LISA
Local spatial autocorrelation

Third Session

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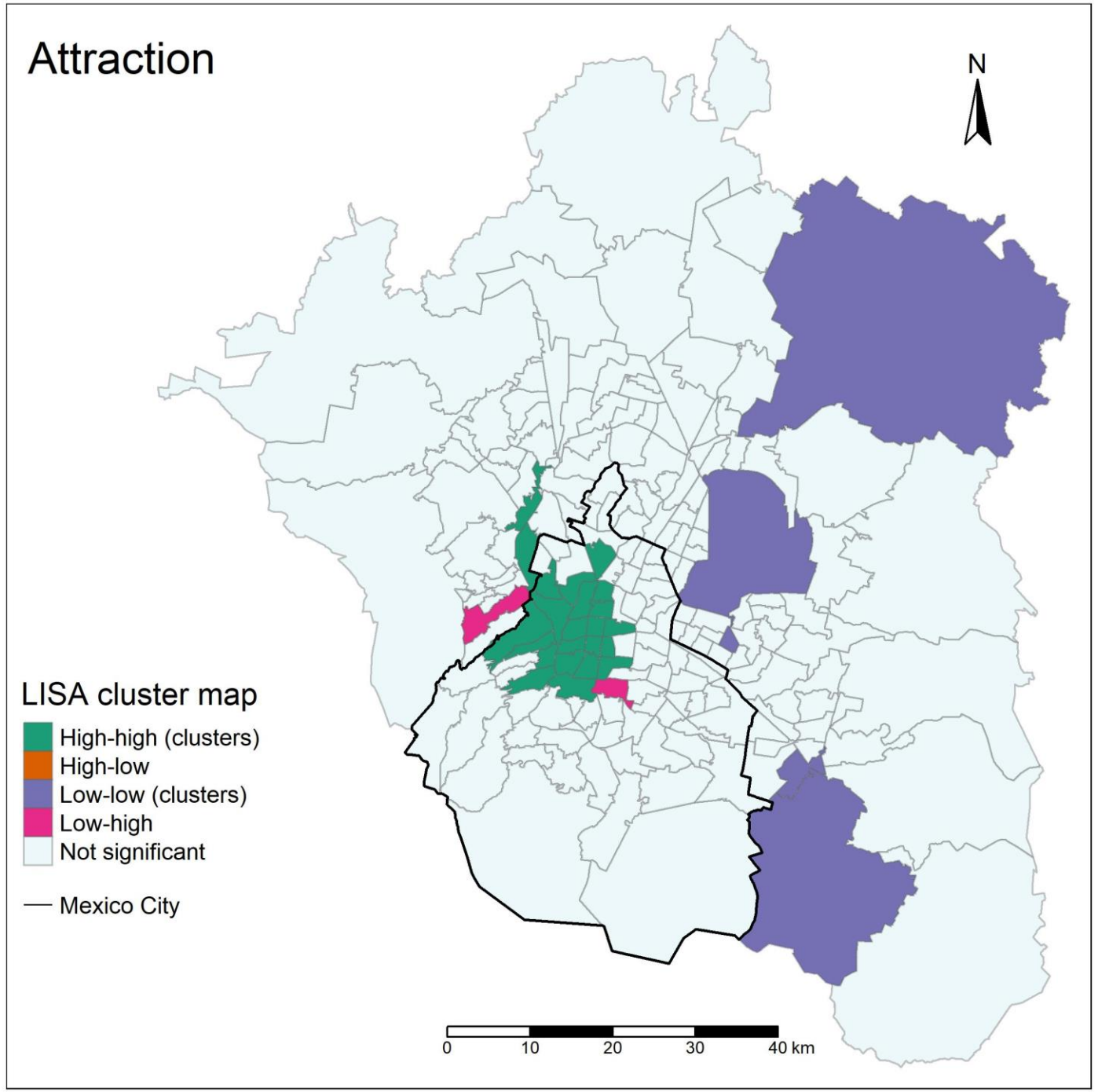
Local spatial autocorrelation

- Examine the spatial patterns and relationships at the local level
- It provides insights into how the attributes of specific locations are related to their neighboring locations, identifying spatial clusters, outliers, and spatially varying patterns

Local Indicators of Spatial Association (LISA)

There are different types of LISA statistics, but the most commonly used is Local Moran's I. Local Moran's I measures the degree of spatial autocorrelation for each individual location by comparing the attribute value of that location with the attribute values of its neighboring locations. It determines whether a location is part of a spatial cluster (high-high or low-low) or an outlier (high-low or low-high) based on the similarity or dissimilarity of attribute values between locations.


