

# Impact of Improved Air Quality During the 1996 Atlanta Olympic Games on Cardiovascular and Respiratory Outcomes



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## Study Motivation

- Increasing interest in evaluating health impacts of actions taken to reduce air pollution levels
- Efforts to reduce traffic during the 1996 Summer Olympics in Atlanta
  - Reduced traffic
  - Reduced levels of air pollutants



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## Study Motivation

- Previously published study reported decreases in pediatric Medicaid asthma ED and hospitalization claims during the Olympic time period compared to 4 weeks before and after (Friedman et al., JAMA 2001) (RR=0.48; 95% CI 0.44, 0.86)
  - Smaller reductions in pediatric asthma ED visits (RR=0.93; 95% 0.71, 1.22)
  - Reductions attributed to reduced traffic
  - Questions about confounding by time trends and behavioral changes during the Olympics

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## Objective

- Assess impact of reduced air pollution levels during the 1996 Olympics on multiple cardiovascular and respiratory outcomes
  - ED visits (pediatric and other age groups)
  - Various control for time trends



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## Methods – Emergency Department Visits

- Billing records from all Atlanta EDs
- Atlanta residents only
- Multiple cardiovascular and respiratory case groups defined based on primary ICD-9 codes
  - Pediatric and all ages
  - 1993 – 2004: 41 hospitals, 20 counties
  - 1996: 12 hospitals, 5 counties



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## Methods – Air Quality Data

- EPA AQS networks, 1993 - 2004
  - Ozone: 2 sites
  - PM<sub>10</sub>: 1 site
  - CO: 2 sites
  - NO<sub>2</sub>: 2 sites
  - SO<sub>2</sub>: 2 sites
- Hourly traffic counts, 18 sites
- Meteorologic data

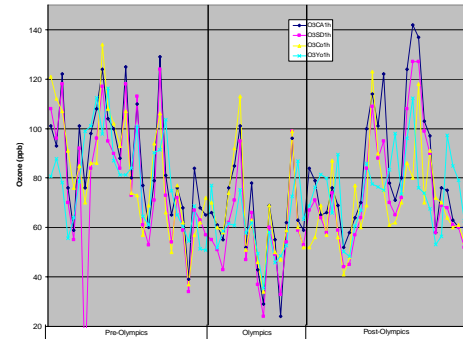
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## Methods

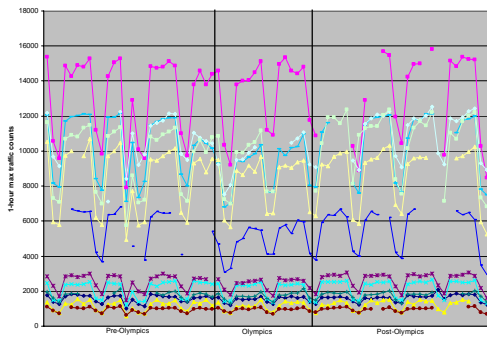
- Poisson time-series models, 1995-2004 summers
  - Adjusted for day of week, holidays, temp, dewpoint, day of summer, indicator for 1996 vs. other years, interaction term for 1996 x exposure
  - Offset = log (total non-accidental ED visits)
  - Exposure = Olympic time period (yes/no) in 1996
  - 12 hospitals (all ages)
  - 2 pediatric hospitals (pediatric visits)

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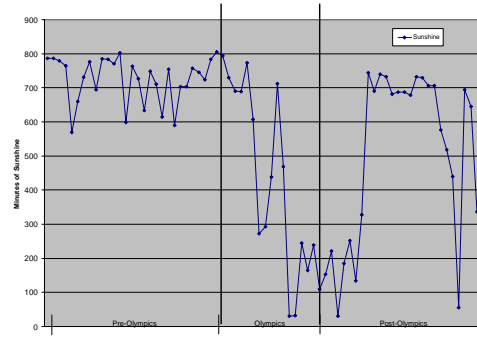
## Results – Ozone (1-hour max)



