COLUMBIA UNIVERSITY | MAILMAN SCHOOL of PUBLIC HEALTH

HAQAST

NASA

Climate and Health Program at the Mailman School of Public Health

COLUMBIA UNIVERSITY | MAILMAN SCHOOL of PUBLIC HEALTH
ENVIRONMENTAL HEALTH SCIENCES

# SHORT-TERM $PM_{2.5}$ AND CARDIOVASCULAR ADMISSIONS IN NY STATE: ASSESSING SENSITIVITY OF EXPOSURE MODEL CHOICE


**MIKE HE**

zh2263@cumc.columbia.edu


**HAQAST5**

**JANUARY 4, 2018**

# Introduction

- Air pollution and health – widely studied, effect well-documented
- Historically, time-series studies used monitoring data (e.g. AQS)
- Recently, increasing use of prediction models to reduce exposure measurement error and include populations in areas without monitors

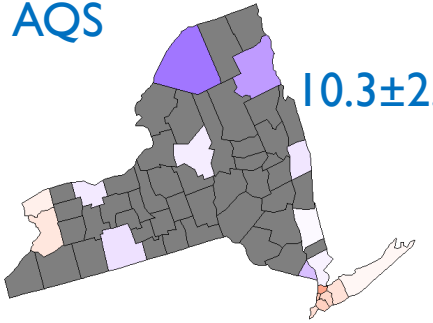
- Multi-pollutant air pollution analysis over NY State, 2002-2012
- Today: $PM_{2.5}$ and cardiovascular admissions
  - Five exposure datasets
  - **<u>Goal:</u> assess sensitivity of health effect estimates on the choice of different prediction models for exposure assessment**

# Methods

- Exposure assessment
  - Five daily county-average $PM_{2.5}$ datasets: AQS, CMAQ, AQS + CMAQ Fused, CDC WONDER, Emory model
  - Meteorological data from NASA
- Outcome assessment: daily inpatient cardiovascular admissions from NYS DOH
  - On average, 7 admissions per day
- Statistical analysis: Poisson regression models
  - Indicator variables for counties and day of week
  - Temperature (3 *df*), relative humidity (3 *df*), and long-term and seasonal trends (4 *df* per year)

