A Role for Indicators in the Environmental Public Health Tracking Network

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Preview

• Why do people use indicators?
• How these reasons relate to the goals of the EPHTN
• Considerations in selecting data and developing indicators
• Ways we might move forward
Why do people use indicators?

- To turn data into something understandable and relevant to audiences
- To provide an interpretation of what numbers mean
- To provide information in simple form that is consistent with science (complex $\rightarrow$ simple)
- To look at trends in conditions of concern, including those for which relationships now known
- In integrated assessments spanning health and environment sectors
Why use indicators?

- Represent data in a form that is understandable to audience
  - The general public
  - Stakeholders
  - Policy makers

Ex: Air Quality Index
  widely reported in news media in metro areas
Updated Sunday, Oct. 10 at 11:46 AM
Why use indicators?

Present an agreed upon interpretation to data
  Requires consensus on what data “mean”
  Can suggest need for action

Ex: Percentage of kids who are overweight (from children’s health chart book)
Figure 6: Percentage of children ages 6 to 18 who are overweight, by gender, race, and Hispanic origin, selected years 1976-1980, 1988-1994, and 1999-2002.
Why use indicators?

Present data in a more simple form

Ex: Blood lead levels by race/ethnicity and income
Median concentrations of lead in blood of children ages 1-5, by race/ethnicity and family income, 1999-2000

SOURCE: Centers for Disease Control and Prevention, National Center for Health Statistics, National Health and Nutrition Examination Survey
Why use indicators?

- Keep an eye on trends in conditions of concern
  - Useful when conditions represent a possible concern

Ex:
- environmental conditions
- body burdens
- disease rates
Measure E3a

Long-term trends in annual average concentrations of criteria pollutants

PM-10, percent of annual standard

Nitrogen dioxide, percent of annual standard

Sulfur dioxide, percent of annual standard

SOURCE: U.S. Environmental Protection Agency, Office of Air and Radiation, Aerometric Information Retrieval System
Measure D1

Percentage of children with asthma

Children with asthma in the past 12 months

Children ever diagnosed with asthma

Children ever diagnosed with asthma and having an asthma attack in the past 12 months

SOURCE: Centers for Disease Control and Prevention, National Center for Health Statistics, National Health Interview Survey

Note: The survey questions for asthma changed in 1997; data before 1997 cannot be directly compared to data in 1997 and later.
Used in Integrated Assessments

Efforts to integrate information from multiple sectors to influence policy
- Span health and environment
- Integrate data systems -> interoperability
- Accessible to public
- Similar attributes found in PACEH and WHO approaches
Knowledge base to define determinants

- Use all evidence of links between environmental factors and health
- Not limited to data linkages as input, but can use these
- Determinants become focus of measurement/surveillance or indicators
  - What we know or suspect
  - Can address different levels of knowledge
Indicators --

• Can measure the determinants that you know or suspect to be related to health or disease
  – Also determinants of “hazard” or exposure
• Can also measure things that contribute to these determinants
  – (e. g., surrogates or interventions)
• Can be “integrated” or not, depending on what you think you need to know
Goals of EPHTN

• Improve understanding of relationships between environmental factors and health

• Track determinants of health that are environmentally mediated
  • “hazards” and “exposures”

• Track diseases that are environmentally mediated

• Make links between “hazards,” “exposures,” outcomes

• Develop information to support policy action -
  - Reduce disease burden or risk
Needs and goals are similar

• Explain what we know or suspect about relationships between environmental factors and health
• Take data and turn it into results that can be used by the public and policy audiences
• Target data collection toward findings that are actionable (surveillance)
To date: emphasis on linking data

• Relationships between “health” and “environment” explained through data linkage
  - Highly technical and data intensive
• Can use indicators to answer broader range of questions, sooner (where data exist)
What indicators could do now

• Present available data in understandable way
• Simplify “data smog” for policy audiences
• Present agreed upon interpretation
• Keep track of conditions of concern and provide benchmarks (PACEH)
Some issues in defining indicators

- Terminology and topics
- Different amounts of knowledge and certainty about relationships
- Metrics matter (and can give different results)
- Addressing “many to many” relationships
1. Terminology and topics

- We use different words:
  - Questions to answer (ROE) =
  - Topic areas (ACE) =
  - Indicator (CSTE) =
  - Priority conditions (CDC)

Need to (and can) deal with:
- Topics or subject
- Data sources
- Metrics
What to include (first)