Attraction
N
LISA cluster map
High-high (clusters)
High-low
Low-low (clusters)
Low-high
Not significant
Mexico City
0
10
20
30
40 km

Local Indicators of Spatial Association (LISA)

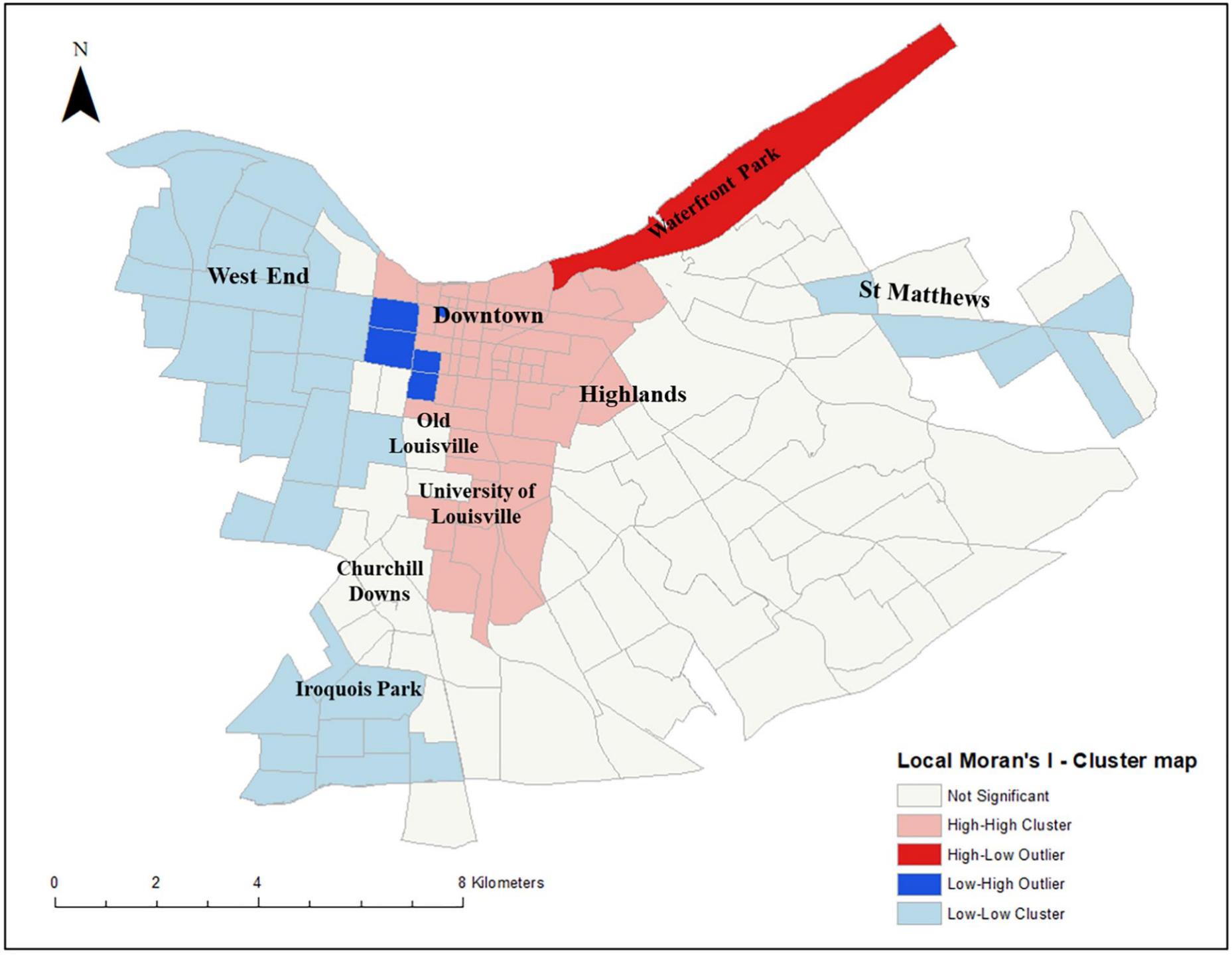
The interpretation of Local Moran's I values can be divided into four quadrants:

High-High (HH): Locations with high attribute values surrounded by other locations with high attribute values. These indicate spatial clusters of high values.

