

Envenoming Snakebite Risk Map for Sri Lanka

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Snakebite is a neglected tropical disease. Hospital based statistics often underestimate snakebite incidence because a significant proportion of victims seek traditional treatments. Since geospatial risk assessments of snakebite envenoming are rare, health care resources are distributed based on administrative boundaries rather than on a need analysis.

The aim of the study was to develop a snakebite envenoming risk map for Sri Lanka. Epidemiological data was obtained from a community-based island-wide survey. The sample was distributed equally among the nine provinces. 165,665 participants living in 1118 Grama Niladhari divisions were surveyed. Model-based geostatistics was used to determine the geographical distribution of envenoming bite incidence. The Monte Carlo maximum likelihood method was used to obtain parameter estimates and plug-in spatial predictions of risk. A predictive model was developed with natural and social environmental variables to construct an estimated envenoming bite incidence map and a probability contour map (PCM) to demonstrate the spatial variation in the predictive probability that local incidence does or does not exceed national envenoming snakebite incidence (i.e. 151 per 100,000).

Envenoming bite incidence had a positive association with elevation up to 195 meters above sea level, with incidence dropping at higher elevations. The incidence of envenoming was higher in the dry zone compared to intermediate and wet climatic zones and decreased with increasing population density. Developed risk maps showed substantial within-country spatial variation in envenoming bites. Conclusion:

The risk maps provide useful information for healthcare decision makers to allocate resources to manage snakebite envenoming in Sri Lanka. We used replicable methods which can be adapted to other geographic regions after re-estimating spatial covariance parameters for each region of interest.

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