Mapping Healthcare Facility Access Times: Leveraging High-Resolution Population Data & Routes API

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1 Background & Objective

Healthcare travel time assessments commonly rely on two main approaches:

- Interview-based methods, yield **limited accuracy** in reflecting the population's representation and spatial distribution.
- Geographic Information System (GIS) modeling approaches rely on static variables (speed limits, distance, terrain) and **do not account for up-to-date real-world traffic conditions**.

To address these limitations, we utilize two key resources: **Meta's high-resolution population density dataset** and **Google Maps Route API**.

> **This study aims to identify specific areas where residents face prolonged travel times to the nearest primary healthcare facility in the study area, Bekasi regency.**

2 Methodology

Downsample population point

The study area was divided into 1km × 1km **grid cells**.

Within each grid cell, the **k-means algorithm** was applied to identify **population clusters** with the **centroid** of each cluster serving as a **representative point**.

Assign nearby facilities to population point

Voronoi partitioning divided the study area into zones based on proximity to primary healthcare facilities. Travel times were then calculated from each population cluster centroid to facilities in **both its zone and adjacent zones**.
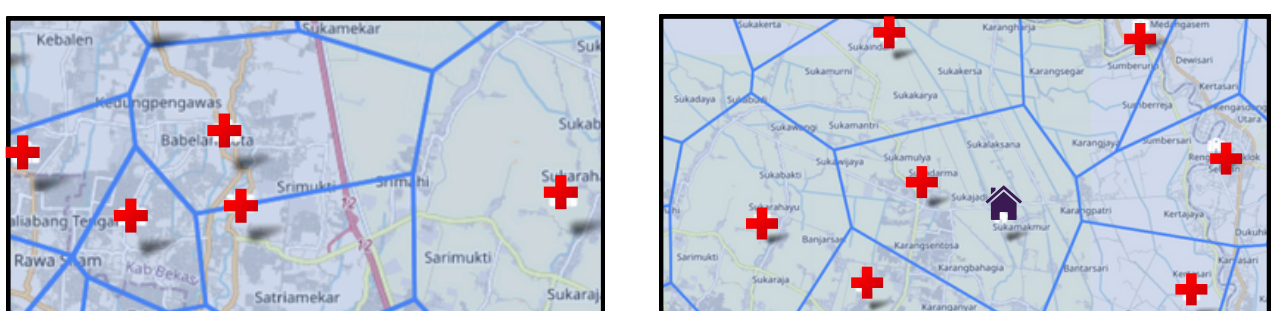

Send API requests to get travel time estimation

Using **Google Maps Route API**, travel times were calculated from each population point to nearby facilities, with the **shortest time** selected to represent accessibility for travel time mapping.

3 Major Findings

> **Five distinct areas (highlighted in red circles) were identified where residents face travel times exceeding 30 minutes to reach the nearest primary healthcare facility, surpassing 99.03% of the population's access times.**