• Some convergence in overall topic areas or subjects
• Less convergence on how measurements can be used to answer questions
• Even less convergence on metrics to use (i.e.) how to calculate

Need to sort this all out
## Agents by Media

<table>
<thead>
<tr>
<th>Categories</th>
<th>Pew</th>
<th>CDC RfA</th>
<th>CSTE</th>
<th>America's Children Environ</th>
<th>Cal Enviro Health Indicators</th>
<th>EPA Report on the Environment</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Outdoor Air contaminant</strong></td>
<td>Air contaminants, including toluene and fine particles (tier 1); Air quality (p. 15)</td>
<td>Air contaminants, outdoor</td>
<td>Criteria pollutants (ozone, particulate matter, SO2, NO2, lead, CO); Hazardous or toxic substances</td>
<td>Criteria air pollutants; hazardous air pollutants</td>
<td>Ozone</td>
<td>Criteria pollutants, Air toxics (benzene, 1,3- butadiene, lead, perchloroethylene)</td>
</tr>
<tr>
<td><strong>Indoor Air contaminant</strong></td>
<td>Air contaminants, indoor</td>
<td>Tobacco smoke; Hazardous or toxic substances</td>
<td>Environmental tobacco smoke</td>
<td>Environmental tobacco smoke</td>
<td>Ozone</td>
<td>Environmental tobacco smoke, Radon</td>
</tr>
<tr>
<td><strong>Ambient water contaminant</strong></td>
<td>Water quality (p. 15)</td>
<td>Contaminants in ambient water</td>
<td>Regulated drinking water contaminants; lead</td>
<td>MTBE, perchlorate, NDMA and other regulated contaminants</td>
<td>Ozone</td>
<td>Mercury, pesticides, dioxin, lead, PCB's, PBT's</td>
</tr>
<tr>
<td><strong>Drinking water contaminant</strong></td>
<td>Drinking water contaminants, including pathogens (tier 1)</td>
<td>Monitored contaminants in systems; source water contamination</td>
<td>Regulated drinking water contaminants; lead</td>
<td>Organophosphate residues</td>
<td>Ozone</td>
<td>Mercury and PCB in fish tissue; contaminants in freshwater fish</td>
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<tr>
<td><strong>Crops</strong></td>
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<td><strong>Food</strong></td>
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</tbody>
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- **Criteria pollutants**: Benzene, 1,3-butadiene, lead, perchloroethylene.
- **Hazardous or toxic substances**: Pesticides, metals, sediment, nutrients or low dissolved oxygen, bacteria and pathogens, trash or debris (p. 35).
- **Organophosphate pesticides residues**: Mercury in noncommercial fish.
2. Knowledge + certainty vary

Relationships between environmental factors and health fall on continuum:

- Well established (lead and cognitive deficits) to
- Not established but of concern (autism)

What to measure may vary depending on this

May be more valuable to track upstream determinants instead and act upon these results
3. Need to think about metrics

- Choices to be made about what is the most honest and informative way to represent data
  - Different metrics do not necessarily track
- Need metrics that correspond to what you know about causes of risks and disease
- Not the same as enforcement ones
4. Relationships are “MEME”

- Many exposures <-> many effects
- Complex in both directions
- Conceptual approaches beginning to address this internationally but not yet in US
One “hazard,” multiple outcomes

Particulate matter in air

- Increased mortality
- Asthma related ER visits
- Increased lung cancer risk
- Increased respiratory diseases (bronchitis)
One outcome, multiple causes

- Particulate matter in air
- Tobacco smoke
- Indoor allergens including those from animals, insects, rodents
- Ozone, SO2, NO2, possibly hazardous air pollutants
- Diesel exhaust
- Bioaerosols including fungi and molds and pollens
Contribution to EPHTN

- Provide source of early success and tangible results for program
- Start to measure determinants and outcomes we know are important in consistent way
- Useful to key audiences
- Help to define data uses and limits
Some possible steps

• Define what we think is important
• Consider data sources,
• Discuss how best to represent results, agree on metrics
• Identify data gaps for and useful surrogates
• Provide “health and environment” perspective to other forums
Conclusion

• Indicators
  - Contribute to policy relevance of data generated by EPHTN
  - Reflect systems approach to identify and track environmental determinants of health (not all of which have to be linked)

• Tracking as surveillance
  - What is tracked (and linked) should be relevant to action to improve public health