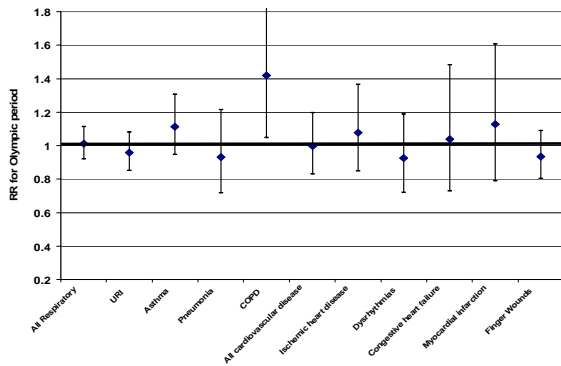
## Results – Traffic Counts



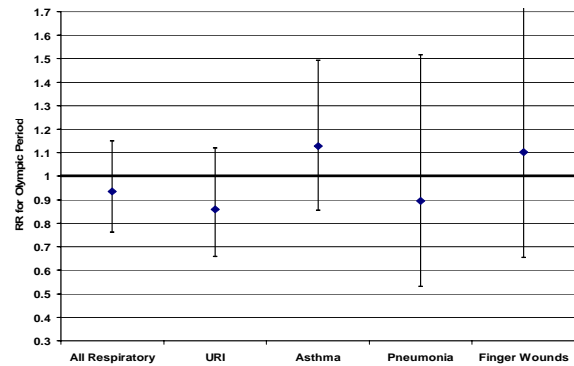
## Results - Sunshine



## ED Visits (all ages)



## Pediatric ED Visits



## Additional Results

- Observed similar reductions in ozone throughout Southeastern US
- Proportions of age groups, gender, payment, racial groups similar during the Olympics
- No difference when restricted to Medicaid visits
- Estimates were sensitive to control for temporal trends and choice of model

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## Summary

- Ozone levels ~30% lower during Olympics compared to 4 weeks before and after
  - PM<sub>10</sub>, NO<sub>2</sub>, CO also slightly lower
- 1-hour max (morning rush hour) traffic counts reduced ~10-15%
- Observed similar reductions in ozone at various sites throughout the Southeast
  - Not impacted by traffic intervention

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## Summary

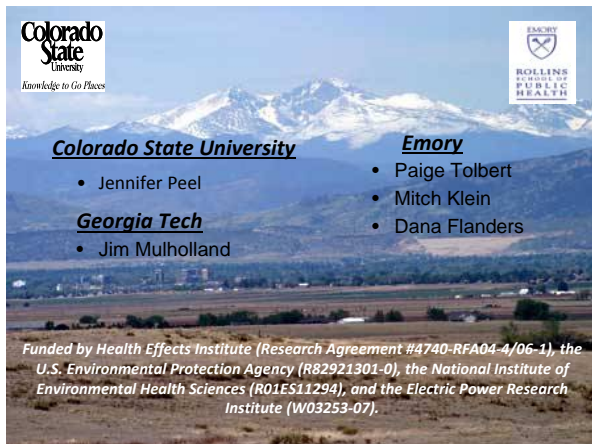
- Both the intervention and prevailing meteorology likely played a role in reduced ozone
  - Regional evidence suggests meteorology
  - Role of traffic unclear
- Observed little or no evidence of reductions in emergency department visits

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## Limitations

- Behavioral changes may have contributed to reductions in ED usage
  - URI
- Entirely retrospective
- Limited time period of intervention (17 days)
- Limited monitoring sites for pollutants, traffic
- Intervention likely not sustainable

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**Colorado State University**  
Knowledge to Go Places

**Emory**

- Jennifer Peel
- Paige Tolbert
- Mitch Klein
- Dana Flanders

**Georgia Tech**

- Jim Mulholland

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