

A Two-step Floating Catchment Area (2SFCA) Method to Evaluate Electric Vehicle Infrastructure Accessibility in Los Angeles

Baoqi “Eileen” Chen<sup>1</sup>, Leilei Duan, Ph.D.<sup>1</sup>

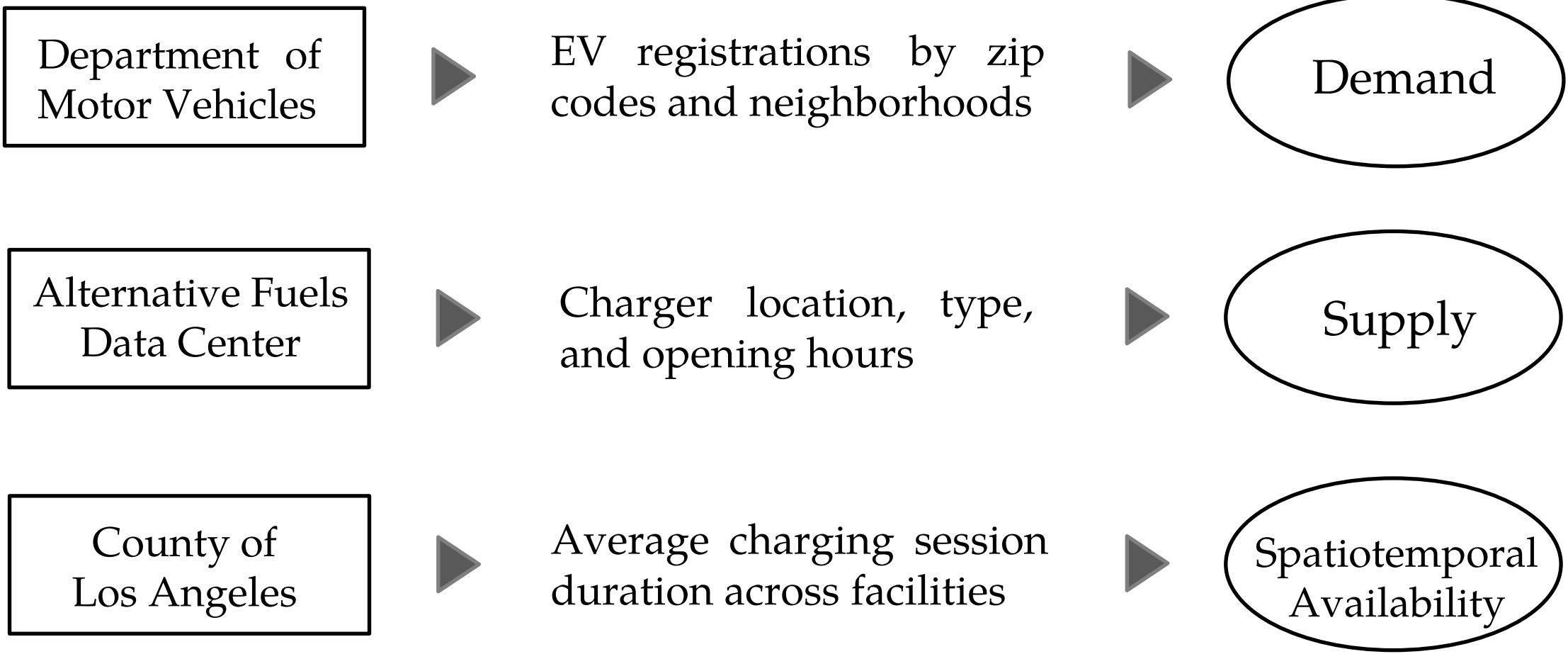
Abstract

Increased electric vehicle (EV) shares in urban mobility facilitate the transportation sector’s transition to renewable energy, benefiting air quality, decarbonization, public health, and grid resilience. As charging access is cited as one of the primary barriers to increasing plug-in EV sales., an accurate understanding of the supplies and demands of EV infrastructure is crucial to informing sustainable urban planning. However, there have not been analyses that assess EV charging accessibility from a dynamic supply and demand perspective, a gap this project aims to bridge. Featuring the City of Los Angeles as a case study, we propose an innovative framework that applies an improved Two-step Floating Catchment Area (2SFCA) method that accounts for chargers’ spatial accessibility over 24 hours. The result found high accessibility index near the downtown area, decreasing toward the city peripheries. Additionally, neighborhoods with the most EV registrations tended to not have access to sufficient charging resources. As a result, this study identified potential policy advisories for supplementary infrastructures and shed light on zero-emission zone pilots.

