9. Primary Air Care Component #1: Governance and Policy

Panel: Chris Heaney, Johannes Urpelainen, Peter Winch, Kira Burkhart

Primary Air Care: Setting the agenda

Global action to build sustainable energy systems and reduce emissions of greenhouse gases and hazardous air pollutants

Friday, April 19, 2019 – Olin Hall, Homewood Campus, Johns Hopkins University
Session 9 Objectives

- Describe role for governance and policy in Primary Air Care
- Identify barriers to formulation and implementation of policies to reduce emissions, and possible solutions
- Define research agenda on governance, policy and community engagement
Setting the stage: Component #1 of Primary Air Care

Peter Winch,¹,³ Kira Burkhart²,³

1. Department of International Health, JHSPH
2. MPH student, JHSPH
3. Healthy Environments Theme, Alliance for a Healthier World
Policies, laws and regulation

- For many years, viewed as central to control of air pollution in high-income countries
- Centrality of policy and regulation captured in the “Air Pollution Accountability Chain”
- Feedback from monitoring of emissions, air quality and human health results in ever-improving policies and regulations
Solomon et al. 2012

Fig. 4 The accountability chain (modified from van Erp et al., 4SQ8.1; figure from HEI 2003). Revised figure reprinted with permission from the Health Effects Institute, Boston, MA.
Governance and policy in low and middle-income countries: Where are we?

Most low-income countries, some middle-income countries

- Awareness of air pollution, but burden of disease not appreciated
- No unit responsible for regulation of emissions
- Few policies or regulations
- Multiple, household-level sources: Cookstoves, cottage industries, burning of trash, burning of crop stubble ➔ Unclear if central regulation would have an effect

Most middle-income countries

- Awareness of air pollution, burden of disease increasingly appreciated
- Increasing work on policies and regulations
- Difficulties with enforcement of regulations:
  - Odd-Even rule in Delhi
  - Regulation of industries and mines
Odd/Even Rationing in Delhi

- Vehicles with license plates ending in odd and even numbers allowed to circulate on alternate days
- Alternative modes of transport put in place:
  - Extra buses
  - Bike taxi service
  - More frequent Metro service

Odd/Even Rationing in Delhi

- Minimal to no impact on air pollution
- Nearly 20,000 vehicles fined in 2016 (January and April phases)
- Challenges
  - 28 exemptions. Mostly government officials, but also emergency and enforcement vehicles, CNG and EV vehicles, vehicles driven by women (safety)
  - Loopholes. Individuals purchasing second vehicles.
  - Politics. Lack of government support.

Toward more effective enforcement

- Take lessons from tobacco and road safety
  - e.g. total vs. partial bans (smoke-free zones vs. odd/even driving)

- Key factors for effective enforcement in road safety
  - Dosage (delivered in sufficient quantity)
  - Unpredictable
  - Meaningful sanctions
  - High-risk times and locations
  - Enforceable/Feasible
  - Clear language
  - Responsible party identified
Other possible directions

- Air Quality Management Districts, adapted from the California model
  - Broader range of stakeholders
  - Representation of marginalized communities and people living with pollution-related diseases
- More effective work with policymakers ➔ Johannes Urpelainen
- Community-level monitoring and advocacy for change ➔ Chris Heaney
- Implementation Science: Examining the entire process of formulation and implementation of policies, laws and regulations
Effecting Policy Change: Guidelines for Academics
Initiative for Sustainable Energy Policy (ISEP)

Johannes Urpelainen
Prince Sultan bin Abduladiz Professor and Director
Energy, Resources and Environment
Johns Hopkins School of Advanced International Studies
The Three R’s

• **Relevance**: address an actual policy problem, not one imagined by the researcher

• **Readability**: policymakers do not need complex reports, digest and summarize

• **Relationships**: policymakers respond to recommendations from trusted advisors
Case Study: Energy Access in Rural India

• Representative survey of 8,500 households across six states – first of its kind
• Partnership with Council on Energy, Environment and Water (CEEW)
• Free data, flagship article in Nature Energy
• Outreach: workshops in state capitals – focus on relevant data

ISEP

sais-isep.org
@sais_isep
Building Community Power: Science for Environmental Justice

Chris Heaney
Departments of Environmental Health and Engineering, Epidemiology, International Health
Johns Hopkins Bloomberg School of Public Health
What is science for environmental justice?

