Tracking Environmental Health Data for Public Health Decision Making

June 21, 2016

Accessible version: https://youtu.be/NN3OgAZA1xg
Creating a Network for Action: Environmental Public Health Tracking Program

Heather Strosnider, MPH

*Acting Lead, Science Development Team*

*Environmental Health Tracking Branch*

*Division of Environmental Hazards and Health Effects*

*National Center for Environmental Health*
Understanding How Our Environment Affects Our Health

- Environmental health is part of public health
- Focuses on understanding the relationship between people and their environmental exposures
- Environmental hazards
  - Can be chemical, physical, or biological factors
  - Found in air, water, communities, and surroundings
Outdoor Air Pollutants

- **EPA Criteria Air Pollutants:**
  - Particulate matter (PM)
  - Ozone (O3)
  - Carbon monoxide (CO)
  - Sulfur oxides (SOx)
  - Nitrogen oxides (NOx)
  - Lead

- **Science-based guidelines used to develop national air quality standards**

Environmental Protection Agency (EPA)
www.epa.gov/criteria-air-pollutants
Air Pollution and Health

Cardiovascular

Respiratory

Central Nervous System

Reproductive Outcomes
Deaths from Air Pollution in 2013

Air pollution was responsible for 5.5 million deaths in 2013

Studies Have Made An Association Between Air Pollution and Health Outcomes

- Emergency Department Visits
- Particulate Matter (PM$_{2.5}$)
- Ozone
- Temperature

National Environmental Public Health Tracking Network
EPA Needs Better Study Results To Inform Standards

- **Currently standards rely on studies that are**
  - Multi-city with populations over 65
    - Medicare data
  - Single city studies with all ages, or
  - International

- **Estimates could be more robust by including studies that have**
  - Multiple U.S. cities and all ages
  - Sensitive populations
Gaps in Air Pollution Data

Annual average ambient concentrations of PM2.5 in µg/m³

Legend
- 3.2 - 7.6
- >7.6 - 8.7
- >8.7 - 9.5
- >9.5 - 10.6
- >10.6 - 22.8

PEW Environmental Health Commission: America’s Environmental Health Gap

- Little information was routinely collected on non-infectious disease
- Environmental hazard data and monitoring conducted for regulatory purposes, not public health
- Little data on human exposure to environmental hazards
- Answers needed about the role of the environment on health outcomes
Environmental Public Health Tracking

Hazard

Exposure

Health Effect

Data

Tracking Network

Collection → Integration → Analysis

Dissemination → Prevention

Assessment → Research → Policy

Stakeholders*

Federal Agencies
State and Local Agencies
Academia
Health Care System
Non-Governmental Organizations

Business and Industry
Policy Makers
Media
Public

*Stakeholders Include

Improved Public Health

Ongoing Evaluation
NATIONAL ENVIRONMENTAL PUBLIC HEALTH TRACKING NETWORK

Grantee Gateway

Secure Portal

Data Repository

Metadata Repository

Tool Box

Grantee Public Portal

National Gateway

Secure Portal

Data Repository

Metadata Repository

Tool Box

National Public Portal
National Environmental Public Health Tracking Network

Keeping Track, Promoting Health

Environmental Public Health Tracking Classroom Modules
Now Available!

- Free
- College-level
- Adaptable and Interactive

The National Environmental Public Health Tracking Network (Tracking Network) is a system of integrated health, exposure, and hazard information and data from a variety of national, state, and city sources.

On the Tracking Network, you can:
- view maps
- view tables, and charts
- search for data on:
  - chemicals and other substances found in the environment
  - some chronic diseases and conditions
  - the area where you live

Learn more about the Tracking Network
Explore Tracking Data

Quick Links
- Home
- About Tracking Program
- Quick Links
- Success Stories
- Indicators & Data
- Print Page
- Bookmark and Share
- CDC on Facebook
- CDC on Twitter

State & Local Tracking Networks

Tracking Hot Topics
- Tracking Asthma
  - Allergy Testing for Persons with Asthma: FAQs
  - Asthma and Allergy Foundation of America
  - Asthma and Schools
  - National Women's Health Week
  - New Tracking Data API
    - View our Tracking Success Stories to learn how Tracking is making a difference across the U.S.
National Environmental Public Health Tracking Program

State & Local Grantees
25/1

State & Local Practitioners
200+

Tracking Fellowships
34

Partnerships

CDC, federal agencies, national organizations

Public Health Actions
341

ASTHO Fellows

City
County
State

Tracking Grantees

NYC
RI
DE
AK
HI

Driving Public Health Actions

- Detect and monitor trends
- Identify populations at risk
- Identify exposure to hazards
- Examine the relationship between hazards and disease
- Assess potential disease clusters or exposures
- Track progress
- Enhance surveillance
- Improve access to quality data
Driving Public Health Actions

- Detect and monitor trends
- Identify populations at risk
- Identify exposure to hazards
- Examine the relationship between hazards and disease
- Assess potential disease clusters or exposures
- Track progress
- Enhance surveillance
- Improve access to quality data

Inform, improve, evaluate… programs, interventions, policies… to address environmental health issues
Reducing Pesticides Near Schools in California
Examples of Programs Using the Tracking Network for Action