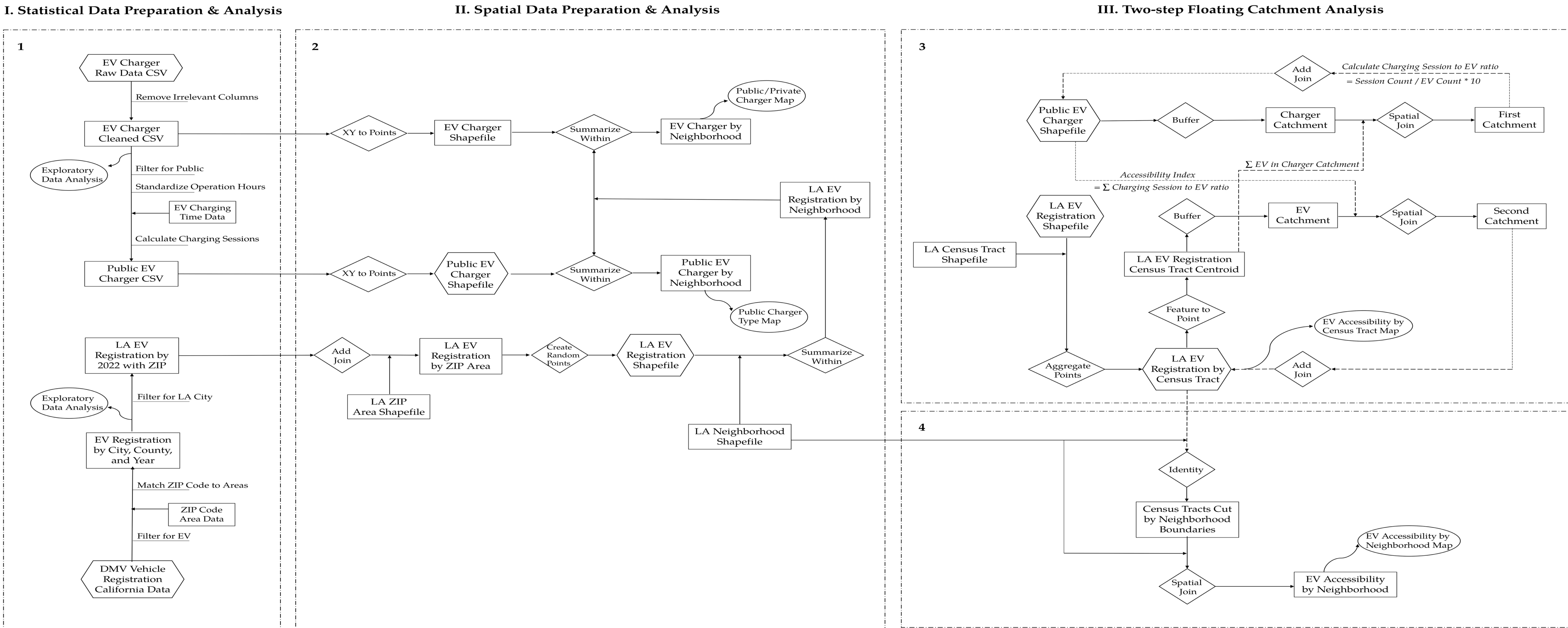
Study Area

- Though California ranked third in public EV charger per capita provision in 2020 with 72 chargers per 100,000 people, its infrastructural coverage might not meet its zero-emission vehicle (ZEV) transition goals.
- Los Angeles is increasing its percentage of ZEV on road to 25% by 2025, 80% by 2035, and 100% by 2050. By 2030, DC fast chargers in L.A. will need to grow by a factor of 33 to about 3,900 chargers; public Level 2 chargers will need to increase by a factor of 8 to about 21,500 chargers.

