Local Human Environmental Exposure
Surveillance as a Policy Lever:
Mercury And Pesticide Exposures In
New York City

EPA Symposium on Disproportionate
Environmental Impacts

Daniel E. Kass
Acting Deputy Commissioner
Division of Environmental Health
NYC Department of Health and Mental Hygiene
Outline

- Biomonitoring by New York City
- Some key findings that have driven policy changes
- Policy changes following NYC’s biomonitoring
- A framework for why policy actors are influenced by biomonitoring
Environmental Biomonitoring by NYC

- Modeled after CDC’s National HANES
- Population-based sampling of non-institutionalized NYC residents aged 20+ years
- Samples collected June – December, 2004
- Combination of interview and physical exam (blood and urine samples from 1811 participants)
Subjects of Environmental Biomonitoring

- Metals
  - Lead
  - Cadmium
  - Mercury (Organic and Inorganic)

- Cotinine

- Pesticides
  - Organophosphate metabolites
  - Pyrethroid metabolites
Key Finding: Inorganic Mercury Exposure Among Women is Highest for a Subset of New Yorkers Born in the Dominican Republic

<table>
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<th>Race/Ethnicity</th>
<th>No.</th>
<th>Geometric Mean</th>
<th>95th Percentile</th>
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<td>538</td>
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<td>Foreign-born Dominican</td>
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<td>Puerto Rican</td>
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<td>Foreign-born Mexican</td>
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<td>0.33</td>
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<td>Non-Hispanic Caribbean-born Black</td>
<td>97</td>
<td>1.39</td>
<td>4.5</td>
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</table>
Key Findings: Organic Mercury Exposure is Higher in NYC, and Highest Among Asians

Percent Above State-Reportable Mercury Levels

- USA: 10%
- NYC: 25%
- Asian: 47%
- White: 25%
- Black: 23%
- Hispanic: 17%
Percent of New Yorkers Eating Fish or Shellfish 20+ Times in Past Month

- NYC
- Chinese
- Non-Chinese
- White
- Black
- Hispanic

% 20+ fish meals
Blood Mercury Levels By Fish Meals in Past 30 Days
Among NYC Women 20-49 Years Old

- 90th Percentile
- Geometric Mean

Fish Meals in Past 30 Days

Blood Hg (mcg/L)
Key Findings: OP Pesticide Exposures are Higher in NYC (95th percentile)

Pesticide Exposure

- Preliminary results. Do not quote or cite.
Key Findings: Pyrethroid Pesticide Exposures are Higher in NYC (95th percentile)

Preliminary results. Do not quote or cite.
OP Pesticide Exposures by Demographic Factors

Geometric Mean Total Organophosphate Exposure by Demographic (Crude Estimates)

p-values reflect adjusted ANOVA in model with all variables

μmol/L/g creatinine

Weight in Kg (p<.001)
Age Group (p<.001)
Foreign Born (p=.07)
Gender (p=.08)
Race/Ethnicity (p=.04)

<65   66-79   80+   20-39   40-59   60+   No   Yes   Male   Female   White   Black   Asian   Hispanic
Key Finding: Pesticide Exposure is NYC Varies by Demographic and Policy-Dependent Factors

95th Percentile Pesticide Exposures by Gender and Professional Pest Control

Total Organophosphorus

Pyrethroid (PBA)

Preliminary results. Do not quote or cite.
Policy..

a course of actions intended to influence and determine decisions and other actions.

may be formed and implemented in the governmental, non-governmental and private sectors.
Policy Impacts from NYC’s Biomonitoring – Inorganic Mercury

- Local embargoing and seizure of offending products
- Regulations requiring posting of warning signs in stores that sold products
- Permanent capacity built in NYC Health Dept to evaluate and interdict contaminated consumer products
- International intergovernmental collaboration to alert Dominican Republic health officials
- Dedication of NYC Health Dept resources for public education
Inorganic Mercury

Skin-Lightening Creams
— Warning —

Skin-lightening creams that contain mercury are dangerous — mercury is a poison.

Read the labels of all skin products.

Do not use it:
• mercury is listed as an ingredient, or if
• ingredients are not listed

See your doctor if you use mercury-containing products.

Call 311 or 212-POISONS (212-734-7647) for more information.

Do Not Use These Products/
No Use Estos Productos
• Recetas de La Farmacia Normal — Crema Blanqueadora
• Miss Kay Crema Blanqueadora
• Santa Crema
• Dermatine Skin Cream
• Dr. Collazo Jabon Germicida

Cremas Blanqueadoras
— Alerta —

Las cremas blanqueadoras que contienen mercurio son peligrosas — el mercurio es un veneno.

