

Using Spatial Analysis to Support Environmental Health Research & Practice

Marie Lynn Miranda, Ph.D.
28 September 2010



- **Focus on children**
- **Focus on issues of environmental justice**
- **Shift to preventive interventions**
- **Emphasis on spatial analytic approaches**




Has the Clean Air Act been equally successful in ensuring the right to healthful air quality in both advantaged and disadvantaged communities in the United States?

- Is the composition of communities with air quality data different from those without data?
- Is there an association between air quality and race, age, or income?



Our Spatial Approach

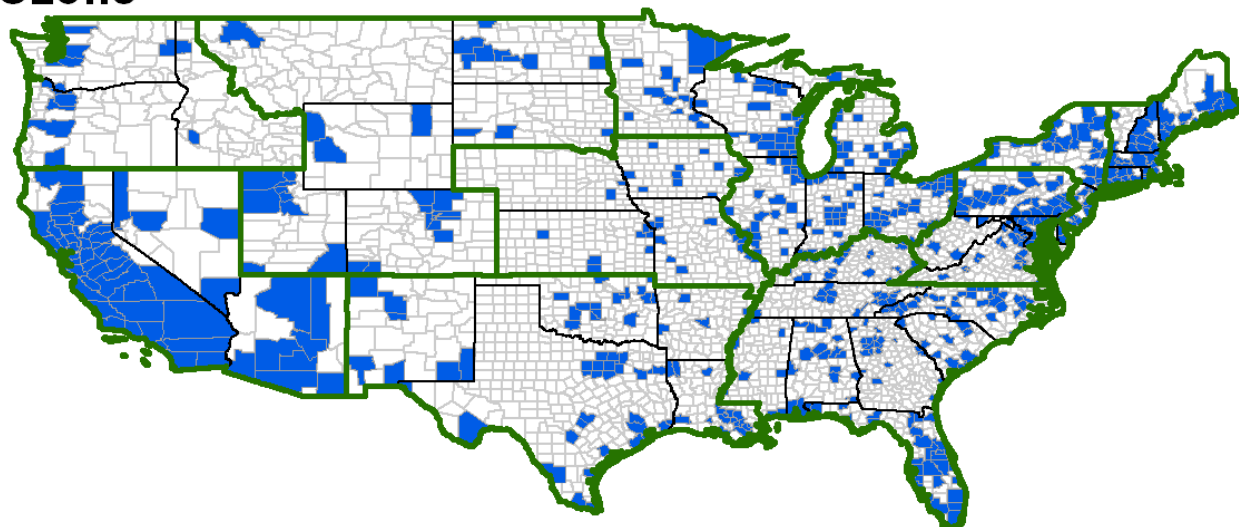
- Use methodology to “grade” air quality developed by American Lung Association (State of the Air 2009)
- Ozone and daily PM_{2.5} levels using AQS monitoring data for 2005-2007
 - Compared demographics of monitored versus unmonitored counties 
 - Compared demographics of the 20% of counties with best and worst air quality for each pollutant
 - Compared demographics of block groups captured by 5km buffer around the 20% of monitors with the best and worst air quality for ozone and daily PM_{2.5}