- Inform blood-lead testing
- Target radon testing outreach
- Warn public of wildfire smoke danger
- Identify local sources of air pollution
- Evaluate transportation plans
Using Tracking Data and Modeling Tools To Fill the Gaps in Air Pollution Data

Annual average ambient concentrations of PM2.5 in µg/m³

Legend

- 4.6 - 7.5
- >7.5 - 9.3
- >9.3 - 10.3
- >10.3 - 11.4
- >11.4 - 17.0
- (Modeled only)

National Environmental Public Health Tracking Network: http://epitracking.cdc.gov/portal?query=9E73A141-A1AF-1B81-2A5F-0A5F74403681
Using Tracking Data To Fill the Gap: Understanding Ozone’s Impact on Younger Population

Rate of Respiratory ED Visits per 10,000 Population, 2000–2013

People younger than 65

All ages

People 65 or older

National Environmental Public Health Tracking Network, unpublished data
For 25% of the days, ozone concentration was 49 ppb or more.

For 25% of the days, ozone concentration was 31 ppb or less.
Increased Respiratory ED Visits for 7 Days After Higher Ozone Levels

Almost 80% of the increase in visits were from people younger than 65.

National Environmental Public Health Tracking Network, unpublished data
www.cdc.gov/ephtracking
Using Data to Drive Public Health Action in New York City: A Local Health Department Perspective

Wendy McKelvey, PhD, MS

Director, Environmental Health Surveillance and PI, NYC Tracking Program
Bureau of Environmental Surveillance and Policy
Division of Environmental Health
New York City Department of Health and Mental Hygiene
New York City Tracking Program
Bureau of Environmental Surveillance & Policy

- Build infrastructure (people, data, systems)
- Provide information that can inform policy, programs, and initiatives
- Educate the public

nyc.gov/health/tracking
NYC Tracking Strategies

- Identify and augment sources of environmental health data
- Improve access to data via automated reporting, portals, and dashboards
- Ongoing data exploration, monitoring, and research
- Collaborate and communicate with internal and external stakeholders to **improve public health**
NYC Tracking Instrumental in Strengthening Existing Environmental Health Programs

- **Building electronic data capture systems**
  - Rat inspections
  - Food safety inspections
  - Child care center inspections

- **Automated, web-based reporting**
  - To guide program operations
  - To track success
  - To target resources where most needed
Analysis Of Programmatic Data Has Informed Public Health Initiatives
Restaurant Inspections

- Restaurant letter grading program
- Publicly posted grades to communicate inspection findings
- Targets more frequent inspections to the poorest performers
Analysis Of Programmatic Data Has Informed Rat Control

- Rat Indexing
- Canvases the city for rats systematically
  - Block by block
- Uses signs of rats to direct placement of bait, instead of only where complaints come from
Analysis Of Programmatic Data Has Informed UPK Initiative

- Universal Pre-Kindergarten (UPK)
- Informing child care center placement and capacity as services expand
Analysis Of Programmatic Data Has Informed Use of Poison Control Center

- Poison Control Center (PCC)
- Daily monitoring of location of the calls
- PCC staff reach out to areas least likely to call—to reduce inequity of use
Tracking Infrastructure Has Also Strengthened Emergency Response

- Assessing residential building needs in the event of a coastal storm

- Surveillance of evacuation shelters
Information Technology Helps Us Inform The Public About Environmental Efforts To Control Zika And West Nile Virus

Mosquito Spraying Events

The Health Department monitors mosquito populations and applies pesticides when appropriate throughout the summer to reduce the number of mosquitoes and to minimize the risk of mosquito-borne diseases such as the West Nile Virus and the Zika Virus.

2016 Mosquito Spraying/Adulticiding* & Aerial Larviciding** Schedule

<table>
<thead>
<tr>
<th>Date(s) ***</th>
<th>Borough, Neighborhood(s), Zip Code(s)</th>
<th>Status</th>
</tr>
</thead>
</table>
| May 14 between 6AM & 7PM | Larvicide in Bronx  
- Neighborhoods: Pelham Bay Park North, Pelham Bay Park South  
- Zip codes: 10464, 10465, and 10475 | Completed |

Additional information:  
- Mosquito Control Notice (PDF)  
- Location

www1.nyc.gov/site/doh/health/health-topics/west-nile-virus-spray.page
NYC Tracking Supported New Initiatives – Four Examples

1. Improving Air Quality
2. Reducing Exposure to Pesticides
3. Improving Resilience to Climate Effects
4. Reducing Exposure to Mercury
1. Improving Air Quality — Using Local Air Monitoring

- Informed phase-out of residual heating oil use in buildings
- Estimated health benefits of air pollution controls
- Identified high-risk neighborhoods for boiler switching and energy efficiency upgrades

www.nyc.gov/health/nyccas
Air Concentrations of SO2 Declined 70% Since Clean Heat Measures In Effect
2. Reducing Use of Harmful Pesticides

Analysis of NYS Pesticide Sales and Use Registry data

- Pesticide use in NYC rivaled use in agricultural areas

IPM in public housing study

- Integrated pest management (IPM) is a safer alternative

Local Law 37

- Requires all city agencies to use IPM wherever possible and to report pesticide use to the health department

www.nyc.gov/health/ll37
3. Improving Resilience to Climate Effects

- Identify more appropriate threshold for heat warnings, based on observed heat-related effects
- Quantify risks and reach out to vulnerable groups
- Advocate for increased access to air conditioning
- Support studies to assess health impacts of power outages

Metzger KB, Ito K, Matte TD. Environ Health Perspect. 2010
3. Using Data to Inform Climate and Health Priorities by Neighborhood

**Climate and Health in Rockaways**

Extreme heat, coastal storms, flooding, and episodes of elevated ozone are climate-related hazards that may increase with climate change and have important public health impacts in New York City. Extreme weather can cause power outages, which also threaten public health. This report provides neighborhood indicators of climate-related hazards, vulnerability and health impacts.