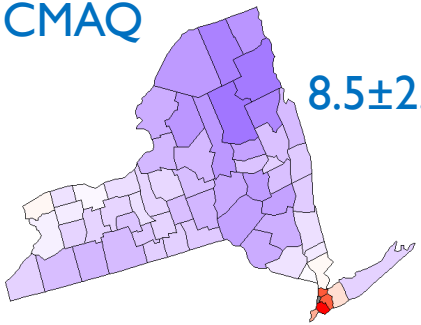
# Results


## AQS



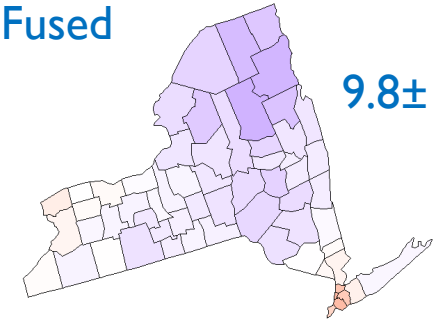
10.3±2.5 µg/m³

## CMAQ



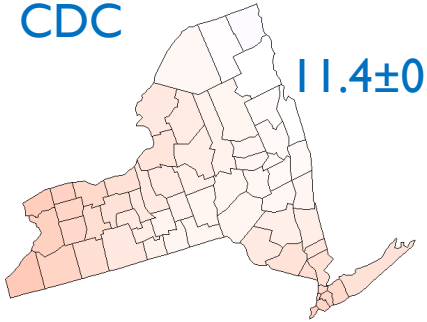
8.5±2.9 µg/m³

## Fused



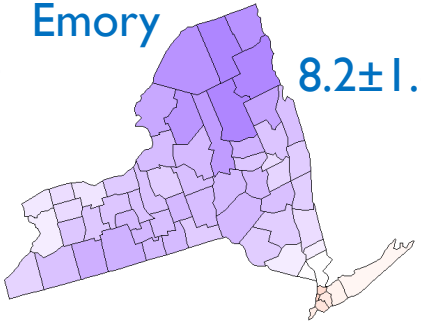
9.8±1.4 µg/m³

## CDC



11.4±0.7 µg/m³

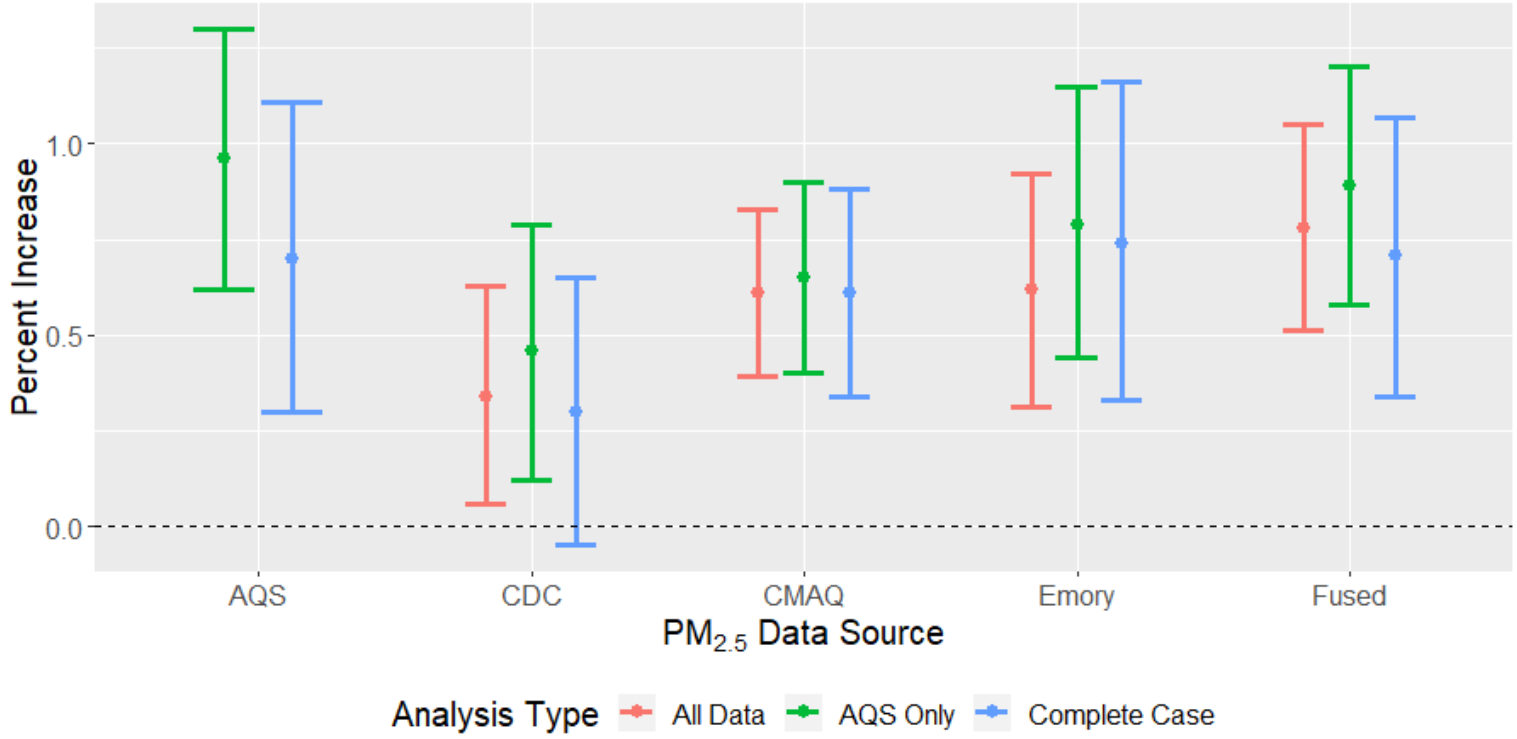
## Emory



8.2±1.6 µg/m³

| | AQS | CMAQ | Fused | CDC | Emory |
|---|---|---|---|---|---|
| AQS | 1.00 | | | | |
| CMAQ | 0.64 | 1.00 | | | |
| Fused | 0.89 | 0.75 | 1.00 | | |
| CDC | 0.68 | 0.48 | 0.73 | 1.00 | |
| Emory | 0.90 | 0.64 | 0.91 | 0.71 | 1.00 |

# Results


Percent Increase
1.0
0.5
0.0
AQS
CDC
CMAQ
Emory
Fused
PM2.5 Data Source
Analysis Type
All Data
AQS Only
Complete Case

# Conclusions

- Significant, positive associations between $PM_{2.5}$ and cardiovascular admissions for all (but one) model
- Some fluctuation in effect estimates depending on analysis type
  - Differences could be due to measurement error
  - However, conclusion remains the same!
- Results are preliminary; next steps:
  - Sensitivity analyses
  - Missingness patterns
  - Other air pollutants/outcomes
  - Different time-metrics

# Acknowledgments

**Collaborators:**

MARIANTHI-ANNA KIOUMOURTZOGLOU[1]
PATRICK KINNEY[2]
ARLENE FIORE[1]
XIAOMENG JIN[1]
VIVIAN DO[1]
SILIANG LIU[1]
TABASSUM INSAF[3]
ADRIAN MICHALSKI[3]

[1]Columbia University
[2]Boston University
[3]NYS Dept. of Health

**Funding:**

NIEHS Individual Fellowship F31 ES029372
NIH Institutional Research T32 ES023770
NIEHS Center Core P30 ES009089
NASA HAQAST Grant (#NNX16AQ20G)
NASA HAQAST5 Travel Award
NYSERDA Grant (#91268)

# Thank You!