Engaging Community in Environmental Health Research in Eastern Ohio

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Learning Objectives

• Describe at ≥ 1 environmental health issue in Appalachian Ohio.
• Summarize ≥ 1 benefit community engagement can have on research.
• Identify the how community members can participate in the research process.
Appalachian Ohio
Manganese Emissions from Eramet

Data from EPA Toxic Release Inventory: Industry-reported emissions/year
Air Mn and Associated Health Effects

Workers – **Manganism** – Parkinson-like syndrome – problems with movement, hallucinations, mood disturbances, aggression

- **> 5000 µg/m³**
  - Workers
  - Fingertapping, movement control (Wennberg et al. 1991)

- **> 2500 µg/m³**
  - Workers
  - Eye-hand coordination, reaction time, handsteadiness (Roels et al. 1992)

- **215-948 µg/m³**
  - Workers
  - Eye-hand coordination, reaction time, handsteadiness (Roels et al. 1992)

- **50 µg/m³**
  - Adults
  - Neuromotor function postural stability

- **0.23-0.50 mg/m³**
  - **Average Washington County Air 2001-2002 (EPA monitor data)**

- **0.13 mg/m³**
  - Adults
  - Coordinating movements (Agudelo et al. 2006)

- **0.05 mg/m³**
  - US EPA Ref Concentration

- **0.033 mg/m³**
  - Typical urban areas in US (ATSDR 2000)

- **0.005 mg/m³**
  - Typical rural areas in US (ATSDR 2000)
• Storage, transfer, and warehousing facility capable of processing, crushing, screening, and packaging of materials.
  – Ferro Alloys
  – Pig Iron, Silicon Carbide, Silicon Metal, Fluorspar, Magnesite
  – Primary Metals (zinc, aluminum, lead, tin, copper, and nickel)
  – Specialty Alloys
  – Refractory products
  – Scrap Metal
  – Minerals
  – Steel products
  – Fertilizer
Community-based participatory research paradigm

Identification of Primary Research Question

**Research Questions**

- Does Mn affect cognitive development of children?
- Does Mn affect senior health?
- Does Mn affect behavior problems?
- Where is Mn found in the environment?
  - Food & water
  - Milk
  - Meat (lamb, beef)

- Is there a safe level of exposure?
- How does time spent outdoors affect Mn dose?
  - Exercise
- Can we determine long-term Mn exposure?
  - Trees
- How to control for other Mn exposures?
- Spatial variation of soil samples?
- Prenatal Mn exposure affects?
- Breast milk?
- School performance affected?
  - Autism, Down syndrome
Community-wide Survey

- Assess community perception of air quality and manganese
- Inquiry of community’s interest and willingness to participate in research
- Identify community’s preferred and trusted communication routes
- Community’s role:
  - Part of conversation that determined need of the survey
  - Assisted in development of the survey.
  - Identified where and how to distribute surveys.
## Concern about Local Environment, Odor, and Manganese Exposure

<table>
<thead>
<tr>
<th></th>
<th>Very Concerned-Concerned n (%)</th>
<th>Neutral n (%)</th>
<th>Slightly Concerned-Not Concerned n (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Air</td>
<td>209 (91%)</td>
<td>8 (3%)</td>
<td>12 (5%)</td>
</tr>
<tr>
<td>Water</td>
<td>193 (85%)</td>
<td>19 (8%)</td>
<td>15 (7%)</td>
</tr>
<tr>
<td>Soil</td>
<td>168 (74%)</td>
<td>33 (15%)</td>
<td>25 (5%)</td>
</tr>
<tr>
<td>Odor (smell) in air</td>
<td>172 (75%)</td>
<td>30 (13%)</td>
<td>26 (12%)</td>
</tr>
<tr>
<td>Mn exposure</td>
<td>175 (77%)</td>
<td>25 (11%)</td>
<td>27 (12%)</td>
</tr>
</tbody>
</table>

n=227-229
Do you want to know more about your potential exposure to Mn?

