Spatial databases were created by PostgreSQL with PostGIS extension to collect neighborhood data of North Carolina. Spatial data such as GeoJson, ESRI shapefile, geodatabase (gdb), or flat CSV file from multiple years were directly stored in the databases

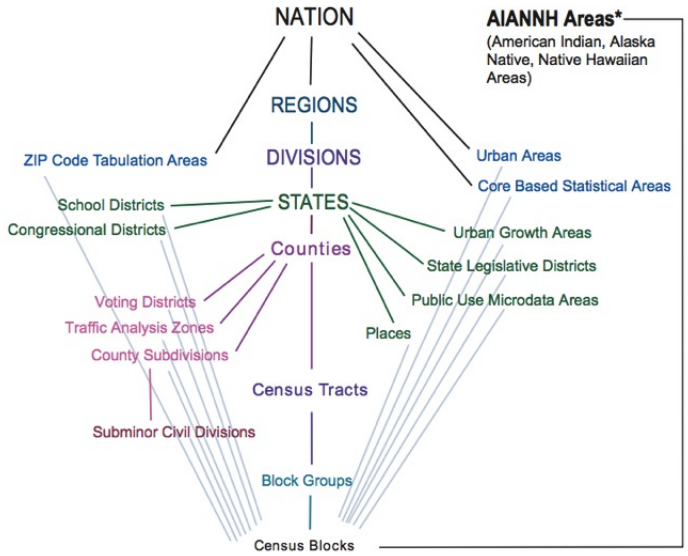

Figure 1: Visualization of Geographic Aggregation Level

Almost all data are at the county, census tract, or block group level.

Description of the Spatial Databases:

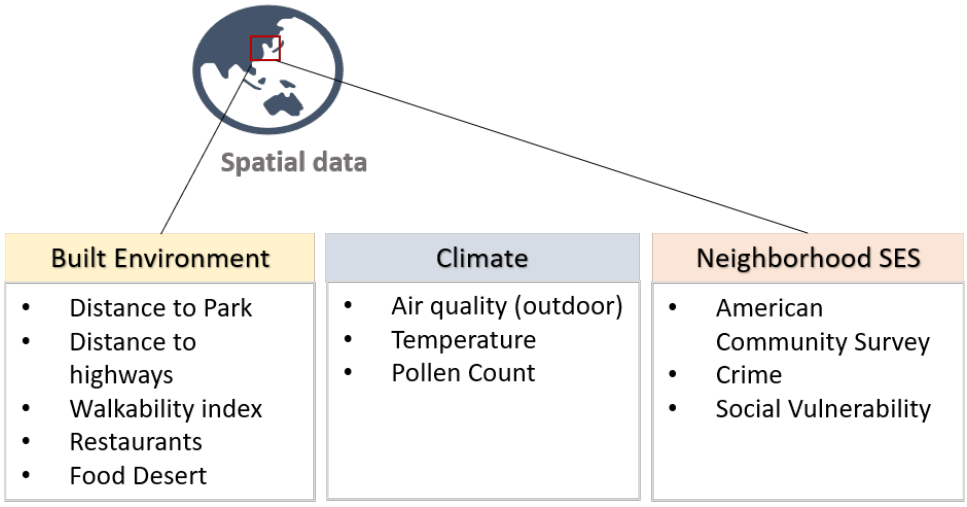

Figure 2: Schema of the Database

Detailed meta-information of the tables were summarized as Table 1.

Use Neighborhood Measures:

- Walkability index: The Walkability Index dataset characterizes every Census 2010 block group in the U.S. based on its relative walkability. Walkability depends upon characteristics of the built environment that influence the likelihood of walking being used as a mode of travel (Fig 3).

- Food Deserts: To qualify as a low-access community, at least 500 people and/or at least 33 percent of the census tract's population must reside more than one mile from a supermarket or large grocery store (for rural census tracts, the distance is more than 10 miles). We could also use percent of no car or grocery store within a mile to indicate the level of difficulty of food access (Fig 4).

