabies in children are 40% in children below 15 (World Health Organization, 2024a).
- In tea estates, the number of bites per 1,000 residents is 11.8 (Tiwari et al., 2025). The rural population is still disproportionately impacted because of inadequate healthcare facilities (Radhakrishnan et al., 2020).

02 RATIONALE

- Although rabies is 100% preventable in the case of post exposure prophylaxis (PEP), there are still obstacles.
- In a meta-analysis, pooled PEP compliance was found in 57per cent of cases, and economic constraints, logistical challenges and cultural beliefs are considered to be the main barriers (Debnath et al., 2025).
- Complete anti rabies vaccination is done by 52.3% and immunoglobulin is taken by 49.4% (Sahu et al., 2021).
- The examination of PEP failures showed that without deviations, 26.4% were offered immunoglobulin (Lodha et al., 2025).
- Just 17.5% of the rural population was aware of proper wound care (Singh, Mahajan and Dahiya, 2020)
- 98.25% showed inappropriate wound care (Maiti et al., 2025).
- There are evidence gaps that are covered in this review regarding the elimination target by India in 2030.

03 RESEARCH QUESTION

What factors hinder effective rabies surveillance and treatment among rural communities and community health workers in India?

REFERENCES

Amit, K., Sinha, S., Choudhary, S.K., Kumar, S. and Moidu, M. (2024) 'Knowledge, attitudes, and practices regarding dog bite and its management: A cross-sectional study from the rural field practice area of Indira Gandhi Institute of Medical Sciences (IGIMS), Patna', *Cureus*, 16(11), e74133. Available at: <https://doi.org/10.7759/cureus.74133> (Accessed: 1 December 2025).

·Bharani, K., Ramachandran, K., Kommisetty, V. and Baalann, K.P. (2022) 'Knowledge of rabies among rural community in Chengalpet district, India', *Bioinformation*, 18(3), pp. 155-159. Available at: <https://doi.org/10.6026/97320630018155> (Accessed: 28 November 2025).

·Debnath, A., Toppo, V.G., Panwar, N., Deori, T.J., Khongsit, A. and Kishore, J. (2025) 'Compliance of post-exposure prophylaxis (PEP) following animal bite in Indian population: A systematic review and meta-analysis', *Journal of Family Medicine and Primary Care*, 14(8), pp. 3121-3131. Available at: <https://doi.org/10.4103/jfmppc.jfmppc.1957.24> (Accessed: 30 November 2025).

Goel, K., Sen, A., Satapathy,P., Kumar, P., Aggarwal, A.K., Sah, R. and B.K. (2023) 'Emergency of rabies among vaccinated humans in India: a public health concern', *The lancet regional health - Southeast*, 9 pp 100109 Available at: <https://doi.org/10.1016/j.lansea.2022.100109> (Accessed: 13 December 2025)

·Janekunte, D.B., Ninganna, O.Y. and Hadya Palaksha, P. (2025) 'State-wise geospatial analysis of dog bite burden in India from 2018 to 2023', *Porto Biomedical Journal*, 10(5), e305. Available at: <https://doi.org/10.1097/j.pbj.0000000000000305> (Accessed: 2 December 2025).

·Kumar, I., Parmar, D., Panesar, S. and Dhamnetiya, D. (2025) 'Epidemiological profile and factors associated with the delay in initiation of post exposure prophylaxis of animal bite cases at the tertiary care hospital, New Delhi', *VirusDisease*, 36(3), pp. 377-383. Available at: <https://doi.org/10.1007/s13337-025-00928-8> (Accessed: 3 December 2025).

·Lodha, L., Gupta, S., Ashwini, M.A., Chandel, S. and Mani, R.S. (2025) 'Rabies despite post-exposure prophylaxis in high-burden settings: Vaccine failure or gaps in healthcare delivery?', *Clinical Infectious Diseases*, ciaf662. Available at: <https://doi.org/10.1093/cid/ciaf662> (Accessed: 5 December 2025).

·Maiti, A., Sharma, A., Patel, S. and Mishra, A. (2025) 'Primary local wound management practices and initiation of post-exposure prophylaxis among animal bite victims in a teaching institution hospital of Central India', *Journal of Family Medicine and Primary Care*, 14(9), pp. 3778-3783. Available at: <https://doi.org/10.4103/jfmppc.jfmppc.2074.24> (Accessed: 4 December 2025).

·Radhakrishnan, S., Vanak, A.T., Nouvellet, P. and Donnelly, C.A. (2020) 'Rabies as a public health concern in India—A historical perspective', *Tropical Medicine and Infectious Disease*, 5(4), 162. Available at: <https://doi.org/10.3390/tropicalmed5040162> (Accessed: 26 November 2025).

·Sahu, D.P., Ps, P., Bhatia, V. and Singh, A.K. (2021) 'Anti-rabies vaccine compliance and knowledge of community health worker regarding animal bite management in rural area of Eastern India', *Cureus*, 13(3), e14229. Available at: <https://doi.org/10.7759/cureus.14229> (Accessed: 27 November 2025).

·Shukla, V., Verma, V., Singh, A.K., Sachan, B., Kaushik, A., Kumari, R., Kandpal, S.D., Jauhari, S., Singh, C. and Singh, S. (2025) 'Empowering adolescents in Lucknow with rabies awareness: An interventional study', *Journal of Family Medicine and Primary Care*, 14(7), pp. 2680-2687. Available at: <https://doi.org/10.4103/jfmppc.jfmppc.1793.24> (Accessed: 6 December 2025).

