LETTER TO EDITOR

Reframing India's Approach to Snakebite Envenomation Through One Health Approach

Kinshuk Gupta, Rajesh Kumar
Department of Community Medicine, Maulana Azad Medical College, Delhi

CORRESPONDING AUTHOR
Dr. Kinshuk Gupta, Department of Community Medicine, Maulana Azad Medical College, Delhi - 110002
Email: kinshuksameer@gmail.com

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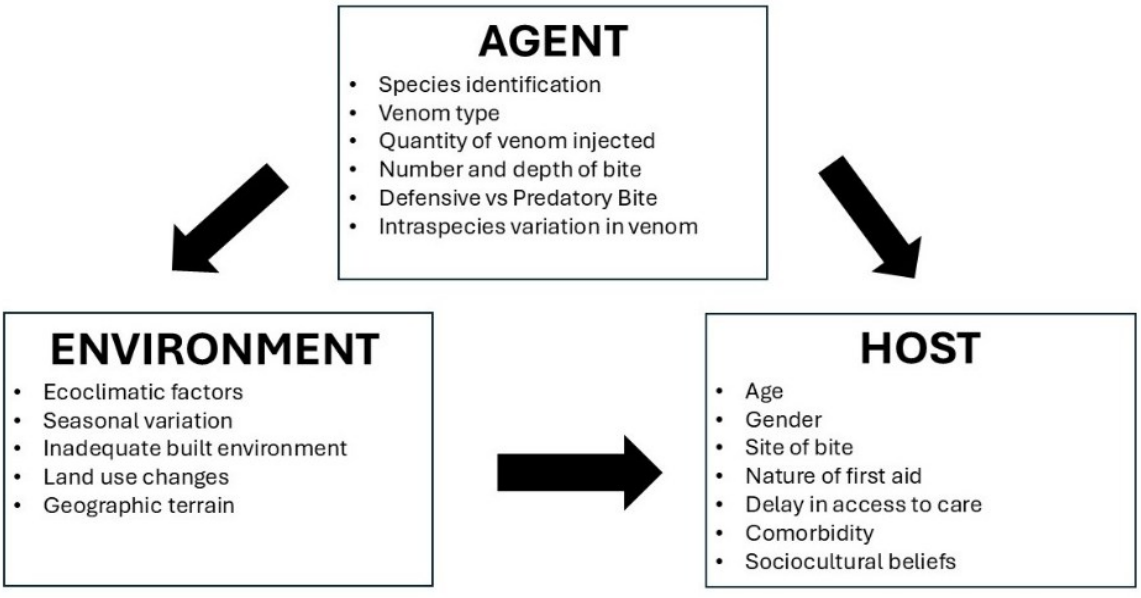
Dear Sir,

Snakebite envenomation remains a neglected public health challenge in India. More than 1,000,000 snakebites occur annually, causing approximately 58,000 deaths, and disability in nearly four times as many people.(1,2) The World Health Organization (WHO) has set a target of reducing snakebite-related deaths by 50% by 2030.(3) India has aligned its national response through the launch of the National Action Plan for Prevention and Control of Snakebite Envenoming (NAPSE) in 2024.(4) Achieving this goal, however, requires moving beyond a predominantly biomedical response to adopting a one-health framework. Figure 1 illustrates the interaction between agent, host, and environmental determinants that together influence snakebite occurrence and outcomes.