- neighborhood SES measures: income, percentage of adult residents with less than a high school education, Asset-based wealth index, neighborhood deprivation index, unemployment rate, percentage of persons below poverty, expenditures-Based Poverty Score

- Air quality index: EPA calculates the AQI for five major air pollutants regulated by the Clean Air Act: ground-level ozone, particle pollution (also known as particulate matter), carbon monoxide, sulfur dioxide, and nitrogen dioxide. Each category corresponds to a different level of health concern.

New Features:

- allows for spatial query: Getting latitude and longitude Centroid, nearest neighbor analysis, distance query, getting a list of objects that are within X distance from another object using built-in functions (e.g ST.Distance)

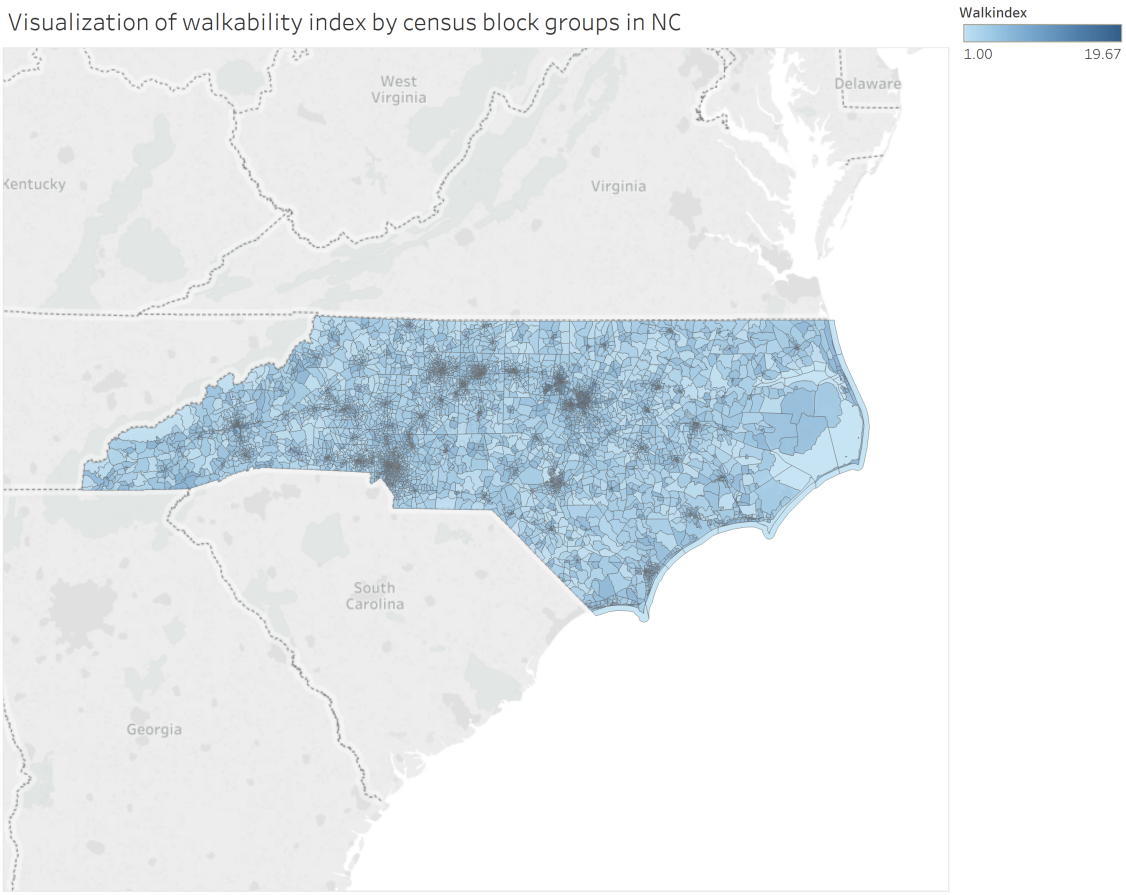

Figure 3: Walkability Index by census block groups

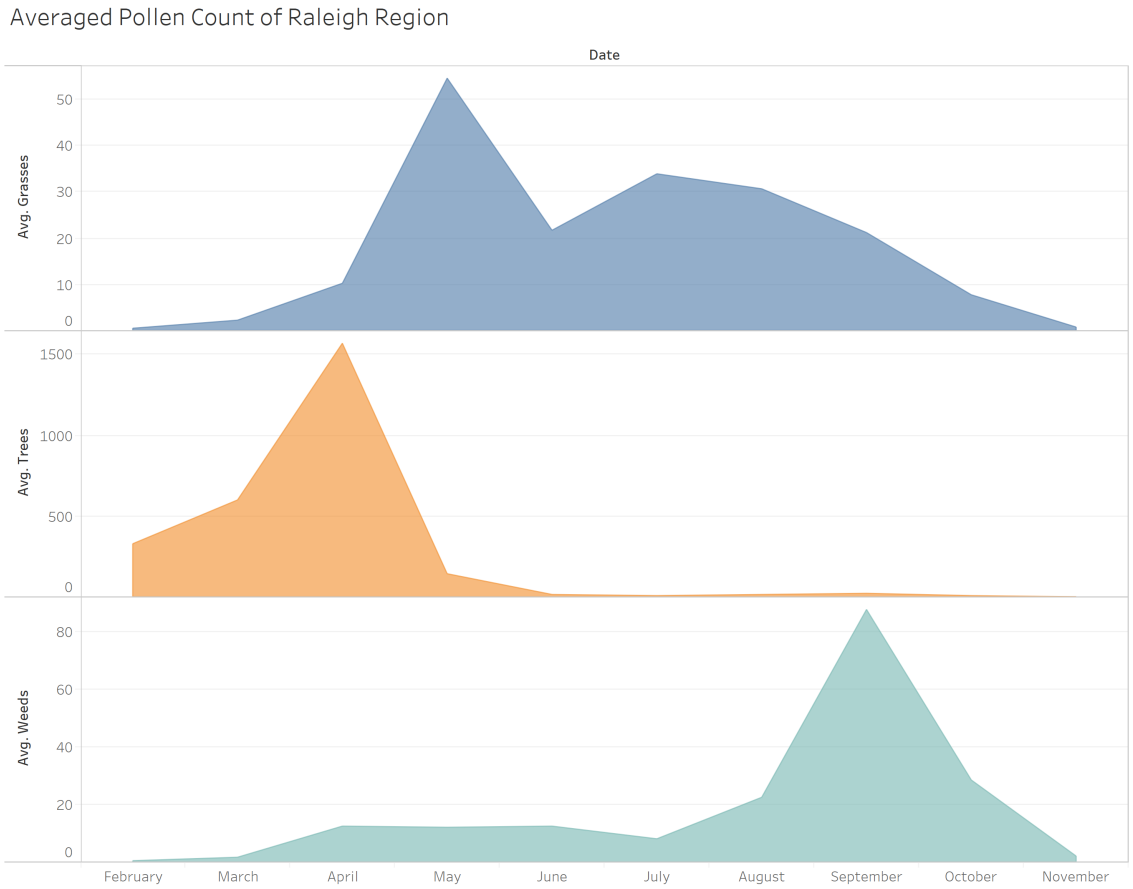

Figure 4: Monthly pollen count in Raleigh region

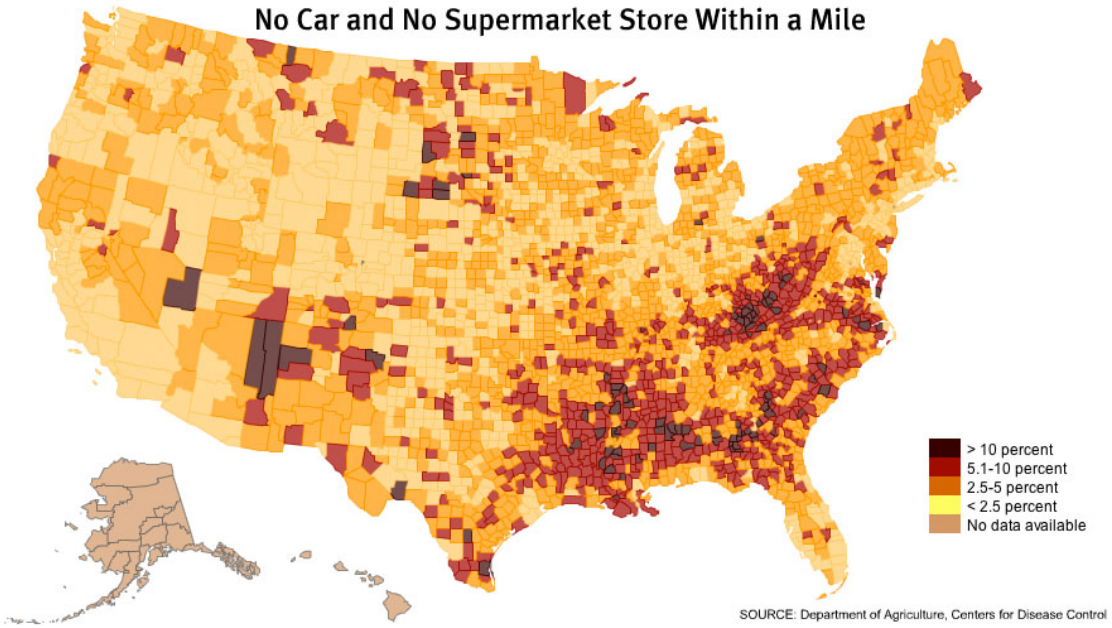

Figure 5: Food deserts

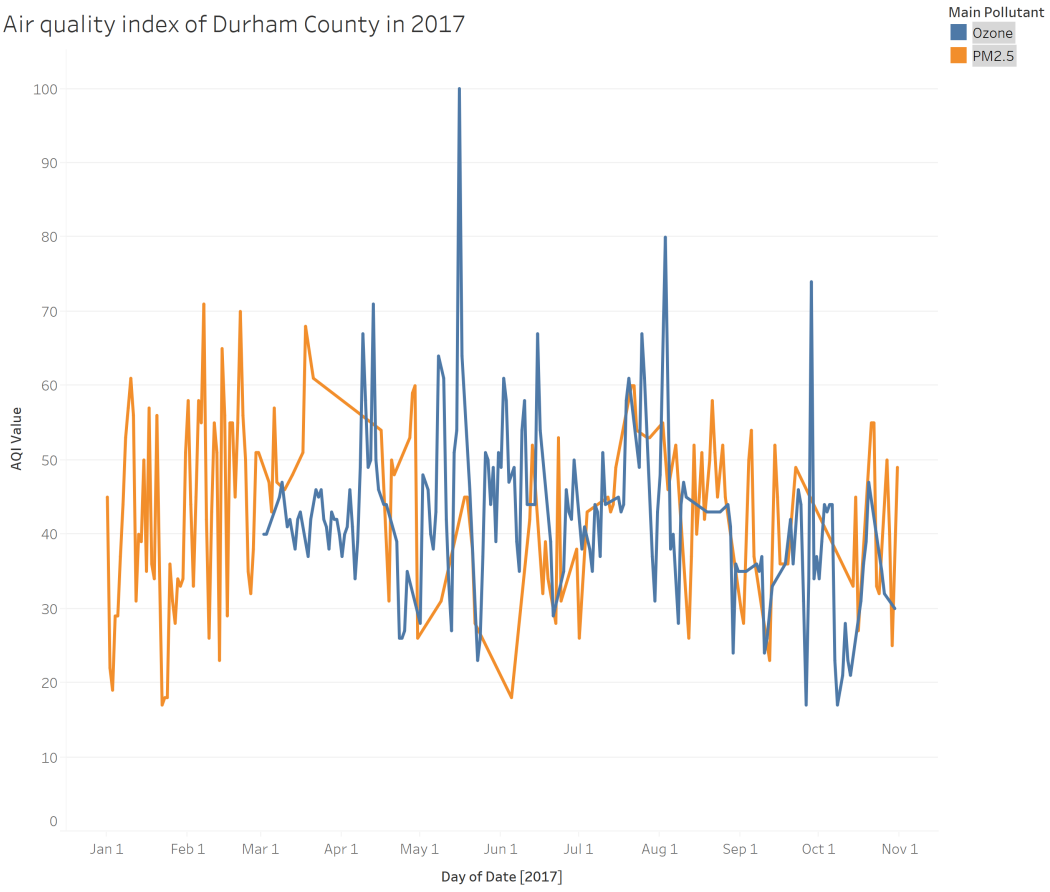

Figure 6: AQI of Ozone and PM2.5