

The Air Pollution Health Community: Who, What and Why?

Patrick Kinney

Professor of Environmental Health Sciences,
Mailman School of Public Health, and Earth Institute,
Columbia University
NY,NY

WHO are the main actors in the health sector?

- Researchers
 - Mainly in academia, but also some in government agencies
- EPA: ORD; Office of air quality planning and standards
- State and local departments of health
- Non-profits like American Lung Association
- Industry associations like American Petroleum Institute
- Community groups and NGOs concerned with local issues

WHO are the Researchers?

Toxicologists

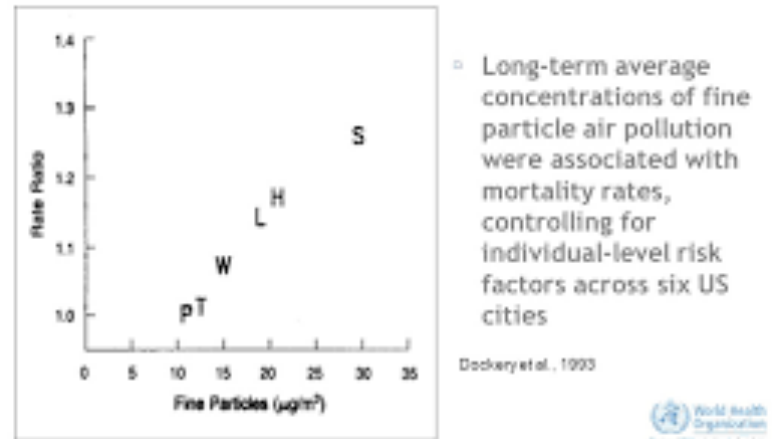


Clinical scientists

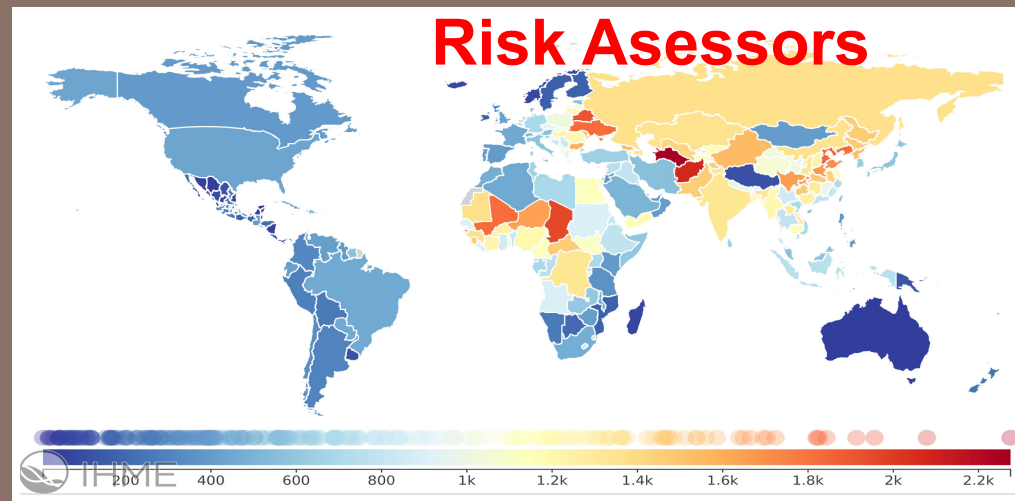


Epidemiologists

Results from Harvard Six Cities Study



Risk Assessors



WHAT models, data, times, scales?

- Epidemiologists mostly use statistical models like regression to fit concentration-response functions
- For exposure, historically we used only ground-based monitoring (e.g., six Cities Study, American Cancer Society cohort)
- Daily or annual averages
- Whole urban scale; sometimes intra-urban

WHAT is the nature of their engagement with air quality science and regulatory communities?

- Historically quite limited
- Engagement with periodic revisions of the National Ambient Air Quality Standards
 - Published studies go into Integ. Sci. Assessment
 - Serve on Clean Air Scientific Advisory Committee
 - Go home and do more research
- In last 10 years, epidemiologists and risk assessors have teamed up with atmospheric scientists to implement new exposure tools
 - Extending spatial coverage for epidemiology
 - Examining what-if scenarios of impacts/benefits

WHAT are the big questions in the air pollution health sector?