These areas are characterized by remote locations **without nearby primary healthcare facilities**.
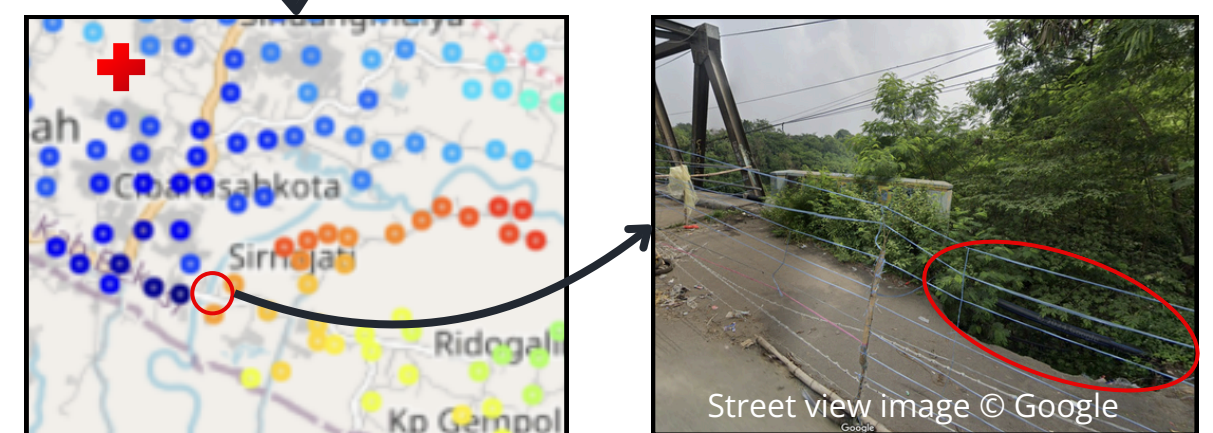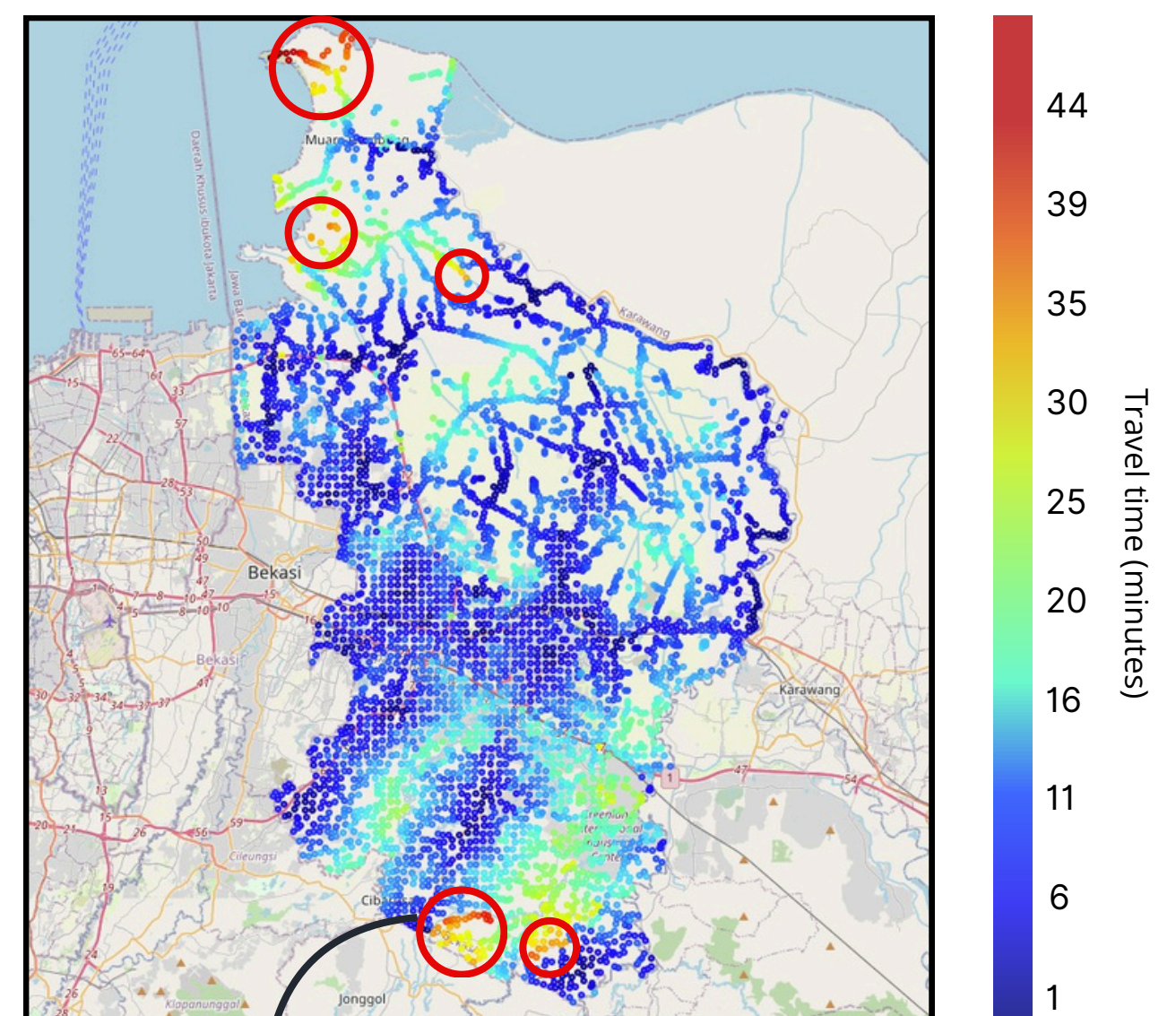
One area highlights the **impact of traffic conditions**, where a damaged road near a bridge forces vehicles to take longer alternative routes.

4 Conclusion & Policy Recommendation

Using two key resources, five areas in Bekasi with extended healthcare travel times (>30 minutes) have been identified, providing **critical insights to prioritize healthcare accessibility improvements**, guide infrastructure development and facility placement.

This method can be extended to assess travel times to **advanced health facilities** offering specialized treatments, addressing gaps in understanding access to such services. These insights can support more targeted and effective health policy interventions to **improve equitable access to care**.

Scan for more detailed information

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