**Zip Codes:** 11694, 11692, 11691, 11697

### Climate Hazards

<table>
<thead>
<tr>
<th>Climate Hazard</th>
<th>Rockaways</th>
<th>Queens</th>
<th>NYC</th>
<th>Trend over time</th>
</tr>
</thead>
<tbody>
<tr>
<td>Area located within hurricane evacuation zones 1-6 (percent), 2013</td>
<td>96.1</td>
<td>43.2</td>
<td>46.9</td>
<td>Worse</td>
</tr>
<tr>
<td>Ozone (O3)(Mean ppb) Summer 2014</td>
<td>36.3</td>
<td>32.4</td>
<td>31.4</td>
<td>Worse</td>
</tr>
<tr>
<td>Spatial average of surface temperature (Deg Farenheit), 11:22 AM, August 18, 2009</td>
<td>92.1</td>
<td>94.5</td>
<td>93.5</td>
<td>Better</td>
</tr>
</tbody>
</table>

### Vulnerability - Built Environment

<table>
<thead>
<tr>
<th>Vulnerability - Built Environment</th>
<th>Rockaways</th>
<th>Queens</th>
<th>NYC</th>
<th>Trend over time</th>
</tr>
</thead>
<tbody>
<tr>
<td>Adults reporting air conditioning in the home (percent), 2007</td>
<td>78.1</td>
<td>86.0</td>
<td>87.5</td>
<td>Worse</td>
</tr>
<tr>
<td>Area with vegetative cover including trees and grass (percent), 2010</td>
<td>35.6</td>
<td>34.2</td>
<td>36.7</td>
<td>Better</td>
</tr>
<tr>
<td>Homes near structures rated good or excellent (percent), 2011</td>
<td>64.6</td>
<td>83.7</td>
<td>76.7</td>
<td>Worse</td>
</tr>
</tbody>
</table>

### Vulnerability - Population Characteristics

<table>
<thead>
<tr>
<th>Vulnerability - Population Characteristics</th>
<th>Rockaways</th>
<th>Compared with other NYC neighborhoods*</th>
</tr>
</thead>
</table>

*Not Available

4. Reducing Exposure to Mercury

NYC HANES Estimates Elevated Blood Mercury Levels, 2004

NYC HANES: New York City Health and Nutrition Examination Survey
Elevated Blood Mercury Is Typically Due to Frequent Fish Consumption

Percent of Adult Population Reporting 20 or More Fish Meals in the Last 30 Days, 2004

- NYC Chinese Non-Chinese Asian White Black Hispanic

We Encouraged High-risk Groups To Choose Lower Mercury Fish

Highest risk from exposure is to the developing nervous system

- Press Release (with extensive media follow-up)
- Health care provider advisory letter on mercury in fish (electronic)
- Brochure in
  - English, Chinese, Japanese, Korean, Spanish

www1.nyc.gov/site/doh/health/health-topics/mercury-in-fish.page
Lots of Press Followed Publication of Our Findings

High Mercury Levels Are Found in Tuna Sushi

By MARIAN BURROS JAN, 30, 2008

More Testing of Seafood to Address Mercury Concerns

By MARIAN BURROS JAN, 30, 2008

A NUMBER of restaurants and retail stores have started testing the fish they sell to see if there is an amount of mercury in seafood, and the city beginning to examine the mercury levels in the local region.

The regional office of the federal agency that monitors fish in the city found high levels of mercury in some local fish.

The city will examine the 20 most common species of fish in the region, including the tuna.

Tuna sushi is a popular item in local restaurants.

A food safety official said that the levels of mercury in the tuna exceeded levels considered acceptable by the Environmental Protection Agency.

Piven Leaves Show Amid Concerns for His Health

By DAVE ITZKOFF DEC, 18, 2008

A real-life fish story has resulted in Jeremy Piven's withdrawal from the current Broadway revival of the David Mamet comedy "Speed-the-Plow."

Mr. Piven, the actor and "Entourage" star, left the production this week after having previously sought an early release from the play. Mr. Piven's doctor said he should not continue to perform because he was suffering from elevated levels of mercury, which may have been the result of large amounts of fish in his diet.
In 2004, we also identified very elevated urine mercury levels.

<table>
<thead>
<tr>
<th>Urine Hg Level</th>
<th>Number</th>
<th>Likely Source</th>
<th>Participant Ethnicity</th>
</tr>
</thead>
<tbody>
<tr>
<td>20–50 mcg/L</td>
<td>9</td>
<td>5 cream / 4 Don’t know</td>
<td>6 Dominicans 1 Jamaican 1 Salvadoran 1 African-American</td>
</tr>
<tr>
<td>&gt; 50 mcg/L</td>
<td>4</td>
<td>4 cream</td>
<td>4 Dominicans</td>
</tr>
</tbody>
</table>

All women, mostly Dominican, using mercury-containing skin-lightening creams.

