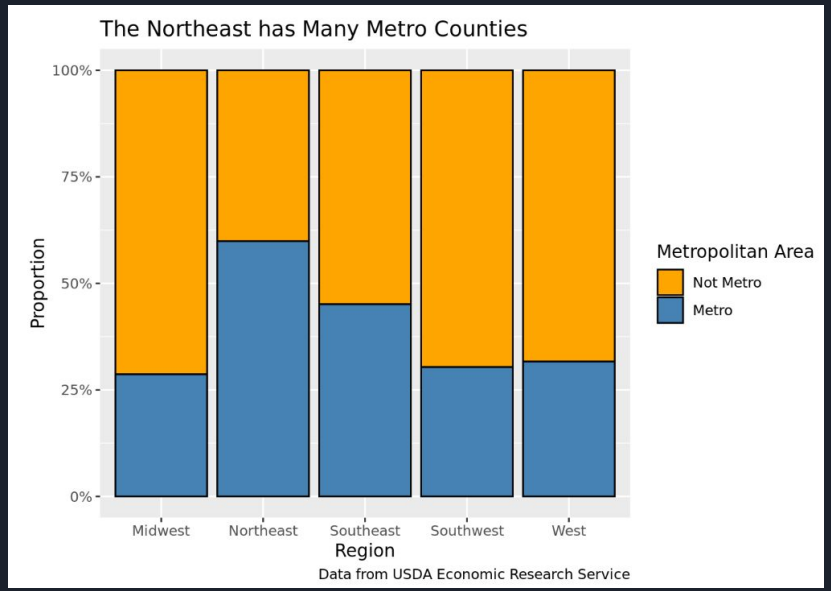
Data Set

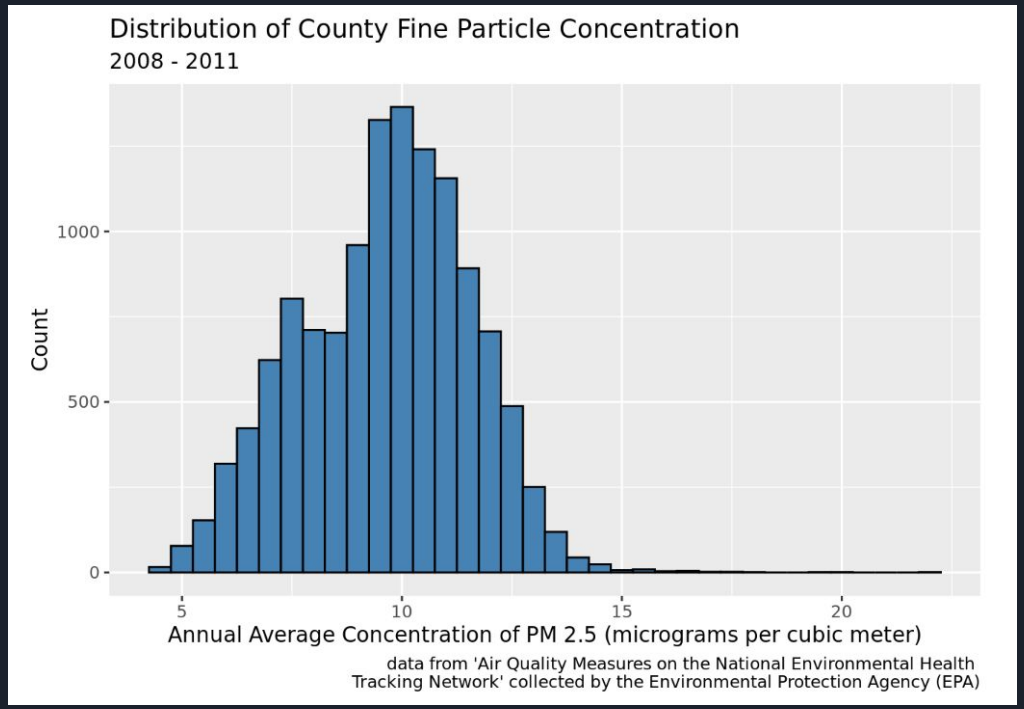
Air Quality Measures on the National Environmental Health Tracking Network:

- Published by Environmental Health Tracking Network
- Data from monitoring stations (Air Quality Systems) across the United States
- Each observation relates to an air pollution reading by an Air Quality System in a certain location

Image of Air Quality System
Source: https://www.airmonitorsystem.com/environmental-monitoring-instrument/air-quality-monitor-station/aqm-09-ambient-air-quality-monitor-system.html

Exploratory Data Analysis





Research Question and Hypothesis

How do air pollution levels differ between states from the West, Southwest, Midwest, Southeast, and Northeast of the mainland United States from the years 2008-2011?