Lea la etiqueta de todo producto para la piel.

No use un producto si:
• la etiqueta indica que mercurio es un ingrediente, o si
• los ingredientes no están listados

Vea a su médico si usted usa productos que contienen mercurio.

Llame al 311 o 212-VENENOS (212-836-3667) para más información.

The New York City Health Code Section 71.05 prohibits sale of mercury-containing skin products.
La sección 71.05 del Código de Salud de la Ciudad de Nueva York prohíbe la venta de productos de la piel que contienen mercurio.
Policy Impacts from NYC’s Biomonitoring – Organic Mercury

- Increased sampling of fish in NYC wholesale markets by New York State and US EPA
- Shift in emphasis by State Agencies from recreational to market fish
- NYC Health Dept launched study of mercury and PCBs in fish sold in Asian fish markets
- Clinical advisory and guidelines to >35,000 health care workers in NYC
- Adoption and distribution of NYC fish educational materials by:
  - largest retail food delivery service (FreshDirect)
  - NYS Women-Infants-Children food distribution program
  - Maternal-child clinics
Fish Markets Selected from Densest Chinese Areas in NYC

- Fish Markets
- Census tracts with 12.7+ % Chinese
- NYC Community Districts

Data from Census 2000 and NYS Ag & Markets
Higher Mercury Exposure Among Asians: Frequency Driven

* Rfd=0.01 ug/kg/d; 60 kg woman; 6-oz portion

Hg (ppb)

Carp, Buffalo
Snapper, "Red"
Croaker, Yellow
Pompano, Golden
Crab, Blue
Bass, Hybrid Striped
Dace (canned)
Carp, Bighead
Pompano, White
Tilapia

Mean
Max

Up to 5/wk
Policy Impacts from NYC’s Pesticide Surveillance

- Adoption of NYC local laws that restrict governmental pesticide use
- Mandatory local governmental pesticide use surveillance and reporting
- Dedication of NYC Health Dept resources to public education on safer pest control
- State regulator’s pledge to restrict consumer sale of pesticide foggers
- Continued effort to address the unique concerns of urban exposure use and exposure
State Moving to Limit Use of Bug Killer by the Public

By SEWELL CHAN

“Bug bombs” — pesticide products intended to fill a home or workplace with insecticide, killing cockroaches, have been in use in American households since World War II, but federal and state authorities are now warning that they are moving to allow only professional exterminators to handle the bug-killing devices.

On Friday, the Centers for Disease Control and Prevention released a study of illnesses and injuries related to bug bomb release foggers — in eight states from 2001 to 2006. New York was one of the states in the study, published in the Journal of the American Medical Association.

The study found 123 cases of bug bomb-related illness or injury in New York State (including 58 in New York City), with the most commonly reported acute health effects from bug bombs were respiratory problems and gastrointestinal reactions, pain. In the study, the C.D.C. also said that the injury and illness figures were most likely underestimated.
Policy Influences – A Framework

- Relatively Stable Parameters
  - Problem Definition, Information, Rules
- Constraints and Resources of Policy Actors
- External Events

Policy Subsystem
- Policy Actor Beliefs, Resources
- Policy Decisions
- Policy Outputs
- Policy Impacts

Adapted from: Sabatier PA and Jenkins-Smith HC (1993)
Ways Biomonitoring Results May Influence Policies

Problem Definition

• Additional information influences knowledge equilibrium – “External Perturbation”

Influence on External Events

• Media coverage of biomonitoring findings
• Contextualizing individual events

Introduction of Additional Policy Actors

• Advocacy coalitions emerge with new evidence
• Health agencies heretofore uninvolved in policy formation
Biomonitoring’s Influence on the Beliefs of Policy Actors

- Normative beliefs
- Scope of problem
- Relative priority of values
- Perceptions of disparity and equity
- Susceptibility to change
- Efficacy of governmental action
Some Caveats

- NYC’s efforts involved population-based exposure assessments for metals and pesticides.
- Analytes were specifically selected in NYC mindful of our potential to interpret findings and compare our results.
- Our findings are generally presented to policy actors alongside health outcome surveillance findings to strengthen the case for risk.
Conclusion
Biomonitoring Can:

• Supplement more commonly available data on health endpoints.
• Mirror public concerns by implicitly emphasizing primary prevention.
• Identify populations at greater risk of exposure and illness/injury
• Readily influence policy by
  • modifying assumptions among existing policy actors
  • creating disequilibrium between competing assumptions regarding risk
  • engaging new policy stakeholders, and by
  • modifying beliefs of key policy actors
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