Figure 1: Agent-Host-Environment Triad in Snakebite Envenomation



Although Indian antivenom is produced against the Big Four snakes, bites from other venomous species are increasingly becoming common.(5,6) Venom composition also exhibits marked geographical variation, thereby leading to interspecies and intraspecies variations.(5,6,7) As antivenom is manufactured using venom sourced from a limited number of southern states, its effectiveness varies across regions.(6,7)

Snakebite disproportionately affects young individuals, women, and those engaged in agriculture and other outdoor occupations.(1,8) The burden falls largely on poor and marginalized communities, where delayed care-seeking, financial hardship, and inequitable access to healthcare worsen outcomes.(8)

Environmental factors further amplify this risk. Incidence peaks during the monsoon, while changing land use, particularly large-scale monoculture plantations, creates favourable habitats for disturbance-tolerant snake species. Poor housing and inadequate built environments further increase opportunities for human–snake contact.(1)

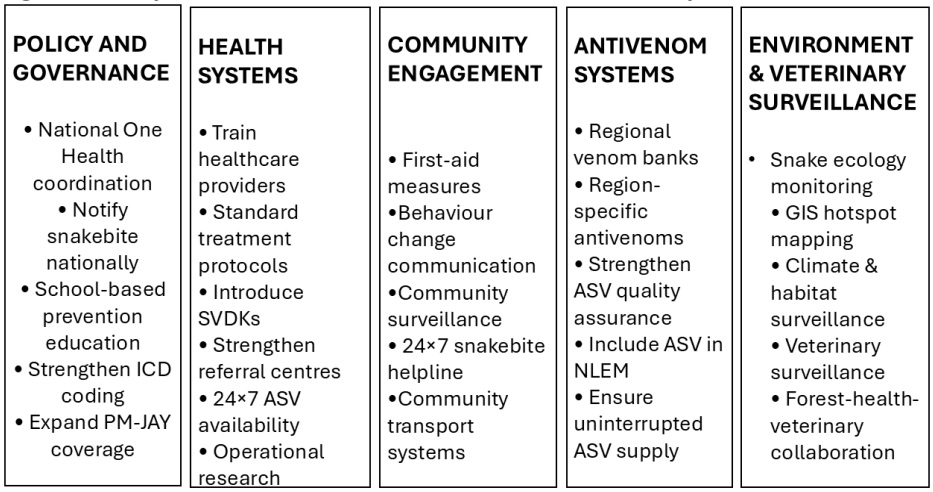
Several health system challenges continue to limit effective snakebite management. Delayed care-seeking due to reliance on traditional healers and harmful first-aid practices remains common. Even after reaching Primary Health Centres (PHCs), shortages of antivenom, inadequate training of healthcare workers, and concerns regarding adverse reactions frequently delay treatment or result in referral without adequate stabilization. Clinical management is further constrained by the absence of a validated snake venom detection kit (SVDK), making diagnosis largely syndromic despite national guidelines.(9,10) Weak surveillance, fragmented coordination, limited training, and inadequate funding continue to undermine effective prevention and control.

These interconnected challenges highlight why snakebite cannot be addressed through clinical management alone. Rather than viewing snakebite solely as a medical emergency, a One Health approach recognises it as the outcome of interactions between people, snakes, animals, and their shared environment. Lessons from dog-mediated rabies demonstrate how integrating human and animal surveillance can improve understanding of disease ecology and support cost-effective disease control.(11) Countries such as Australia have demonstrated a marked reduction in snakebite fatalities through systematic approach to snake bite well-organized health systems, timely access to care, and sustained public awareness initiatives. (12)

One Health approach offers a practical framework for strengthening surveillance, community engagement, environmental management, and health system preparedness.

It can help in identification of snakebite hotspots, guide resource allocation, and anticipate changing patterns of risk.(11) Community engagement through participatory approaches can improve awareness, dispel myths, strengthen surveillance, and promote timely care-seeking.(13) Emerging initiatives such as the SNAKE-BYTE project (2018–2022) demonstrate the potential of this integrated model.(11) Figure 2 summarizes the proposed One Health framework for strengthening snakebite prevention, surveillance, and management in India. Figure 2 summarizes the proposed One Health framework for strengthening snakebite prevention, surveillance, and management in India.

Figure 2. Proposed One Health framework for snakebite prevention and control in India



Authors Contribution

All authors have contributed equally.

Declaration Of Generative AI And AI Assisted Technologies In The Writing Process

The author has not used any generative AI/AI assisted technologies in the writing process.

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