

# Hotspots: A Geographical Analysis of Tuberculosis and Diabetes Mellitus in Los Angeles County, California, 2015-2017

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## BACKGROUND & OBJECTIVE:

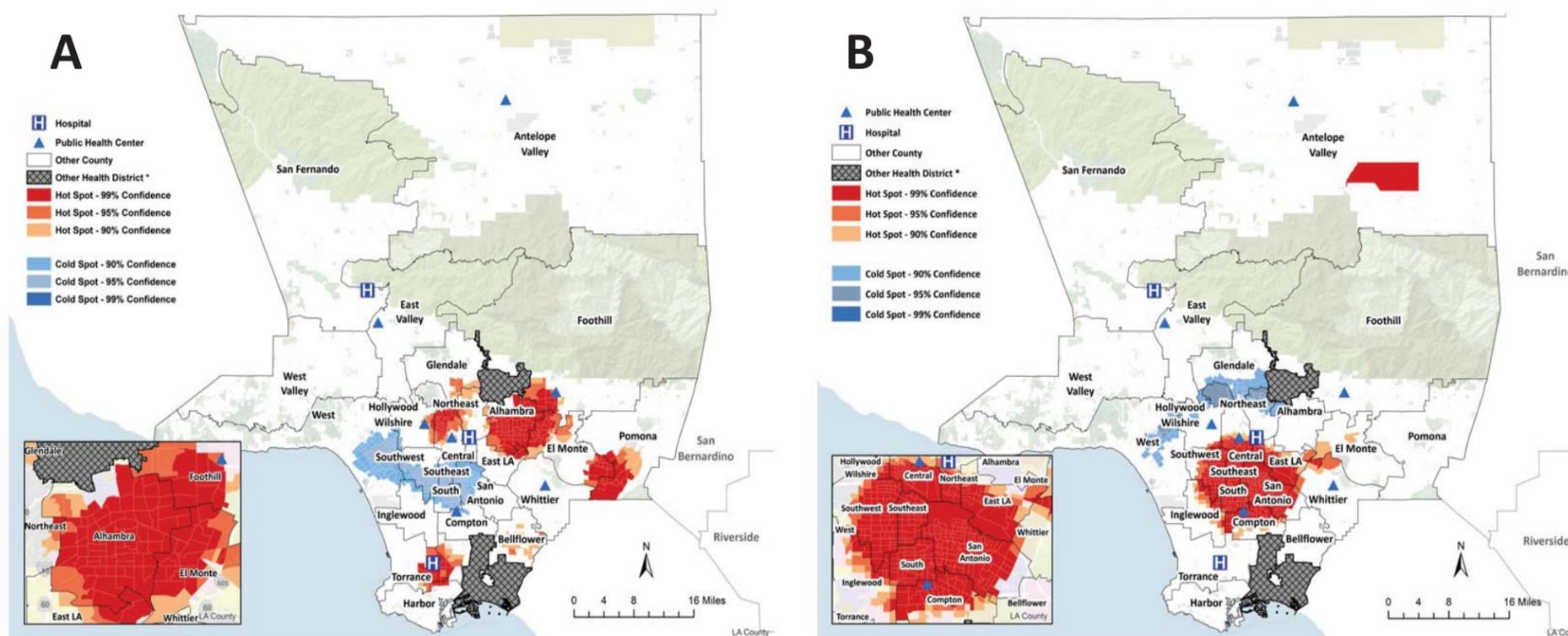
- The application of Geographic Information Systems (GIS) to public health research can elucidate the underlying geography of health disparities.
- Co-occurrence of tuberculosis (TB) and diabetes mellitus (DM) poses a significant challenge for TB control programs. Having DM triples the risk of TB and contributes to poor outcomes<sup>1</sup>. In Los Angeles County (LAC), 10% of residents have DM and 44% have prediabetes, disproportionately affecting racial/ethnic groups<sup>2,3</sup>.
- The goal of this study was to apply GIS methodology to examine the geographic distribution of TB and DM and identify areas and populations disproportionately burdened by TB and DM.

## METHODS:

- Verified cases of TB reported in LAC between 1/1/2015 and 6/30/2017 were identified from the LAC-DPH TB Registry database.
- Descriptive statistics were performed with SAS 9.4 to summarize the study population.
- Patient addresses, at the time of TB diagnosis, were geocoded using ArcMap 10.3.1 to obtain longitude and latitude coordinates.
- Optimized hotspot analyses were performed utilizing the Getis-Ord Gi\* statistic to identify statistically significant hotspots of TB and DM.

## RESULTS:

- Among 1,346 TB cases, 389 (29%) also had DM:
  - 166 (43%) were Hispanic
  - 193 (50%) Asian
  - 16 (4%) African-American
  - 13 (3%) non-Hispanic White.
- Statistically significant geographical variations for Hispanic and Asian TB cases were found ( $p < 0.05$ ).
- Hotspot clustering of TB and DM were identified among Asians residing in central, eastern, and southern LA County.
- Hotspot clustering of TB and DM were identified among Hispanics residing in south central and northeastern LA County.



**Figure 1.** Optimized hotspot analysis of TB and DM burden among Asian (A) and Hispanic (B) TB cases in LA County, 2015-2017. Asian race/ethnicity category includes TB cases who reported being Asian or Pacific Islander. Hispanic race/ethnicity includes persons of Hispanic origin of any race. Census tracts with statistically significant elevated burden are represented by hotspots ( $p < 0.05$ ); census tracts with statistically significant lower burden are represented by coldspots ( $p < 0.05$ ). LA County health district map overlays are applied to the hotspot maps. \*Data exclude TB cases from other health districts, i.e., Long Beach and Pasadena, as these cities have their own health departments.

## DISCUSSION AND CONCLUSIONS:

- GIS methods can serve as an important epidemiological tool to identify geographic areas experiencing disproportionate burden of TB and DM and can help inform future public health activities and interventions.
- Hotspots of TB and DM were identified among Asians and Hispanics residing in areas corresponding to low English language proficiency.<sup>3</sup> Facilitating language-appropriate and culturally sensitive patient awareness and education can help address health disparities among vulnerable populations.
- Caveats include that the data are cross-sectional and do not indicate temporal order of onset of TB or DM, the data does not provide information on severity or duration of DM among TB cases, and address data may not reflect location at time of first diagnosis for patients with multiple instances of active TB.
- Nevertheless, these findings highlight opportunities for targeted public health interventions aimed at reducing health disparities in underserved communities.

## REFERENCES:

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