Did Power Plant and Motor Vehicle Controls Improve Air Quality and Health in Atlanta?

Thursday April 19, 1 pm EDT

Presented by the Health Effects Institute and Armistead (Ted) Russell, Georgia Institute of Technology

1:00 pm   Welcome
            Dan Greenbaum, HEI

1:05 pm   What is Accountability research?
            Annemoon van Erp, HEI

1:20 pm   Feature presentation
            Ted Russell, Georgia Tech

1:45 pm   Question & answer period
About the Health Effects Institute

- Over 35 years providing impartial, high-quality science on health effects of air pollution to inform often controversial decisions
- Initially, and still today, joint core funding from
  - Government (U.S. EPA)
  - Industry (Worldwide Vehicle and Engine Manufacturers)
- Also expanded partnerships with:
  - European Union, WHO, California, other agencies
  - Oil (API, CONCAWE), Chemical, other industries
  - Foundations, Development Banks (Global Work)
- HEI structured to maintain credibility & transparency
  - Balanced government and industry funding
  - Independent Board and Expert Science Committees
    - Board agreed to by EPA Administrator and core industry sponsors
    - Research Committee selects all research competitively
    - Separate Review Committee intensively peer reviews all results
  - All results and data – both positive and negative – reported
- Does not take policy positions

Trusted Science  ●  Cleaner Air  ●  Better Health
• **Targeted Research and Reanalysis**
  - Over 350 Studies on a wide variety of air pollutants: PM, ozone, diesel, air toxics, others
  - Exposure, Toxicology, Epidemiology
  - Accountability Research

• **Rapid Scientific Review**
  - E.g. The Health Effects of Exposure to Traffic

• **Global Health**
  - North America, Europe
  - Developing Asia

• **NEW Energy Research Program**
  - Potential Exposures and effects from unconventional oil and gas development
Accountability Research

- How do we know that environmental policies “work”?

- **Accountability Research**: Evaluating the effectiveness of air quality regulations in improving public health

- Part of a broad effort to assess the performance of environmental regulatory policies
Why assess health impacts of air quality regulations?

• While air quality in North America and Europe has improved substantially, further improvements are becoming more costly

• Ensure that current and future regulations are achieving the intended public health benefits

• Check that projected calculations of benefits have actually happened

• Generate new knowledge
Focusing the challenge on health:
*The Chain of Accountability*

- **Regulatory action**
  - Compliance, effectiveness

- **Emissions**
  - Atmospheric transport, chemical transformation, and deposition

- **Ambient air quality**
  - Human time-activity in relation to indoor and outdoor air quality; Uptake, deposition, clearance, retention

- **Exposure/dose**
  - Susceptibility factors; mechanisms of damage and repair, health outcomes

- **Human health**

**IMPROVED ACTIONS**
HEI’s Accountability Program

• Concepts and methods (HEI Communication 11, 2003)

• Nine first-wave studies
  o A majority were shorter-term studies of local interventions (e.g. at the city level)

• Interim program evaluation (HEI Communication 14, 2009)

• Four second-wave studies
  o Focus on longer-term, national / regional scale regulations
First-wave studies

Traffic measures
Frank Kelly: Congestion charging scheme in London
Frank Kelly: London low emission zone baseline study
Jennifer Peel: Traffic measures during the 1996 Olympic Games in Atlanta

Fuel changes
Curtis Noonan: Wood stove change-out program in Montana
Chit-Ming Wong: Reducing sulfur in fuel in Hong Kong
Doug Dockery: Coal bans in Irish cities

Multiple sources
Dick Morgenstern: Air quality improvement under Title IV of the 1990 Clean Air Act Amendments
Annette Peters: Air quality improvement after German reunification
Jim Zhang: Air quality improvements during the 2008 Olympic Games in Beijing
HEI’s interim evaluation: What have we learned?

- Importance of exposure contrast: establish size of AQ improvement before starting a health study
- Sensitivity analyses: select appropriate time windows, geographic areas for comparison
- Studies of short-term actions: useful, achievable, though with some challenges, generalizability a consideration
- Evaluation of regulations implemented over long term remains most challenging
Considerations for HEI’s Second Wave Accountability Request for Applications

• Conceptual groundwork laid in HEI Monograph remains valid

• Importance of **exposure contrast**
  – Establish the size of AQ improvement before starting a health study: adopt a staged approach

• Research of **shorter-term and small scale** actions under well-defined circumstances: useful, achievable, though with some challenges, generalizability can be an issue
  – Ensure sufficient power
• Research of **long-term, national scale** actions is needed but remains most challenging
  – Need for high quality data collected continuously (health & AQ monitoring)
  – Develop platforms for key research data

• **Overarching issues**
  – Studies encompassing the entire “accountability chain” remain very difficult
  – Need for further development of tool kits and statistical methods including analysis for trends, sensitivity, confounding and causality
  – Need for collaboration among health and atmospheric scientists and regulatory agencies
  – Integrate outcomes research into policy implementation
Second wave RFA studies

Statistical Methods

Ports
Ying-Ying Meng: Improvements in air quality and health outcomes among California Medicaid Enrollees due to Goods Movement Actions (First phase completed; ongoing – see poster at 2018 HEI Annual Conference)

Multiple sources
(Presentation by Dr. Russell)
What this study adds

• In this study in Atlanta, a suite of air quality regulations was shown to be **effective**:

• Emissions and levels of all evaluated pollutants **decreased by 14% to 91%** over the study period.

• There were **fewer emergency department visits for asthma** and other cardiorespiratory outcomes than would have been expected without the regulations.
What this study adds (2)

• For a variety of reasons, the HEI Review Committee had more confidence in the results that were attributed to all regulations combined than to individual regulatory programs.

• This is one of few accountability studies to follow the effect of individual regulations on emissions all the way through health outcomes, using scenarios with and without regulation.

• The approach is valuable and worth considering for future accountability studies.
Further information

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Questions?
Contact Annemoon van Erp
(avanerp@healtheffects.org)
or Rashid Shaikh
(rshaikh@healtheffects.org)