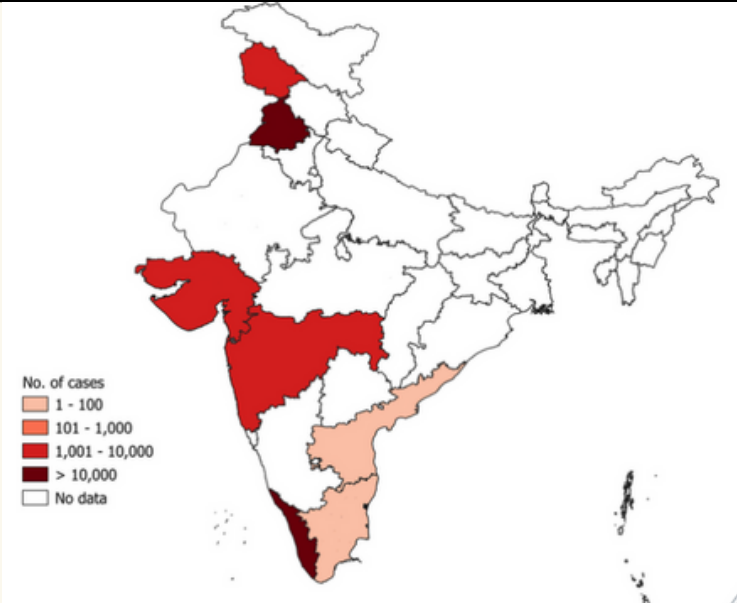
·Singh, T., Mahajan, S. and Dahiya, N. (2020) 'A cross-sectional study of awareness and practices regarding animal bites in rural community, North India', *Journal of Family Medicine and Primary Care*, 9(6), pp. 2751-2757. Available at: <https://doi.org/10.4103/jfmppc.jfmppc.158.20> (Accessed: 29 November 2025).

·Thangaraj, J.W.V., Krishna, N.S., Devika, S., Egambaram, S., Dhanapal, S.R., Khan, S.A., Srivastava, A.K., Mishra, A., Shrinivasa, B., Gour, D., Madhukar, M., Verma, N., Sharma, P., Soni, R.K., Ramasamy, S., Mohandas, S., Baidya, S., Rehman, T., Yeldandi, V.V. and Murhekar, M.V. (2024) 'Estimates of the burden of human rabies deaths and animal bites in India, 2022-23: a community-based cross-sectional survey and probability decision-tree modelling study', *The Lancet Infectious Diseases*, 25(1), pp. 126-134. Available at: [https://doi.org/10.1016/S1473-3099\(24\)00490-0](https://doi.org/10.1016/S1473-3099(24)00490-0) (Accessed: 25 November 2025).

·Tiwari, H.K., Mohanty, P., Shirke, R.G., Kurup, A.U., Satwik, C., Kindo, S.P., Shigwan, R., Wangdi, K., Gogoi-Tiwari, J., Cunha Silva, L. and Dürr, S. (2025) 'Two-leaves and many bites: Profiling dog-bites and adherence to rabies prophylaxis in tea-estate communities of Udalguri District, Assam, India', *PLoS Neglected Tropical Diseases*, 19(12), e0013791. Available at: <https://doi.org/10.1371/journal.pntd.0013791> (Accessed: 7 December 2025).

·World Health Organization (2024a) Rabies: Epidemiology and burden. Geneva: World Health Organization. Available at: <https://www.who.int/teams/control-of-neglected-tropical-diseases/rabies/epidemiology-and-burden> (Accessed: 1 December 2025).

·World Health Organization (2024b) Rabies in India. New Delhi: WHO Regional Office for South-East Asia. Available at: <https://www.who.int/india/health-topics/rabies> (Accessed: 2 December 2025).



WORLD HEALTH ORGANIZATION (2024B)

04 AIM

To systematically synthesise and critically evaluate evidence on community, cultural, and health system barriers to rabies surveillance and treatment in rural India, to inform improved prevention strategies and health outcomes.

05 OBJECTIVES

- 1) To identify and critically appraise health-system barriers affecting the availability, accessibility, affordability, and reporting of rabies post exposure prophylaxis (PEP) in rural India.
- 2) To examine how community knowledge, beliefs, cultural practices, and reliance on traditional medicine influence care seeking behaviour following suspected rabies exposure in rural settings.
- 3) To evaluate the role, capacity, and challenges of community health workers in rabies prevention, case detection, referral, and surveillance, and to synthesise evidence based recommendations for strengthening practice and policy.

06 EXPECTED RESEARCH IMPACT

- Rural populations will be helped by this review, as it will highlight the barriers to seeking treatment that can be addressed through modification.
- The results will guide policymakers in enhancing the implementation of the National Rabies Control Programme, and help in preventing rabies in India in the 2030 strategy (World Health Organization, 2024b).
- The information about gaps in health worker training will be used to inform capacity-building since the frontline workers exhibit inefficient knowledge (Sahu et al., 2021; Amit et al., 2024).
- Educational interventions are useful, raising the level of awareness by 9 – 40 (Shukla et al., 2025).
- PEP delays are marked by large differences in rural and urban areas (31.6% vs 12.4%) that need to be addressed by special actions (Kumar et al., 2025).
- There is still a low level of community awareness, as 49.5per cent are familiar with wound management methods (Bharani et al., 2022).