Designing rigorous science to complement, support, and elevate popular movements for safe environments and living and working conditions.

This concept is not new!
Copyrighted Photo taken by Jenny Labalme
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What is science for environmental justice?

Designing rigorous science to **complement, support, and elevate** popular movements for safe environments and living and working conditions

**Building partnerships** with communities most affected by air, climate, and energy impacts

**Elevating communities** as valid **drivers of scientific questions** to fill knowledge gaps where they live, work, and play

**Putting scalable tools** into hands of communities – including study designs and measurement tools that can withstand **bias claims** when communities participate in research
Science for environmental justice requires

Knowledge of the structural / institutional drivers of patterns of environmental injustice -- this is starting place for research questions

Training community, faculty, and students in community-driven research principles, advanced exposure assessment, and epidemiologic methods

Equitable funding for small community groups (Heaney et al., 2007)

Parity in management of problems and solutions (Heaney et al., 2007)
Equitable, meaningful, active community participation in all phases of research

- Development of research questions
- Discussing study design
- Delineating roles & responsibilities
- Drafting research proposal
- Distribution of resources
- Refinement of study materials
- Participant recruitment, enrollment, retention
- Data collection, QA/QC, ongoing review
- Data analysis
- Interpretation of results
- Dissemination: Education, advocacy, policy change

Who is principal investigator?
Who is supported?
Does community organization take lead?
Does university take lead?

Iterative process

Heaney et al., 2007: https://www.ncbi.nlm.nih.gov/pubmed/20208213
Research partnership with Baltimore City neighbors of **crude oil by rail transport lines**
Monitoring railway transport patterns and exposures

Slides courtesy of Community course student Rachel Viqueira
Real-time day / night vision trail cameras
Time-series of hazardous materials train traffic patterns proximal to homes

- **21** more trains pass by at night vs. day (95% confidence interval [CI]: 17, 25; p<0.0001)
- **22** more train cars of any type pass by at night vs. day (95% CI: 2, 43; p<0.033)
- **11** more DOT-111 type tanker cars pass by at night vs. day (95% CI: 6, 17; p<0.0001)
- **3** more tanker cars with flammable hazard placards passing by at night vs. day (95% CI: 2, 4; p<0.0001).
Research partnership with South Baltimore’s Curtis Bay Community

Community-driven science to estimate and mitigate the societal costs of industrial activities in Baltimore
Plume Labs **Flow** Personal Air Monitor

- Nephelometer

- Logs data every minute

- Measures:
  - Nitrogen dioxide (NO2)
  - Volatile organic compounds (VOCs)
  - Particulate matter (PM10 and 2.5)

- Artificial Intelligence

- Low cost and direct reading


Slide courtesy of students in Dr. Heaney’s 3rd term *Community-driven epidemiology and environmental justice* class.
Street science: Road sign swabbing
Metal levels (ppb) at increasing distance from CSX Coal Pier in Curtis Bay, Baltimore, USA

Mean Aluminum & Calcium Concentration by Location

- Filbert and Prudence
- Filbert and Fairhaven
- Filbert and Pennington
- Filbert and Curtis
- Elm Tree and Curtis
- Control

- Average of Calcium
- Average of Aluminum

0 1000 2000 3000 4000 5000 6000 ppb (parts per billion)

Slide courtesy of students in Dr. Heaney’s 3rd term Community-driven epidemiology and environmental justice class.
Questions for Discussion

1. How to develop a program of research on governance and policy?
2. Which JHU divisions to involve, and how to build collaborations?
3. Differing strategies for high, middle and low-income countries?