Press Release

New York City Department of Health and Mental Hygiene
Office of Communications

FOR IMMEDIATE RELEASE
CONTACT: Sandra Mullin/Sid Dinsay

Business Hours (212) 788-5290
After Business Hours (212) 764-7667
Thursday, January 27, 2005

NYC HEALTH DEPT. WARNS AGAINST USE OF "SKIN-LIGHTENING" CREAMS CONTAINING MERCURY OR SIMILAR PRODUCTS WHICH DO NOT LIST INGREDIENTS

Almost a Dozen Products Made in the Dominican Republic, Hong Kong and China Do Not Conform to FDA Regulations; Sale of These Products Illegal Under City Law

NEW YORK CITY - January 27, 2005 - Following a confirmed case of mercury poisoning in a New York City resident who had been using an imported "skin-lightening" cream, the New York City Department of Health and Mental Hygiene (DOHMH) and the Mayor's Office of Immigrant Affairs
Second NYC HANES Conducted in 2013–14

- Biomonitoring for mercury was included again
- Preliminary analyses suggest declines in blood mercury are greater than declines observed nationally
- A manuscript is in preparation
Where Is New York City Tracking Program Heading?

- Using new technologies to support operational programs by pulling data from a variety of sources
  - Improving food safety
  - Expanding access to child care
  - Safer, more effective pest control
  - Responding to complaints, emergencies, and emerging or continuing threats
Where Else Is New York City Tracking Program Heading?

➢ Expanding collaborations to develop new policies and initiatives
  ● Improving air quality
  ● Increasing resilience to extreme weather
  ● Reducing pesticide use
  ● Supporting “Vision Zero” to reduce traffic deaths and injuries

➢ Coming soon!
  ● Reduce ambient noise
  ● Promote active design of the built environment
  ● Use health impact assessment to inform environmental sustainability goals
Environmental Public Health Tracking: A Tool for Public Health Decision-making in Massachusetts

Jan Sullivan

Acting Director, Bureau of Environmental Health and Co-PI, Tracking Program
Massachusetts Department of Public Health
Massachusetts Evolution of Tracking

Portal Development

Data Presentation

- Website
- Database

Data Utilization

- Queries
- Maps
- Tables
- Charts
- Content

- Stakeholder engagement
- Policy applications
- Targeted surveillance
- Intervention & prevention
- Recommendations
Two Ways Tracking Data Informs Massachusetts Department of Public Health Policies and Actions

1. Health Outcome Surveillance

2. Health in Environmental Policy
Health Outcome Surveillance in Massachusetts and Data Utilization Examples

- **Community and Census Tract Level Health Data**
  - Hallmark characteristic of Massachusetts Tracking
  - An expectation of stakeholders in Massachusetts
  - Public Health Performance Measures are often evaluated at this level

- **Data Utilization Examples**
  - Community Profiles
  - Lead in Drinking Water Monitoring
  - Population Vulnerability to Extreme Weather Events and Climate Change
2016 Boston Community Health Profile

Geography

About Environmental Public Health Tracking (EPHT)

The Massachusetts Department of Public Health EPHT program has assembled profiles to provide a snapshot of environmental health for Massachusetts communities.

What information is inside this community profile?

Data for several health and environmental topics are presented in this profile, as well as population information. Terms that might be unfamiliar are in bold and defined in a glossary at the end of the profile. For more details about the data displayed here, about the EPHT program, or for more health and environmental data in your community, please visit our website at http://www.mass.gov/ephtTrack/.

Who can use this community health profile, and what can they use it for?

The community health profiles can be used by anyone who would like to know about environmental public health in Massachusetts communities. Profiles can be used to gather data, guide public health actions, identify high-risk groups, shape policy decisions, or simply inform the curious.

What is environmental public health?

The word “environment” describes aspects of the outdoors — trees, grass, and other parts of the natural world. In the field of environmental public health, the environment also includes the man-made spaces that surround us every day — our homes, neighborhoods, schools, and workplaces — all of which contribute to our health.

How can the environment impact my health?

In several ways. Some examples include sunny noses and itchy eyes from pollen allergies that occur each spring, asthma attacks triggered by air pollution, and health problems in young children due to consuming old lead-based paint chips and dust.

Why track environmental public health?

Monitoring different health topics over several years allows us to see trends over time and helps public health scientists better understand how the environment can impact our health.

Boston’s Geography

Total Area

49.5 square miles

Office of Geographic Information (MassGIS), 2013

Total Population

817,684 people

U.S. Census, 2010

Percent of Land Use

Agriculture: 0.3%

Forest: 82%

Open space: 6.9%

Recreation: 5.6%

Urban: 70.5%

Water: 2.2%
2016 Boston Community Health Profile
Population Demographics

Boston’s Population

Some people are more vulnerable to the negative effects of different environmental hazards than others. For example, the effects of lead poisoning are worse in young children. This is why it is important to not only collect data about the environmental health of an area, but also understand the sociodemographic makeup of a community. Population characteristics are important to know because they can help a community learn about the needs of its residents, and better target public health messages and programs.