Location of Monitors – Daily PM_{2.5}

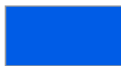





Monitored vs Unmonitored Counties

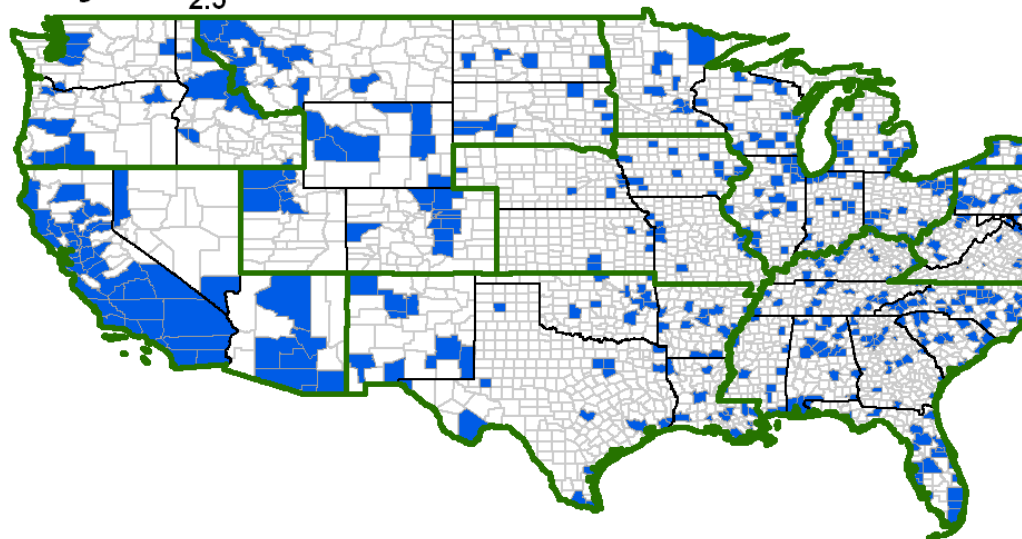
Ozone



Legend

-  Graded counties
-  Non-graded counties
-  EPA region boundaries
-  State boundaries