- Which PM components are more or less toxic?
- What is the shape of the concentration-response function for PM_{2.5} above 30 $\mu\text{g}/\text{m}^3$?
- What exposures and health effects occur at intra-urban scales, and what can we do to intervene?

WHY is engagement between the health and atmospheric sciences communities important?

- Modeling future impacts/benefits under emission change scenarios
- Developing improved exposure data for input to epidemiology studies
- Source-apportionment of health-relevant concentrations
- Component-specific PM exposures and health effects
- Pushing exposure assessment to finer spatial scales: down to 1 km² or better

Long-Term Ozone Exposure and Mortality in a Large Prospective Study

Michelle C. Turner^{1,2,3,4}, Michael Jerrett⁵, C. Arden Pope III⁶, Daniel Krewski^{1,7}, Susan M. Gapstur⁸, W. Ryan Diver⁸, Bernardo S. Beckerman⁵, Julian D. Marshall⁹, Jason Su⁵, Daniel L. Crouse¹⁰, and Richard T. Burnett¹¹

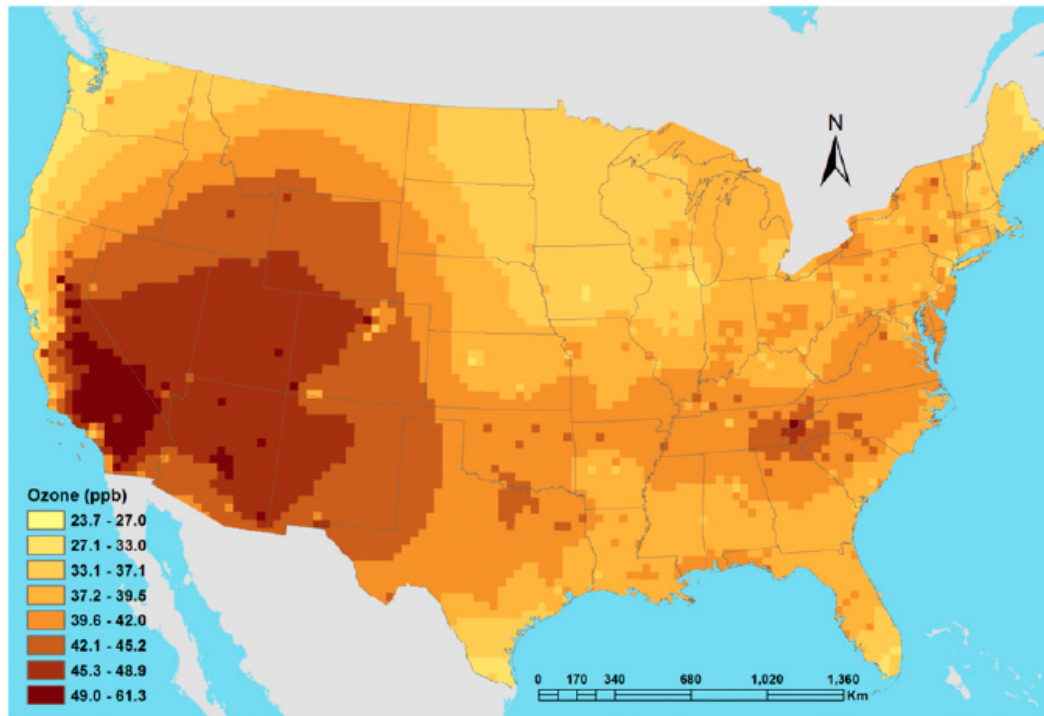


Figure 1. Distribution of mean annual daily 8-hour maximum tropospheric ozone concentrations based on a hierarchical Bayesian space-time modeling system, United States, 2002–2004.

What This Study Adds to the Field: In this study, we examined the association between chronic ambient O₃ exposure and all-cause and cause-specific mortality in an extended analysis of the Cancer Prevention Study II, using new national-level estimates of ambient O₃, fine particulate matter (particulate matter with an aerodynamic diameter of up to 2.5 μm [PM_{2.5}]), and NO₂ concentrations. Results from this large-scale prospective study suggest that long-term ambient O₃ contributes to risk of respiratory and circulatory mortality. There were also positive mortality associations observed with PM_{2.5} (both near source and regional) and NO₂ in multipollutant models.

Case Study