Demographics

Age

<table>
<thead>
<tr>
<th>3-9</th>
<th>10-14</th>
<th>15-64</th>
<th>65+</th>
</tr>
</thead>
<tbody>
<tr>
<td>22%</td>
<td>19%</td>
<td>35%</td>
<td>16%</td>
</tr>
</tbody>
</table>

Population breakdown by age

In the Boston area, 22% of the population is 3-9 years old, 19% is 10-14, 35% is 15-64, and 16% is 65 or older.

Income

<table>
<thead>
<tr>
<th>&lt;50K</th>
<th>50K-75K</th>
<th>&gt;75K</th>
</tr>
</thead>
<tbody>
<tr>
<td>67%</td>
<td>13%</td>
<td>10%</td>
</tr>
</tbody>
</table>

Median household income is the total amount of money made by people who live together, who may or may not be related to each other.

Poverty

<table>
<thead>
<tr>
<th>Below</th>
<th>Above</th>
</tr>
</thead>
<tbody>
<tr>
<td>18%</td>
<td>22%</td>
</tr>
</tbody>
</table>

Poverty status for a household is determined by the income and makeup of that household. A household is “below the poverty line” if the total household income falls below a set level established by the federal government. This value changes according to household size and ages of household members, and is updated annually.
Environmental Justice

People who are members of minority racial and ethnic groups, and people who are poor, may face more environmental burdens in their neighborhoods. According to the U.S. Centers for Disease Control, members of these populations are more likely to live near toxic waste sites, smelting with high air pollution, and in substandard housing. Furthermore, these populations might have difficulty accessing health resources.

The principle of environmental justice was developed to address this inequality. This principle states that all people, regardless of income or race, have the right to fair treatment and equal involvement in environmental issues, and the right to live in environmentally healthy neighborhoods.

The Massachusetts Executive Office of Energy and Environmental Affairs (EOEEA) defines environmental justice neighborhoods as census block groups where at least one of the following is true:

- Median annual household income is at or below 60% of the statewide median income.
- 20% or more of the residents are minority;
- 20% or more of the residents are not fluent in the English language.

Environmental justice neighborhoods where more than one criteria are met may be the most vulnerable to environmental and health hazards. To find out more about environmental justice populations and your community, visit the Executive Office of Energy and Environmental Affairs’ website at http://www.mass.gov/eoea/ or call 1-800-622-3360 for more detailed information about how EJ neighborhoods are defined.
2016 Boston Community Health Profile
Childhood Lead Poisoning

The environment can contribute to the development of chronic diseases. Chronic illnesses are some of the most common, expensive, and avoidable health problems. Some links between chronic disease and the environment are well understood— for example, that smoking cigarettes can cause lung cancer. However, many links between chronic disease and the environment are not well understood. It is very difficult to determine the true cause of an illness. Individual genetics, the natural and built environment, and lifestyle can all play a role in determining whether or not a person develops a chronic disease.

Childhood Lead Poisoning

Lead paint in older homes is the most common source of lead poisoning. Chipping and peeling paint, and paint disturbed during home remediation, can release lead dust which is then inhaled or consumed. Lead can cause damage to the brain, kidneys, and nervous system, slow growth and development, and create behavioral problems and learning disabilities in children. The use of lead in household paint was banned in 1978, but lead paint applied before the ban is still present in many older homes across the Commonwealth.

**Lead Screening**

- **Statewide:** 77% of children 1 to 14 months old tested
  - Statewide Testing Rate: 54%
  - Statewide Lead Poisoning Prevention Program (CLP2P) 2016

**Confirmed Blood Lead Levels (BLL)**

- **Statewide:** 3.7% of children with confirmed BLL
  - 6 months with confirmed BLL < 10 micrograms per deciliter (µg/dL)

**Lead in Homes**

- **Statewide:** 71% of homes have lead
  - U.S. Census American Community Survey 2015, 6-year estimates, 2014

*CLP2P considers a child with a confirmed blood lead level of 10 micrograms per deciliter (µg/dL) or more as elevated and requiring a public health intervention.*

Do you live in a high risk lead community? A community is considered high risk for childhood lead poisoning based on the number of blocks impacted, 60% or more children tested, and the number of children with elevated blood lead levels over the past 10 years. All cities and towns are assessed for lead risk annually.

**Based on these factors, Boston was considered a high risk lead community for 2014.**
2016 Boston Community Health Profile

Heart Attack and Asthma

Heart Attack

While not factors for having a heart attack include obesity, smoking, and high cholesterol, exposure to air pollution, specifically ozone or particulate matter, can also increase risk.

Heart attack hospitalizations are treated for adults over age 35. Hospitalization data are presented in age-adjusted rates per 10,000 people.

Asthma

Asthma attacks can be triggered by environmental pollutants and asthmatics can be more sensitive to cigarette smoke. This illness is more common in children than adults and is increasing in prevalence.

Asthma hospitalization is tracked for people of all ages who visit the emergency department of a hospital for an asthma-related reason. Hospitalization data are presented in age-adjusted rates per 10,000 people.

Asthma prevalence in Massachusetts is also tracked among children from the time they enter kindergarten (K) through the fifth grade. Prevalence is expressed as a percentage of all children enrolled in these grades.