Low-Low (LL): Locations with low attribute values surrounded by other locations with low attribute values. These indicate spatial clusters of low values.

High-Low (HL): Locations with high attribute values surrounded by locations with low attribute values. These indicate spatial outliers with high values.

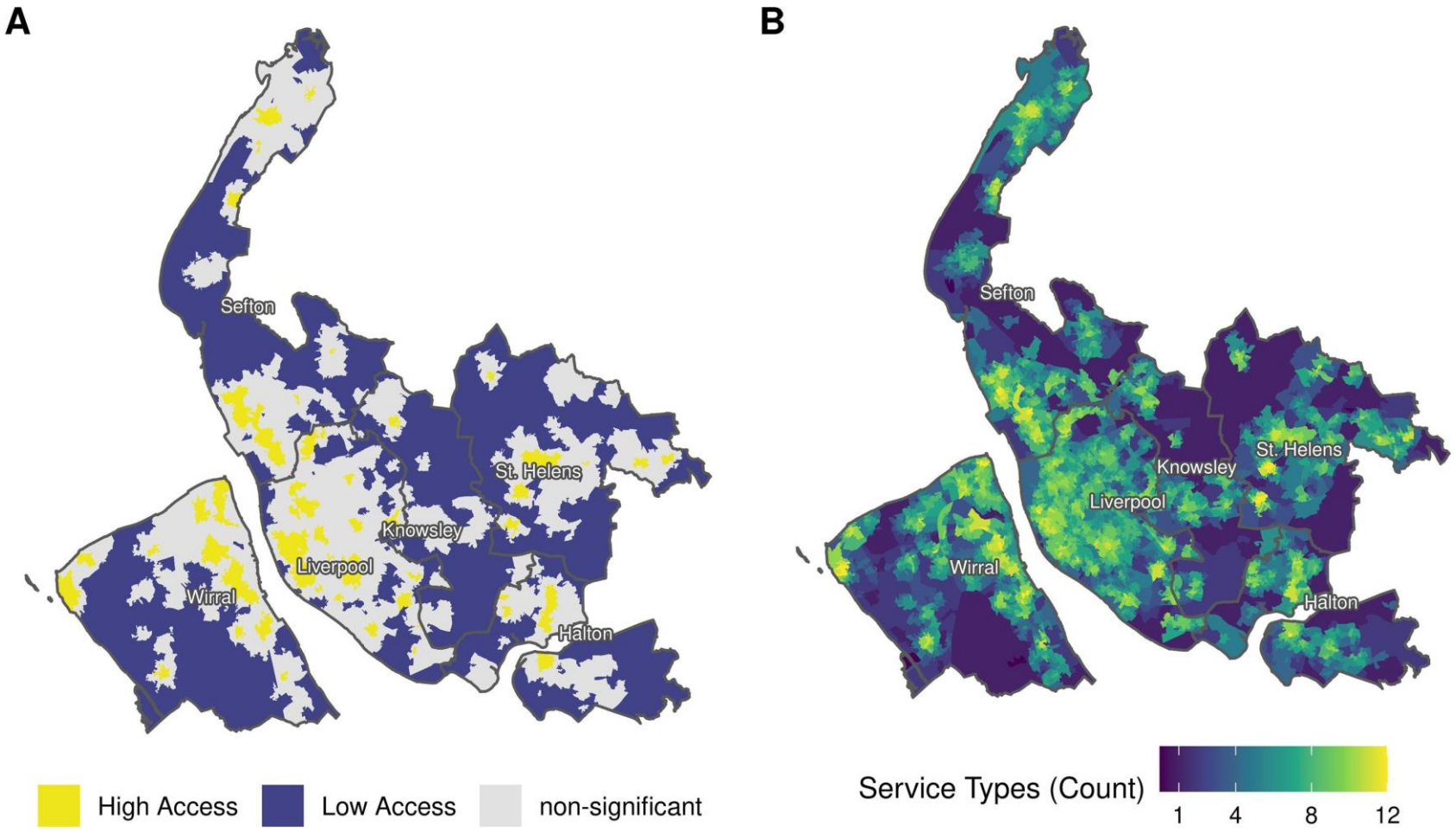
Low-High (LH): Locations with low attribute values surrounded by locations with high attribute values. These indicate spatial outliers with low values.