Data Sources & Objectives



Methodology



Results

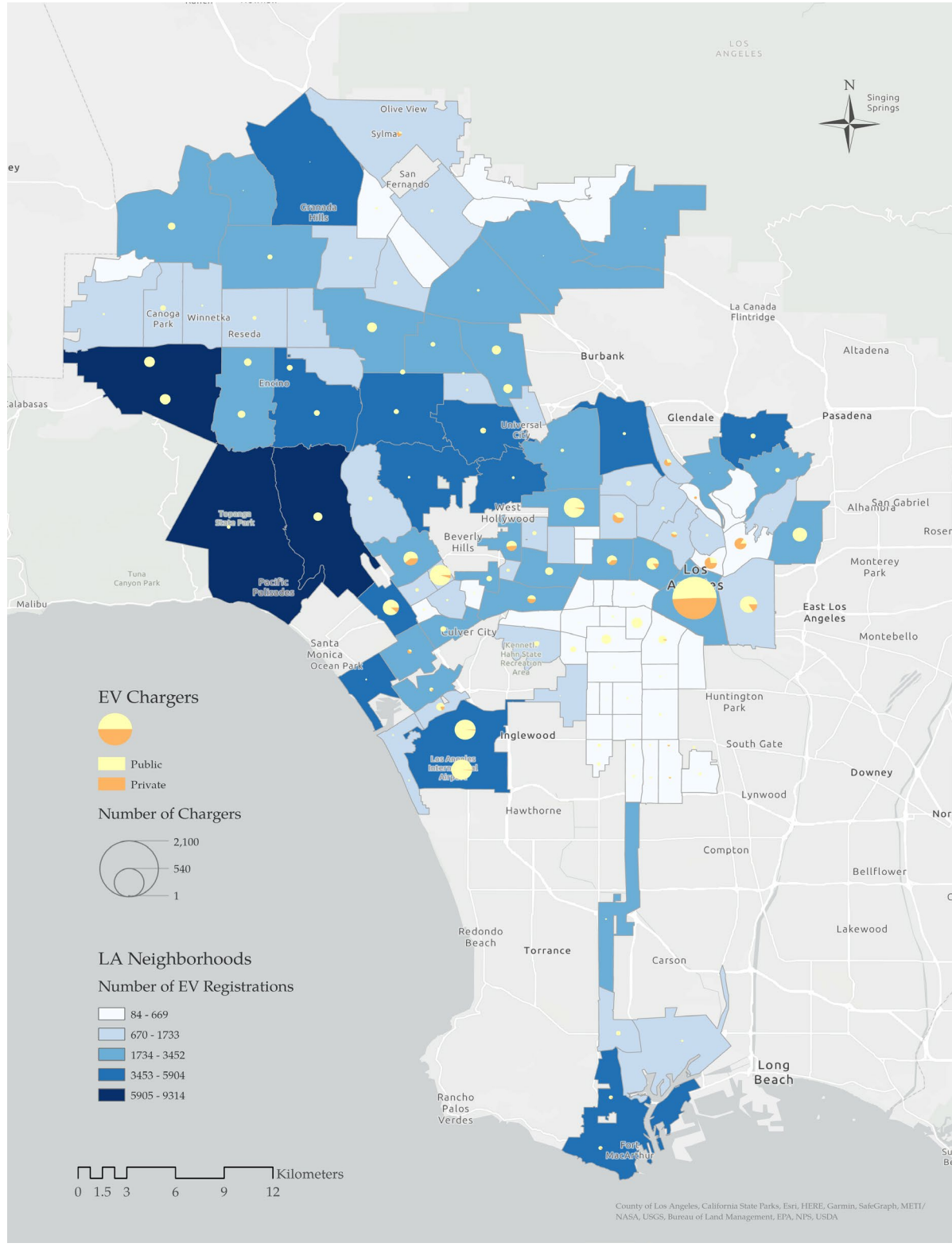


Figure 1. Public and private EV chargers by neighborhoods, overlaying EV registrations by zip codes.

- Northwestern L.A. has the most EV registrations by neighborhood; central L.A. neighborhoods have the fewest, except for Downtown.
- Downtown, Century City, Westchester, Hollywood, and Boyle Heights are the top five neighborhoods with the most chargers, among which Downtown outnumbers the others by almost six folds.
- Downtown areas have the most private chargers, due to the clustering of hospitals and municipal organizations.

