

# Assessing Spatial Patterns of Dengue Incidence in Nepal for 2022 And 2023: A Local Indicator of Spatial Association (LISA) Approach

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Dengue, first reported in Nepal in 2004, occurred as large outbreaks in 2022 and 2023 (54,784 and 51,243 cases), with cases reported in every district (n=77). Initially confined to districts of the lower plains, dengue has spread to higher elevations and is now endemic. We used spatial analyses to map and describe incidence in Nepal in 2022 and 2023. Incidence was calculated for each district, using digitized case data from Nepal's Ministry of Health and Population, and 2021 census data from the National Statistics Office. Cases, population, and peak dengue months were visualized in ArcGIS Pro. The Local Moran's I statistic was implemented in GeoDa to identify spatial clusters (hotspots and cold spots) and spatial outliers of incidence rates for the two years. In 2022, one hotspot (High-High) including six districts around Kathmandu, and one cold spot (Low-Low) including eight high-elevation districts in Nepal's northwest region were identified. District-wise peak cases occurred in August–October. In 2023, hotspots shifted to north-central and eastern regions, and a High-Low outlier district in the central region was identified, and cases peaked March–October. Identifying spatial clusters of dengue incidence can inform targeted management, improving effectiveness and cost-efficiency. The mountainous northwest cold spots align with expectations of fewer mosquitoes due to geography and climate. However, dengue peaked in all 77 districts over three months in 2022, suggesting ecological and climatic barriers may no longer be sufficient. This study provides a baseline examination of spatial patterns of recent dengue in Nepal.

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