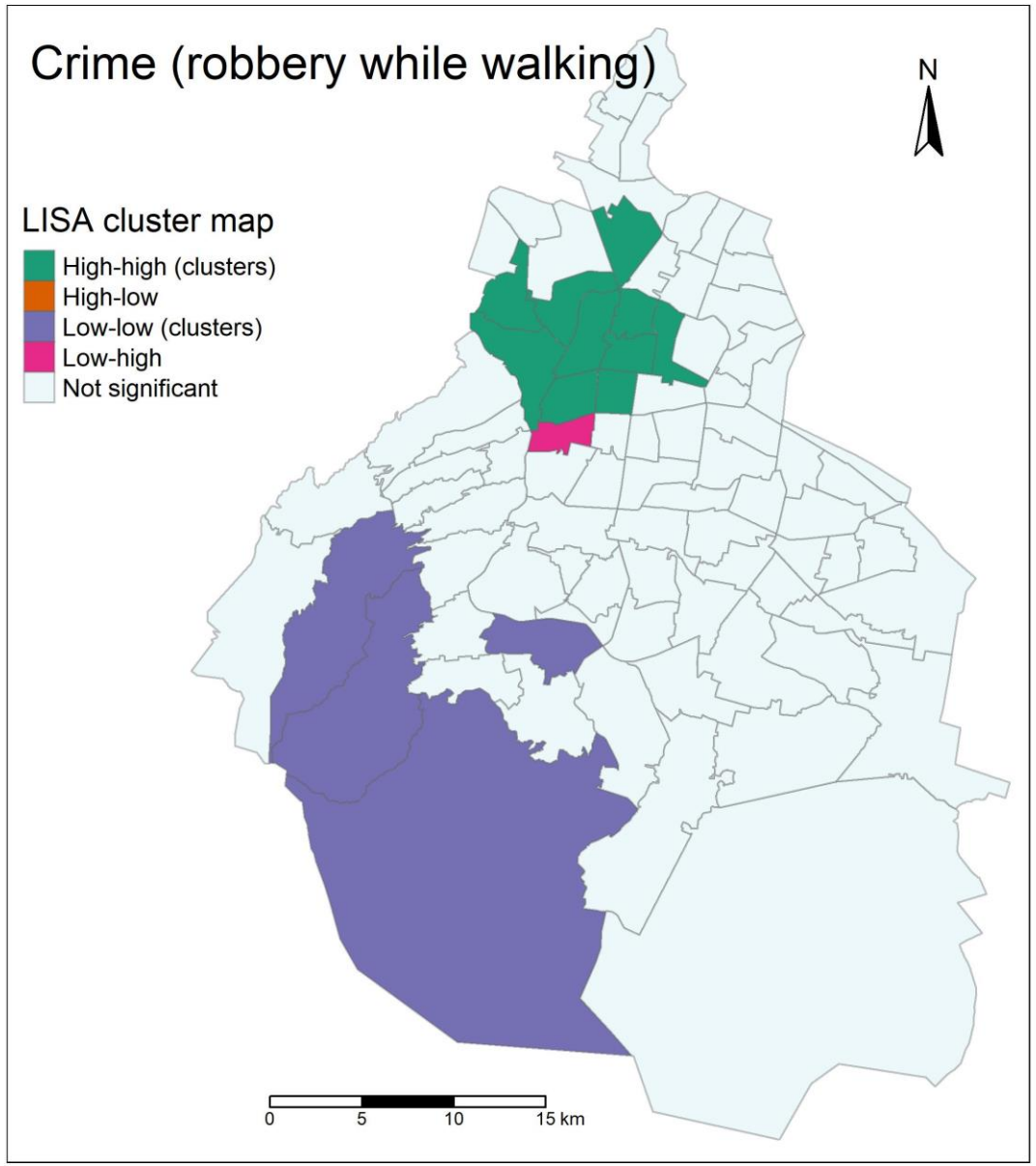
Local Moran's I result of e-scooter trip density