- Yes: 87%
- No: 4%
- Don't know: 9%
Level of Trust

- News reporters
- Friends/neighbors
- Local government officials
- State government officials
- Federal government officials
- Chemical industry officials
- Medical doctors
- Research scientists
- Teachers
- Websites
- Environmental groups
- Town meetings
- Church meetings

Funding provided by the National Institute of Environmental Health Sciences (1 R03 HD059615-01)
Amount of Information Received

- News reporters
- Friends/neighbors
- Local government officials
- State government officials
- Federal government officials
- Chemical industry officials
- Medical doctors
- Research scientists
- Teachers
- Websites
- Environmental groups
- Town meetings
- Church meetings

- No Information
- A lot of information

Funding provided by the National Institute of Environmental Health Sciences (1 R03 HD059615-01)
Communities Actively Researching Exposure Study (CARES)

Evaluate the neurological effects of Mn exposure on children.
WASHINGTON AND WOOD COUNTIES
7-9 year old children
N = 400

GUERNSEY, OH
7-9 year old children
N = 100

Study Cohort
7-9 year old children
N = 400

Ambient Air Sampling
Personal Air Sampling
Home Environmental Sampling

Biomarker Study Cohort
7-9 year old children
N = 400

Health Assessment
Biological Collection for Metals
Neurological Assessment
Neuromotor Assessment

Exposure Assessment
Washington and Wood Counties
7-9 year old children
N = 300

Guernsey, OH
7-9 year old children
N = 100

Home Environmental Sampling

Ambient Air Sampling

Personal Air Sampling

Biological Collection for Metals

Neuropsychological Assessment

Neuromotor Assessment
Washington and Wood Counties
7-9 year old children
N = 300

Guernsey, OH
7-9 year old children
N = 100

Study Cohort
7-9 year old children
N = 400

Home Environmental Sampling

Ambient Air Sampling

Personal Air Sampling

Biological Collection for Metals

Neuropsychological Assessment

Neuromotor Assessment

Exposure Assessment

Biomarker

Health Assessment

Biological Collection for Metals

Neuropsychological Assessment

Neuromotor Assessment
Reporting Results
Back to Participants

Lead level in your child’s blood: 1.45 μg/dL
East Liverpool Study level: 0.99 μg/dL
National level: 0.99 μg/dL
Lead level in your child’s blood: 1.45 µg/dL
East Liverpool Study level: 0.99 µg/dL
National level: 0.99 µg/dL
Report Back to Community
Capacity Building

- Community identified need to provide environmental health education to:
  - Physicians
  - Journalists
  - Community members and children, “Science Advocates”
Do you ever wonder if the air in your community affects your child’s health?

To try and answer this question, the Communities Actively Researching Exposure Study (CARES) is taking place in your community. CARES is a combined effort between your local community members, Marietta College and the Department of Environmental Health at the University of Cincinnati.

You and your child may be eligible to participate if:

- You have a child who is 7, 8, or 9 years old.
- Your child has lived in Washington County throughout their life.

Families will receive $100 for their participation and will be reimbursed for their travel.

To learn more, contact Jody at 740-516-3200.

Current News

Check here for what’s happening with CARES.

“Environmental health research should be done with a community not simply on a community.”
Online module on Air Particles and Health by Dr. Patrick Ryan

- Partnered UC journalism students with NCA members, local news reporters and environmental health scientists

Pediatric Environmental Health CME/CNE
by Dr. Nicholas Newman

- Interactive, online module
- Measures change in knowledge evaluated by pre-test/post-test
- Measures change in behavior measured by calls to Pediatric Environmental Health Specialty Unit

http://www.eh.uc.edu/CARES/learn/physicians.html
Summary

• Engaging community members throughout the research process has enhanced the quality and meaning of the research.

• The community trusts and perceives research scientists to be highly knowledgeable about environmental health information.

• Engaging the community requires reciprocal capacity building

• Community members are key members of a multidisciplinary research team.
A team is a small number of people with complimentary skills who are committed to a common purpose, performance goals, and approach for which they are mutually accountable.

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