Hypothesis: Since the Northeast has the largest proportion of metropolitan counties and the greatest median population, they would have the most air pollution.

Hypothesis Test

$$H_o : \mu_{ne} - \mu_{other} = 0$$

$$H_a : \mu_{ne} - \mu_{other} > 0$$

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# A tibble: 2 × 2
  is_northeast median_concen
  <chr>                <dbl>
1 Northeast             9.31
2 Other                 9.82
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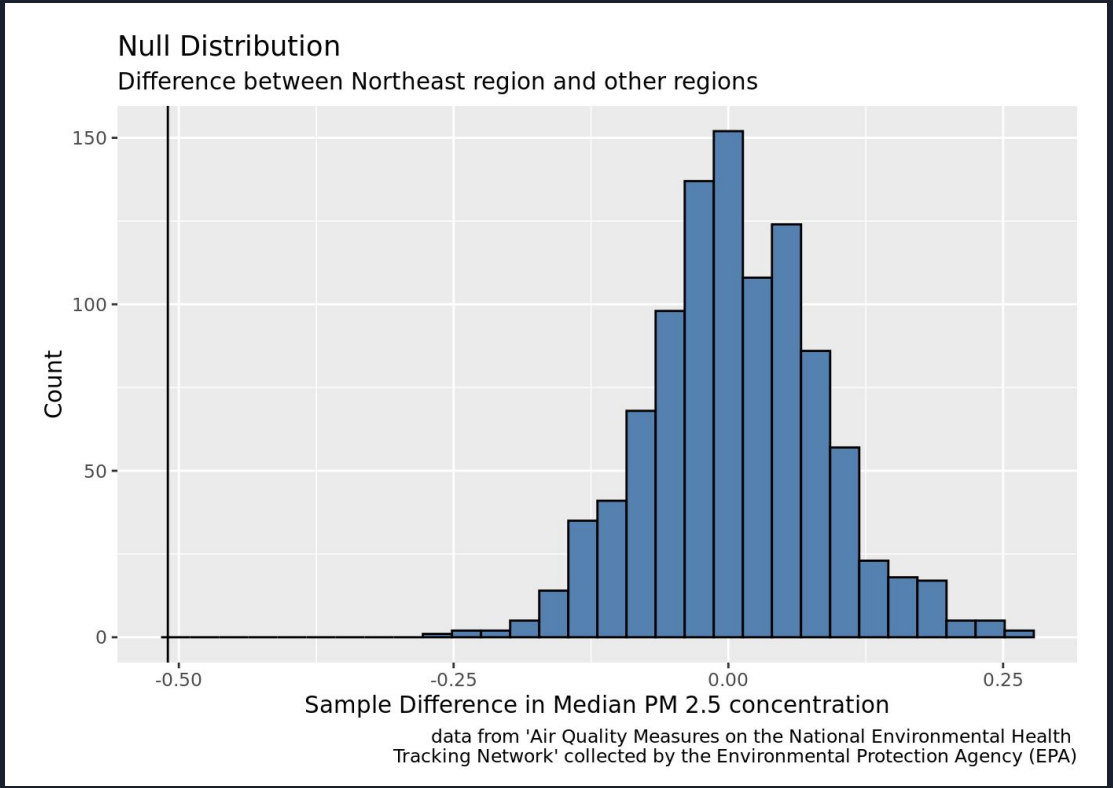

Results

Northeast has a lower true median annual PM 2.5 concentration than other regions in the United States.

Annual average concentration of fine particle concentration is related to population size and whether a county is a metropolitan county.

Although we expected the Northeast to have the worst air quality, it turns out to have a lower typical fine particle concentration than other regions.

Limitations

- Data time span
  - Only data between 2008-2011. Therefore its difficult to determine trends over time and determine cause
- Regional results cannot be generalized over the entire land mass
  - Some parts (likely urban parts) are much more likely to have high air pollution than rural parts
- Measurement
  - Typical fine particle concentration was used to measure air quality. Other measurements exist such as AQI pollutant measurement, atomic absorption spectrometry, etc.