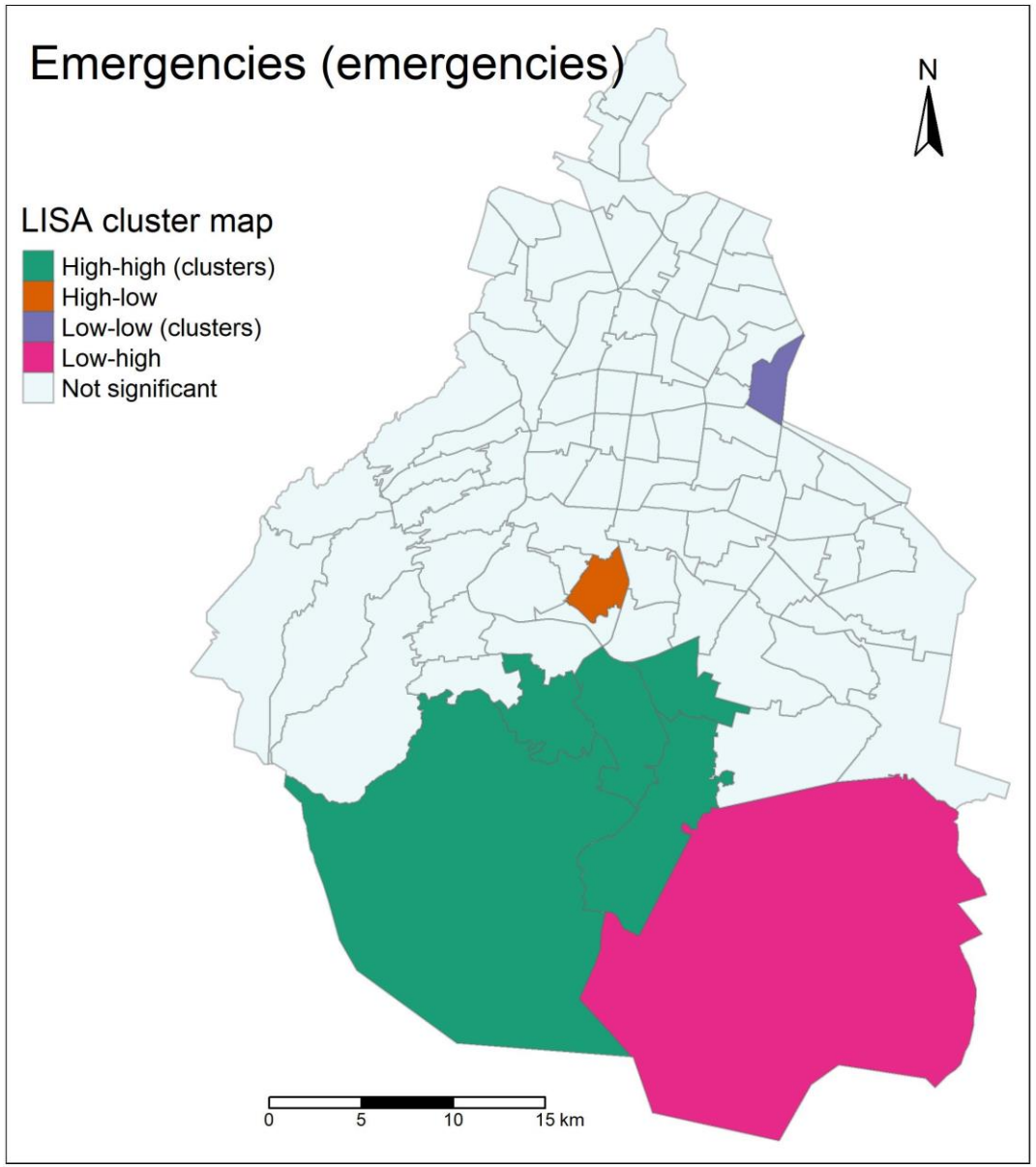
Source: Hosseinzadeh et al., (2021)
Available at:
https://www.sciencedirect.com/science/article/pii/S2666692321000697?casa_token=deOhNgyxA38AAAAA:8glP6HsuZ-NVOZrKHEEADVdnZljLPJNT_8XYkmh5oeQF66Zlwg5ZxpeZOMdGIy8Qcv9Vb9V9e6Q#f0010

"A) Standardized level of service access in combination with the Local Indicator of Spatial Autocorrelation (significance p-value < 0.05). Yellow areas indicate high accessibility to a wide variety of services and being surrounded by other similar areas. These better approximate 20-minute neighbourhoods. Dark blue areas have low accessibility and are surrounded by areas with low accessibility. B) Count of the distinct services types that are accessible in 10 min walk."



Source: Calafiore, Dunning, and Singleton (2022)
Available at: https://www.sciencedirect.com/science/article/abs/pii/S1361920921004077


Crime (robbery while walking)
N
LISA cluster map
High-high (clusters)
High-low
Low-low (clusters)
Low-high
Not significant
0
5
10
15 km


Emergencies (emergencies)
N
LISA cluster map
High-high (clusters)
High-low
Low-low (clusters)
Low-high
Not significant
0
5
10
15 km

Thank you

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