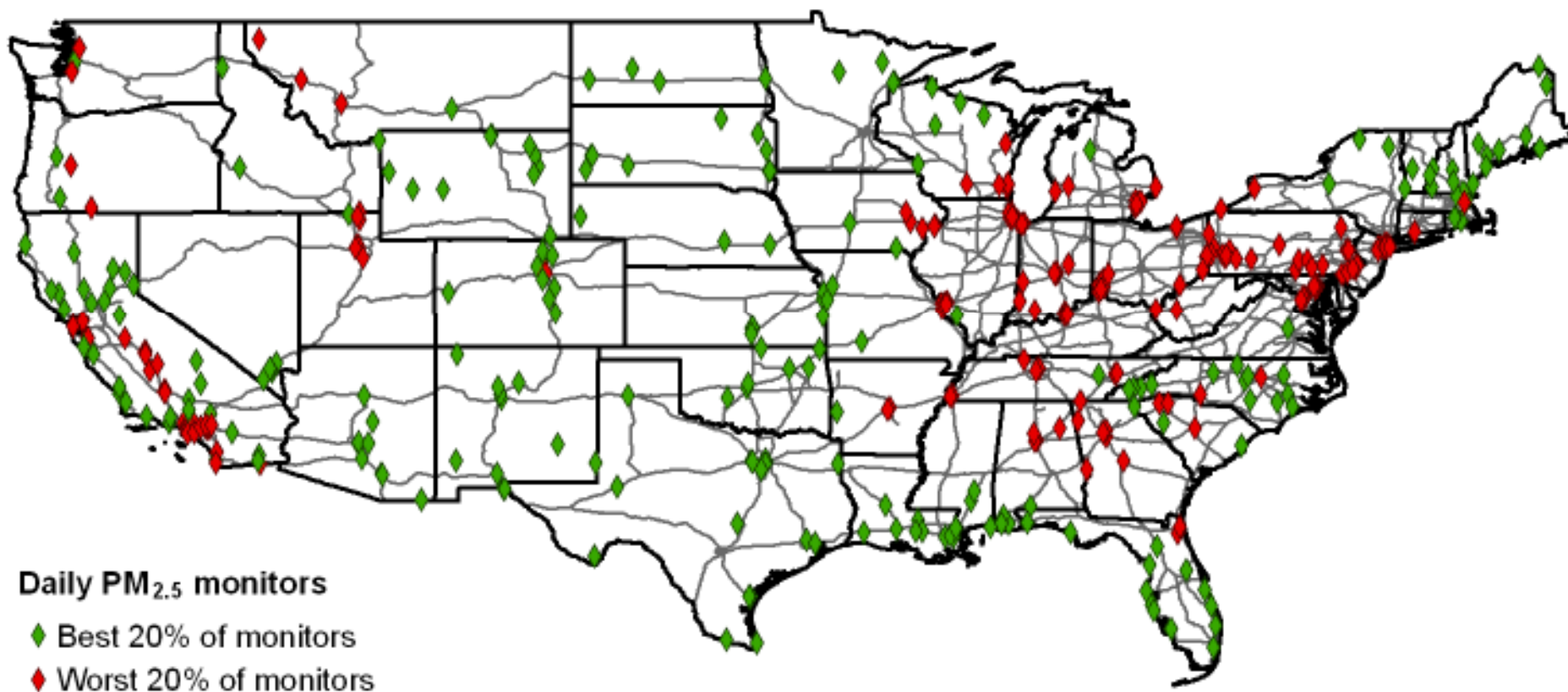
Daily PM_{2.5}



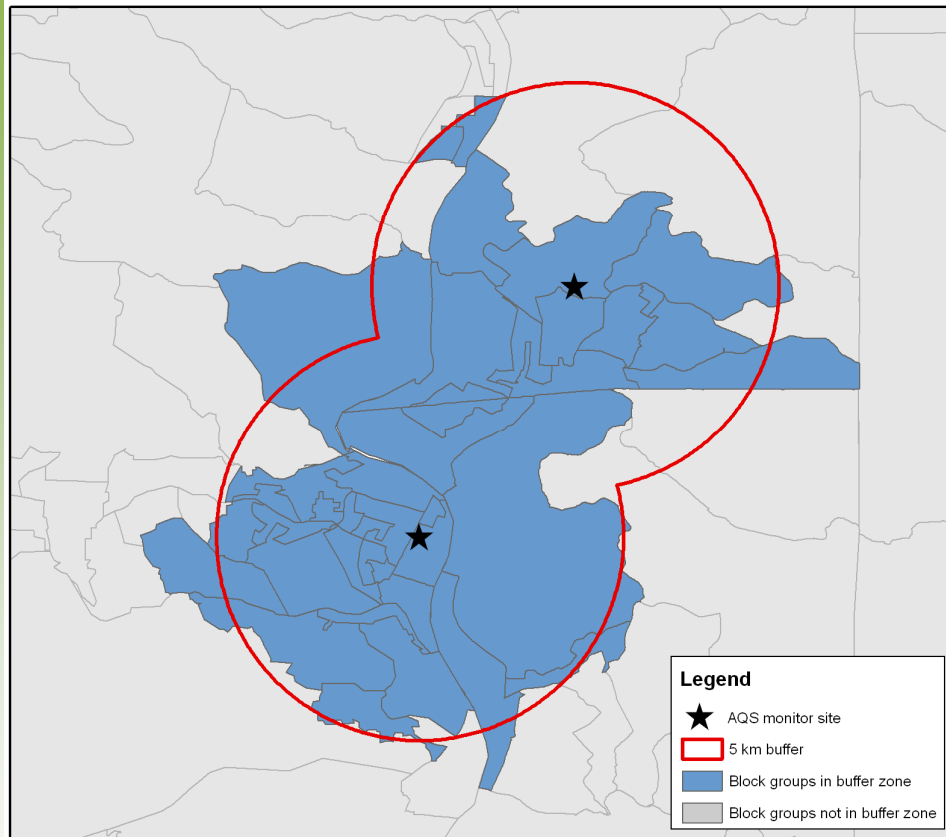
Monitored counties

- higher % NHB
- higher % H
- higher % <5 yo
- lower % \geq 65 years
- same % in poverty

Cleanest/Dirtiest Monitor Analysis



Cleanest/Dirtiest Monitor Analysis



- NHB and H much more likely to live in counties with worst air quality
 - NHB more likely to live near monitors with the worst daily $PM_{2.5}$ and ozone
 - H more likely to live near monitors with the worst daily $PM_{2.5}$, but less likely to live near monitors with the worst ozone
-
- Areas proximate to the worst daily $PM_{2.5}$ and ozone monitors are characterized by lower rates of poverty



Environmental Justice Findings

- **NHB and H more likely to have access to monitoring data**
- **NHB in the United States suffer worse air quality across multiple metrics, geographic scales, and multiple pollutants**
- **H suffer worse air quality with respect to particulate matter, but not necessarily so for ozone**
- **Geographic scale matters in EJ analyses**
- **Environmental justice concerns more prominent along race/ethnicity lines, rather than measures of poverty**



Acknowledgements

- **U.S. Environmental Protection Agency**
- **National Institute for Environmental Health Sciences**
- **Office of Research Support, Duke University**

<http://www.nicholas.duke.edu/cehi/>

Acknowledgements