The Indoor Air Quality (IAQ) Program assesses indoor environmental quality in public schools at the request of the public. For more information about school assessment or to find out if an assessment has been conducted at a school in your community, visit mass.gov/iaq/iaq.
Air Quality

Exposure to air pollution can contribute to heart or lung illnesses, particularly for people at risk because of preexisting heart or lung disease. Air pollution can aggravate asthma or other respiratory ailments, or trigger heart attacks. The U.S. EPA establishes limits on air pollution levels to protect public health, including the health of at-risk populations. These limits, called National Ambient Air Quality Standards (NAAQS), apply to widespread pollutants including ozone and fine particles. Currently, PM10 air quality measures are available for counties with monitoring stations, which are maintained by the Massachusetts Department of Environmental Protection (MassDEP).

Fine Particles (PM2.5)

- Percent of days where the 24-hour PM2.5 daily concentration exceeded the NAAQS of 25 μg/m³

- Yearly analysis

- Sulfur Dioxide (SO2)

- Yearly analysis

- CO (Carbon Monoxide)

- Yearly analysis

- Ozone

- Yearly analysis

Fine particulate matter or PM2.5 refers to a mixture of extremely small airborne particles. PM2.5 is displayed here as the percent of monitored days when concentrations were above the NAAQS over a 24-hour period.

Ozone is a colorless gas. The measure reflects the number of days in a year that ozone concentrations exceeded the NAAQS over an 8-hour period.
2016 Boston Community Health Profile
Drinking Water Quality

Drinking Water Quality

The U.S. EPA sets limits for acceptable and safe levels of contaminants in drinking water, and the MassDEP Drinking Water Program is responsible for monitoring and enforcing those limits. The EPHT program has information available for nine contaminants.

Most people in Massachusetts drink water from a public community water system. Providers are responsible for testing water and reporting test results to the MassDEP. Contact your town water department or water provider to obtain a copy of current test results.

Some people have private wells on their properties that provide drinking water. Those individuals are responsible for testing their own well water to ensure it is safe for drinking.

It is important to track the water quality of community water systems. Health effects from potential contaminants will depend on the pollutant, the amount ingested, how it was ingested (for example, if the polluted water was ingested directly into the body by drinking or skin absorption) and the sensitivity of the individual.

2016 Boston Community Health Profile
Climate Change

Massachusetts is already experiencing the effects of climate change, from hotter summers to rising sea levels. These effects will have consequences for the health of many people across Massachusetts. With evidence suggesting that effects of climate change will be most directly felt at the local level, MDPH is working with local health partners to prepare for the health threats and challenges posed by a changing climate in their community.

MDPH is implementing CDC’s Building Resilience Against Climate Effects (BRACE) framework to help communities better prepare and respond to potential climate-related impacts. BRACE tools can inform strategies to: 1) better understand links between climate and health; 2) identify vulnerable populations or areas; 3) identify interventions to reduce potential health impacts; and 4) support local planning efforts.

Understanding the Climate and Health Link: Extreme Heat-Related Events

Tracking Links between Climate and Health
One predicted impact of climate change is an increase in the number of days over 90 degrees. More days of extreme heat increase the number of residents at risk for experiencing heat stress, the effects of which include fatigue, changes, dehydration and heat stroke. EPHT tracks the number of emergency room visits for heat stress in each community in Massachusetts.

Tracking Vulnerable Populations
Studies of deaths during extreme heat events found that older adults, especially those living alone, are more vulnerable. EPHT provides a vulnerability mapping tool that displays this measure and other demographic data for each community.

Identifying Possible Interventions
Green space decreases overall outdoor temperature because trees and shrubs can provide shade. Green space is measured as the percent of land in the town devoted to agriculture, forest, open space, and recreation. EPHT provides percent of green space in each community in the vulnerability mapping tool.

Supporting Intervention Planning Efforts
In this example, interventions can be implemented to monitor and communicate risk to the elderly who are living alone during times of extreme heat, improve access to cooling centers, and support longer-term efforts to reduce the impact of increasing temperature by creating more green space, especially where vulnerable populations are located.
Sources of Data

Data presented in this profile are collected by many different partners of the MA EPHIT Program and are the most up-to-date data available for each topic. For more information about the data, visit https://www.mass.gov/ephit道教


Hospitalizations: Massachusetts Center for Health Information and Analysis (CHIA), 2012. http://www.mass.gov/chiac


Climate change: MOPH BEH and U.S. Centers for Disease Control (CDC). http://www.cdc.gov/nhsr/career/health/...
2016 Boston Community Health Profile
Glossary to Understand the Terms

**Glossary**

**Age-adjusted rate** - A statistical method applied to the rates of a disease in a population that allows comparison among populations with different age distributions, also known as age-standardized rates.

**Census block group** - A geographic area used by the U.S. Census. Block groups are smaller than census tracts and usually hold between 200 to 4,000 people.

**Chronic disease** - A chronic disease is an illness that is persistent or long-lasting. According to the U.S. Centers for Disease Control and Prevention, chronic diseases are among the most prevalent, expensive, and preventable diseases.

**Community Water System (CWS)** - Any water system that provides water for human consumption through pipes or other constructed conveyances to at least 15 service connections or serves an average of at least 25 people for at least 60 days a year.

**Confirmed Blood Lead Level** - A confirmed blood lead specimen is either a single venous blood lead specimen of any value, or the highest confirmed value of two or more capillary blood lead specimens >=10 μg/dL drawn within 12 weeks of each other.

