# A Granular Analysis of Snakebite Cases in India and its Spatial Trends

Thirumal Reddy Vennam[1], Prachi Shukla[1], Khushboo Balani[1], Jitendra Shah[1], Satish Agnihotri[1]
[1]Indian Institute of Technology Bombay, Mumbai, 400076, India

Introduction

India is home to half of the total snakebites and more than half of the snakebite-related deaths in the world. Yet it continues to be a low-priority issue for the government. The susceptibility to snakebites has only increased in recent times due to increased urbanisation and resultant deforestation. While past analyses have identified the high-burden states, we identified hotspots at district-level for improved targeting of resources and preventive action. We also identified the time-periods of peak incidence at the disaggregated levels, to feed into the early-warning systems, thereby informing the anti-venom inventory management at local levels. Lastly, we examine the relationship between cropping patterns and incidence of snakebites.
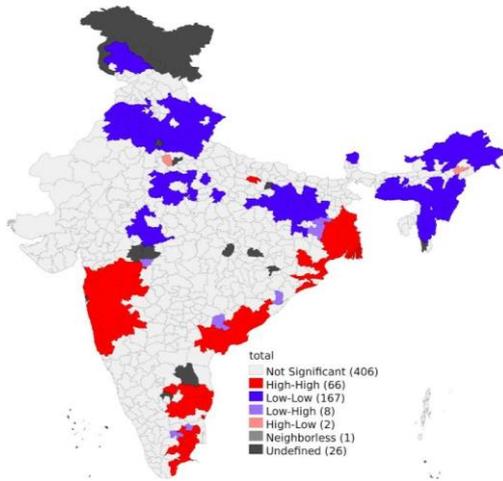
LISA map for total snake bites (2019-20)(Source: HMIS)
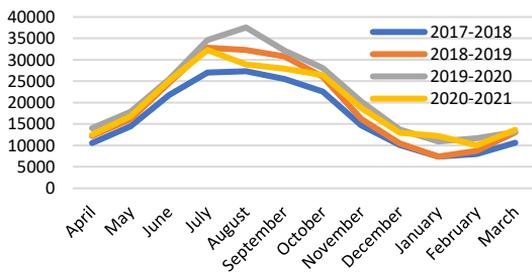
Seasonality of Total Snakebites (2017-21)(Source: HMIS)

Methodology

We use the official HMIS database, which provides monthly data from health facilities, across the country. Most studies have relied on primary data collection to inform their analysis. The time period of our analysis is FY18-FY20. The unit of analysis is districts and states. We use univariate Local Indicators of Spatial Autocorrelation (LISA) technique to identify the hotspots of snakebites. Lastly, we present correlational estimates between the nature of crops and incidence of snakebites to enhance our understanding of the determinants of snakebites.

Results

Just 77 districts (out of 703) constituted 52.7% of the snakebites cases in the country between FY18-FY20. LISA analysis identified 63 hotspots (Moran's I = 0.516), with 62 being located in four states of Andhra Pradesh, Tamil Nadu, West Bengal and Maharashtra. The peak months for incidence of snakebites differ across states, with June to October (cropping season) being the most common time-period. While paddy cultivation is usually found to be correlated with greater incidence of snakebites, we found that cropped area under coarse grains (millets, sorghum) had a higher correlation [0.48] than cereals (rice, wheat) [0.37].

Conclusion

The HMIS database, despite its limitations, provides monthly data for monitoring burden of snakebites across districts. Since health is a state subject in India, the preventive and curative effort should be directed towards the identified hotspots, by the respective state governments. Limited availability of official data on this issue reiterates the need for investment in data-collection efforts. The study highlights the need for quality data to better inform anti-venom inventory management.