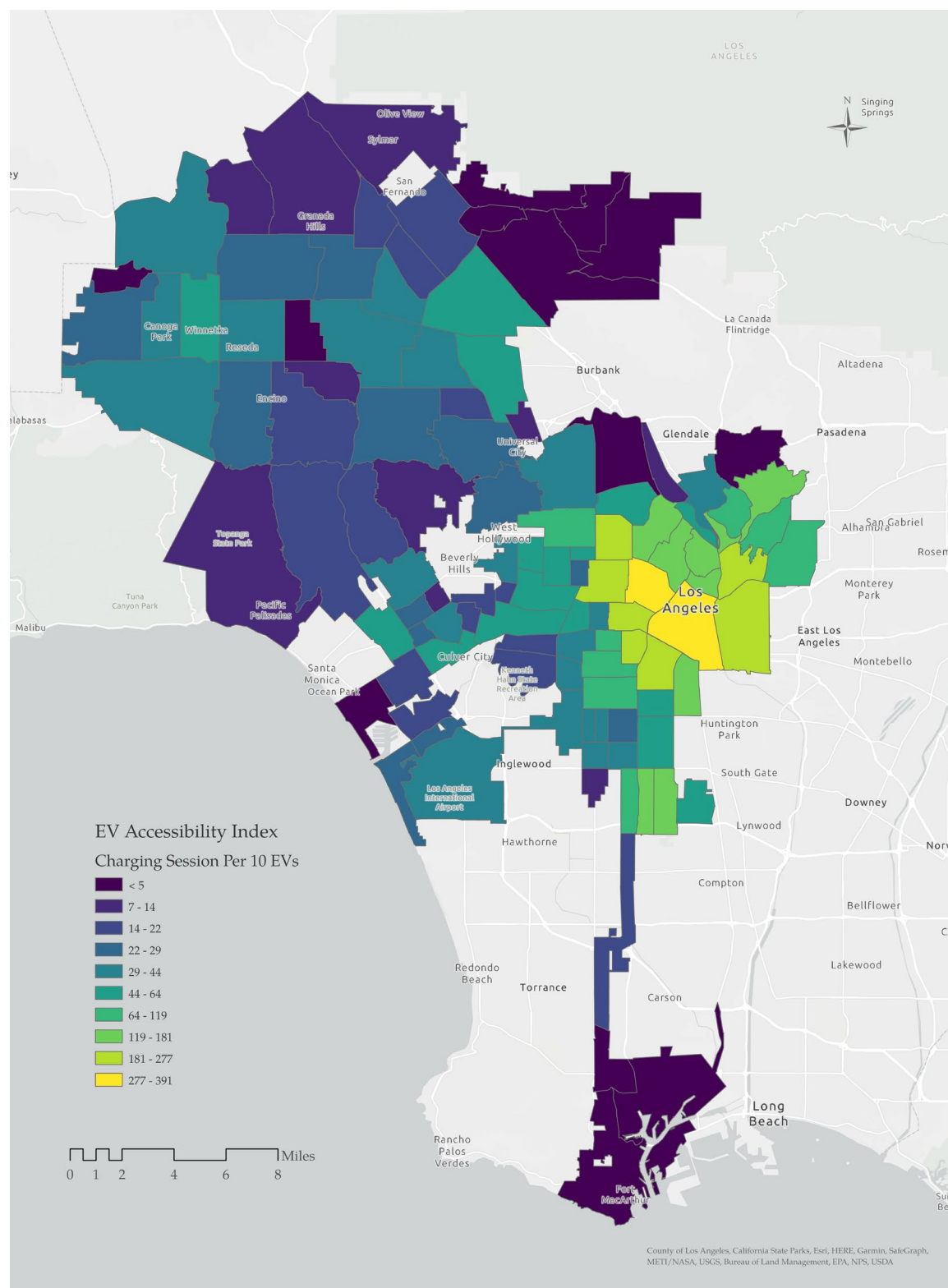


Figure 2. EV charging accessibility index by neighborhoods.

- High accessibility index near the downtown area, such as Downtown LA, Westlake, and Lincoln Heights.
- Downtown LA has the highest accessibility index: about 300 to 400 charging sessions per EV.
- Accessibility index displays a ring pattern and decreases toward the urban peripheries.
- Neighborhoods with the most EV registrations tended to not have access to sufficient charging resources, such as Brentwood, Sherman Oaks, and Venice.