**Deciliter (dl)** - A metric measure of capacity that is 1/10th of a liter.

**Environmental hazard** - A substance or situation in the environment that might adversely affect human health. They can be exposed to physical, chemical or biological factors from various environmental sources through air, water, soil, and food.

**Environmental Justice (EJ)** - The fair treatment and meaningful involvement of all people regardless of race, national origin, or income when developing, implementing, and enforcing environmental laws, regulations, and policies. Fair treatment means that no group of people, including a racial, ethnic, or socioeconomic group, should bear more than its share of negative environmental impacts.

**Median** - The median is the number in a data set that separates the upper half of the data in the data set from the lower half.

**Micrograms (μg)** - Unit of measure for weight/mass equal to one millionth of a gram used to measure the concentration of pollutants in the air.

**National Ambient Air Quality Standards (NAAQS)** - Standards established by the U.S. EPA that apply to outdoor air throughout the country.

**Ozone** - There are two types of ozone—"good" ozone and "bad" ground-level ozone. Good ozone occurs high in the atmosphere and forms a layer that protects harmful ultraviolet (UV) rays, preventing them from reaching the Earth. Bad ozone is an odorless, colorless gas that is created by a chemical reaction and can affect health.

**Particulate matter** - "Particulate" or "particulate matter" are terms used to describe the mixture of solid particles and liquid droplets in the atmosphere. The microscopic solid and liquid particles are of human and natural origin and can vary greatly in size and composition.

**Poverty** - Poverty status for a household is determined by the income and makeup of that household. A household is "below the poverty line" if the total household income falls below a value set by the federal government. For more information about how the government defines poverty, including tables of poverty thresholds, visit the U.S. Census Bureau’s Poverty website (https://www.census.gov/programs-surveys/poverty.html).

**PPM** - Parts per million; denotes 1 part per 1,000,000 parts. Used to measure the concentration of a substance in the air.

**Prevalence** - The proportion of individuals in a population having a disease or condition. Prevalence is a statistic that refers to the number of cases of a disease that are present in a particular population at a given time.

**Sociodemographic** - A term describing data relating to sociologic and demographic factors.
Blood Lead Dashboard To Track and Detect Exposures

Prevalence of confirmed BLLs >= 5 ug/dL

<table>
<thead>
<tr>
<th>Geo Description</th>
<th>Rate per 1,000</th>
<th>% of Population</th>
</tr>
</thead>
<tbody>
<tr>
<td>Geo Description</td>
<td>2010</td>
<td>2011</td>
</tr>
<tr>
<td>Boston</td>
<td>4.0</td>
<td>4.5</td>
</tr>
<tr>
<td>Braintree</td>
<td>3.5</td>
<td>4.0</td>
</tr>
<tr>
<td>Brookline</td>
<td>2.5</td>
<td>3.0</td>
</tr>
<tr>
<td>Cambridge</td>
<td>1.0</td>
<td>1.5</td>
</tr>
<tr>
<td>Chelsea</td>
<td>0.5</td>
<td>1.0</td>
</tr>
<tr>
<td>Malden</td>
<td>0.0</td>
<td>0.5</td>
</tr>
<tr>
<td>Medford</td>
<td>0.0</td>
<td>0.5</td>
</tr>
<tr>
<td>Revere</td>
<td>0.0</td>
<td>0.5</td>
</tr>
<tr>
<td>Somerville</td>
<td>0.0</td>
<td>0.5</td>
</tr>
<tr>
<td>Winthrop</td>
<td>0.0</td>
<td>0.5</td>
</tr>
</tbody>
</table>

Prevalence of confirmed BLLs >= 5 ug/dL and Screening Rates for 2014

<table>
<thead>
<tr>
<th>Geo Description</th>
<th>Screening Percent</th>
</tr>
</thead>
<tbody>
<tr>
<td>Boston</td>
<td>80.0</td>
</tr>
<tr>
<td>Braintree</td>
<td>75.0</td>
</tr>
<tr>
<td>Brookline</td>
<td>70.0</td>
</tr>
<tr>
<td>Cambridge</td>
<td>65.0</td>
</tr>
<tr>
<td>Chelsea</td>
<td>60.0</td>
</tr>
<tr>
<td>Malden</td>
<td>55.0</td>
</tr>
<tr>
<td>Medford</td>
<td>50.0</td>
</tr>
<tr>
<td>Revere</td>
<td>45.0</td>
</tr>
<tr>
<td>Somerville</td>
<td>40.0</td>
</tr>
<tr>
<td>Winthrop</td>
<td>35.0</td>
</tr>
</tbody>
</table>
Community Lead Report Card

- Annually distributed to community Boards of Health
- Our portal automatically updates as new data available
  - Community screening rate
  - Community percent of children tested compared to state
  - Number of homes to remediate

mass.gov/dph
Combining Data on Health, Climate Events, and Health Indicators to Inform Preparedness Efforts

Communities with the most vulnerable populations to climate events are not just those closest to the coast.

Population Vulnerability Measures in this map are Low Income, Low English Proficiency, Non-white Race, and Elderly Age.
Massachusetts Health in Policy Tracking Data Utilization Examples

- Tracking has expanded breadth and availability of data
  - Health and environmental data now available to stakeholders
- Tracking data used to inform health policies
- Environmental Policies that use Tracking data
  - Health Impact Assessments
  - Environmental Justice Population Definitions
- Community Health Policies that use Tracking data
  - Community Health Needs Assessments
Healthy Transportation Compact (HTC)

“Under Massachusetts General Laws Chapter 6C, Section 33, the 2009 Healthy Transportation Compact, is directed to:

-- establish methods to implement the use of health impact assessments (HIAs) to determine the effect of transportation projects on public health and vulnerable populations; and

-- institute a health impact assessment for use by planners, transportation administrators, public health administrators and developers.”

