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

FINE PARTICULATE MATTER AND RESPIRATORY ADMISSIONS: AN ASSESSMENT OF SHORT-TERM EXPOSURE MODEL CHOICE SENSITIVITY FOR HEALTH STUDIES

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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
- To date, most health studies uses predictions from a single model to assign exposures

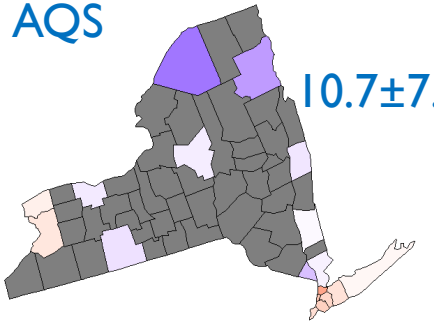
- Multi-pollutant air pollution analysis over NY State, 2002-2012
- Today: $PM_{2.5}$ and respiratory admissions
  - Five exposure datasets
  - **<u>Goal:</u> assess sensitivity of health effect estimates on the choice of different prediction models for exposure assessment**

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 respiratory admissions from NYS DOH
  - On average, 2 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 (5 *df* per year)

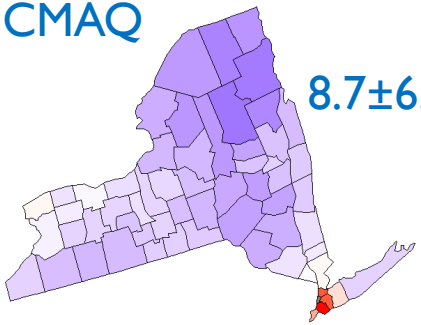
Results

AQS



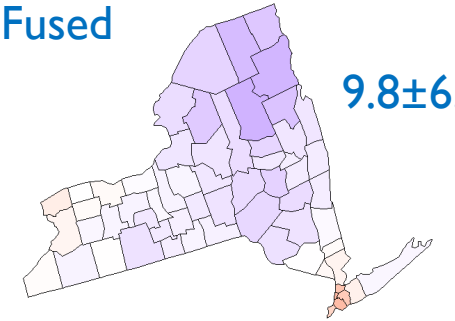
10.7±7.0 µg/m³

CMAQ