Requires inclusion of health considerations and impact assessments in transportation projects
Healthy Transportation Compact Health Impact Assessment for Inserting Health into Environmental Policy
Health Driving Policy
“McGrath Grounding” HIA

“Previous”

“Proposed”

Reduces noise and promotes physical activity
Health Impact Assessments (HIA) Using Tracking in Massachusetts

HIA integrated into policy

Opportunity to leverage Tracking Data to improve public health

Increase awareness to tracking by offering guidance on HIA implementation and highlighting EPHT Resource

HIA Data Tool

Expedite data access into centralized system for many types of Impact Assessments
Development of tool to extract health, SDOH and environmental indicators by use type

Extract aggregate data for custom geography of interest

SDOH: Social determinants of health
The Inclusion of Health Outcomes in Environmental Justice (EJ) Policy to Give Residents a Voice in Environmental Decision-making

- **Review of Environmental Justice (EJ) Policy**
  - Urged by stakeholders, including Department of Public Health (DPH) to include health in EJ policy

- **DPH concerned that a definition adding health was not consistent with the intent of EJ**
  - Might favor ill populations over minority and poor populations

- **DPH proposed two stage EJ policy**
  - Use health data to identify and prioritize EJ populations as **vulnerable** EJ populations
  - Tracking data will be used for this
Environmental Justice criteria include:
• Income
• Minority Population
• English Isolation
Using Health Data to Identify Vulnerable Environmental Justice (EJ) Populations

Three key provisions offered by DPH

- Identify EJ populations with higher than average rates of environmentally related health outcomes, including
  - Childhood asthma
  - Low birth weight
  - Childhood lead poisoning
  - Heart disease
- A rate greater than 110% of the state rate would be sufficient to characterize a population as having vulnerable health
- Specific Massachusetts Tracking criteria would be used
Potential Benefits by Including Health in Environmental Justice (EJ) Policy

- **Enhance public participation**
  - Enhance reviews of Massachusetts Environmental Policy Act projects in EJ populations
    - An Act designed to avoid damage to the environment from environmental projects
  - Increase participation in environmental agency programs

- **Improve regulatory compliance, enforcement, and technical assistance**

- **Promote**
  - Brownfields revitalization and environmental restoration
  - Economic partnerships for projects incorporating cleaner production processes in EJ populations
  - Open space
Tracking Data Used to Inform Community Health Needs Assessments

- Tracking Data Utilization as a Community Health Policy Driver
  - As with environmental policies, the lack of readily accessible and interpretable data could lead to uninformed decisions and unclear targets for limited resources
  - Data used for Community Health Needs Assessments
Community Health Needs Assessments (CHNAs)

- CHNAs are required by all tax-exempt hospitals every three years.
- Hospitals are required to consult with state and local health departments in developing CHNAs and intervention strategies.
- Opportunity for public health and Tracking to help guide community health improvement and health equity.
- Tracking can provide hospitals with much of the data that hospitals need to identify community health needs.
- Tracking data can assist in implementation and evaluation of strategies to improve community health.
Community Health Needs Assessments Initial Query Box to Select Hospital and Geography of Interest
Community Health Needs Assessment Output for Lead Poisoning

<table>
<thead>
<tr>
<th>Year</th>
<th>Community</th>
<th>Sex</th>
<th>Age Group</th>
<th>Case Count</th>
<th>Percent Screened - Rate per 100</th>
</tr>
</thead>
<tbody>
<tr>
<td>2014</td>
<td>Amherst</td>
<td>Male</td>
<td>9 to 47 Months</td>
<td>157</td>
<td>57.20</td>
</tr>
<tr>
<td>2014</td>
<td>Amherst</td>
<td>Female</td>
<td>9 to 47 Months</td>
<td>161</td>
<td>74.00</td>
</tr>
<tr>
<td>2014</td>
<td>Amherst</td>
<td>Total</td>
<td>9 to 47 Months</td>
<td>328</td>
<td>64.40</td>
</tr>
</tbody>
</table>
Where Is Massachusetts Tracking Heading?

- On the drawing board ...
  - Developing predictive measures of health care costs associated with hypothesized changes in disease rates
  - Inclusion of Tracking data in Primary Cancer Prevention 5-year Strategic Plan objectives
  - Application of predictive modeling to target vulnerable populations
  - Employing the Tracking infrastructure to help meet DPH formal Population Health goals
- All because environmental health data is now accessible through Tracking
We’re only touching the surface of Tracking’s potential!

http://www.mass.gov/dph/matracking
Environmental Public Health Tracking

- More and more health and environmental data are available
- CDC’s Tracking Network sets standards and describes patterns and trends across the US
- State and city tracking programs and networks address local environmental health concerns
Tracking Experts Fill the Gaps!

- Data are increasingly integrated into environmental and community health policy and decision-making
- Tracking data and expertise fills the gap between the environment and our health
Tracking Environmental Health Data for Public Health Decision Making

June 21, 2016