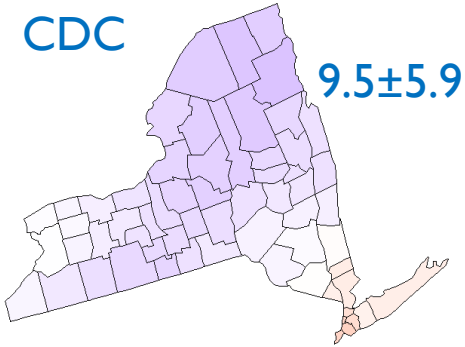
8.7±6.7 µg/m³

Fused



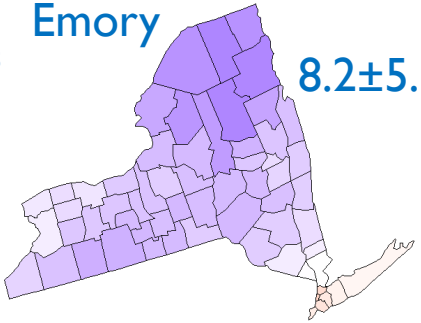
9.8±6.0 µg/m³

CDC



9.5±5.9 µg/m³

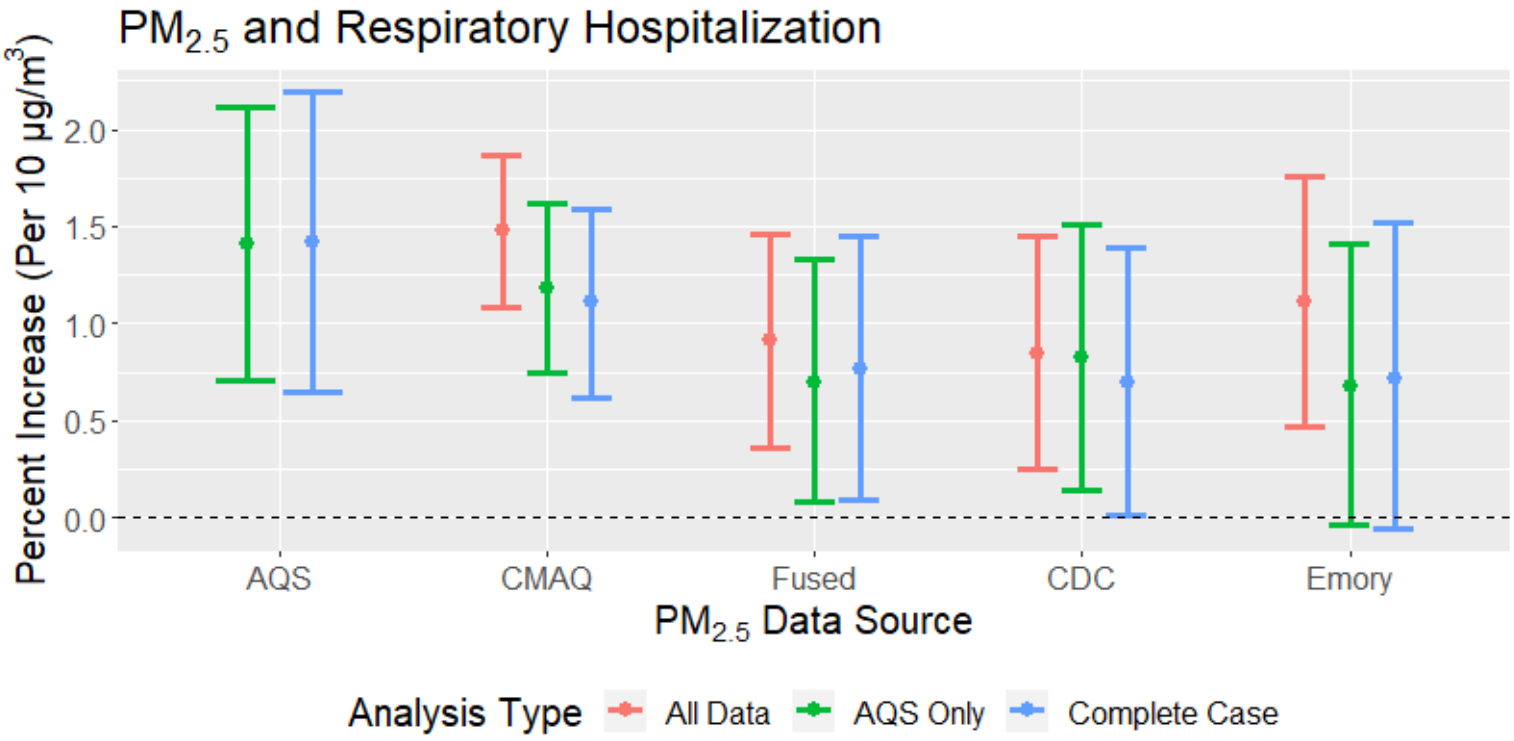
Emory



8.2±5.7 µg/m³

	AQS	CMAQ	Fused	CDC	Emory
AQS	1.00				
CMAQ	0.52	1.00			
Fused	0.89	0.61	1.00		
CDC	0.83	0.49	0.86	1.00	
Emory	0.90	0.52	0.92	0.85	1.00

Results


PM2.5 and Respiratory Hospitalization
Percent Increase (Per 10 µg/m3)
2.0
1.5
1.0
0.5
0.0
AQS
CMAQ
Fused
CDC
Emory
PM2.5 Data Source
Analysis Type
All Data
AQS Only
Complete Case

Conclusions

- Consistent positive associations between $PM_{2.5}$ and respiratory admissions for all models
  - Higher effect estimates than that of CVD, but wider CIs
- Some fluctuation in effect estimates depending on analysis type
  - Differences could be due to measurement error
  - Predictive accuracy of models varies in space and time in different ways
  - However, conclusion remains the same!

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Thank You!