Environmental Public Health: Tracking Diabetes in Massachusetts

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Outline

I. Introduction to the Bureau of Environmental Health

The Bureau of Environmental Health has a broad mission of protecting the public health from a variety of environmental exposures. The Bureau responds to environmental health concerns and provides communities with epidemiologic and toxicological health assessments.

The Bureau comprises nine programs.

The Bureau also ensures regulatory compliance related to food and radiation safety, as well as the state sanitary code.

Bureau of Environmental Health

- Indoor Air Quality
- Community Assessment Program
- Environmental Epidemiology Program
- Environmental Toxicology Program
- Environmental Health Education And Outreach Program
- Community Sanitation Program
- Food Protection Program
- Radiation Control Program
- Childhood Lead Poisoning and Prevention

How do we evaluate health?

- Assess the potential impact of exposure on the population

- Evaluate disease frequency in the population

- Investigate possible associations between exposure and disease

Health Outcomes & Exposure Investigations at BEH (selected examples)

- ALS/MS

- Asthma

- Birth Defects

- Developmental Disabilities

- Lupus

- Scleroderma

- Suspected Cancer Clusters

- Arsenic Exposure Investigation

- Childhood Lead Exposures

- IAQ and Mold Investigations

- Suspected Pesticide Exposure

Report of the Pew Commission:
Public Perception of Environmental Contribution to Health

Not Important
11%

Don't Know
2%

Very Important
45%

Important
42%
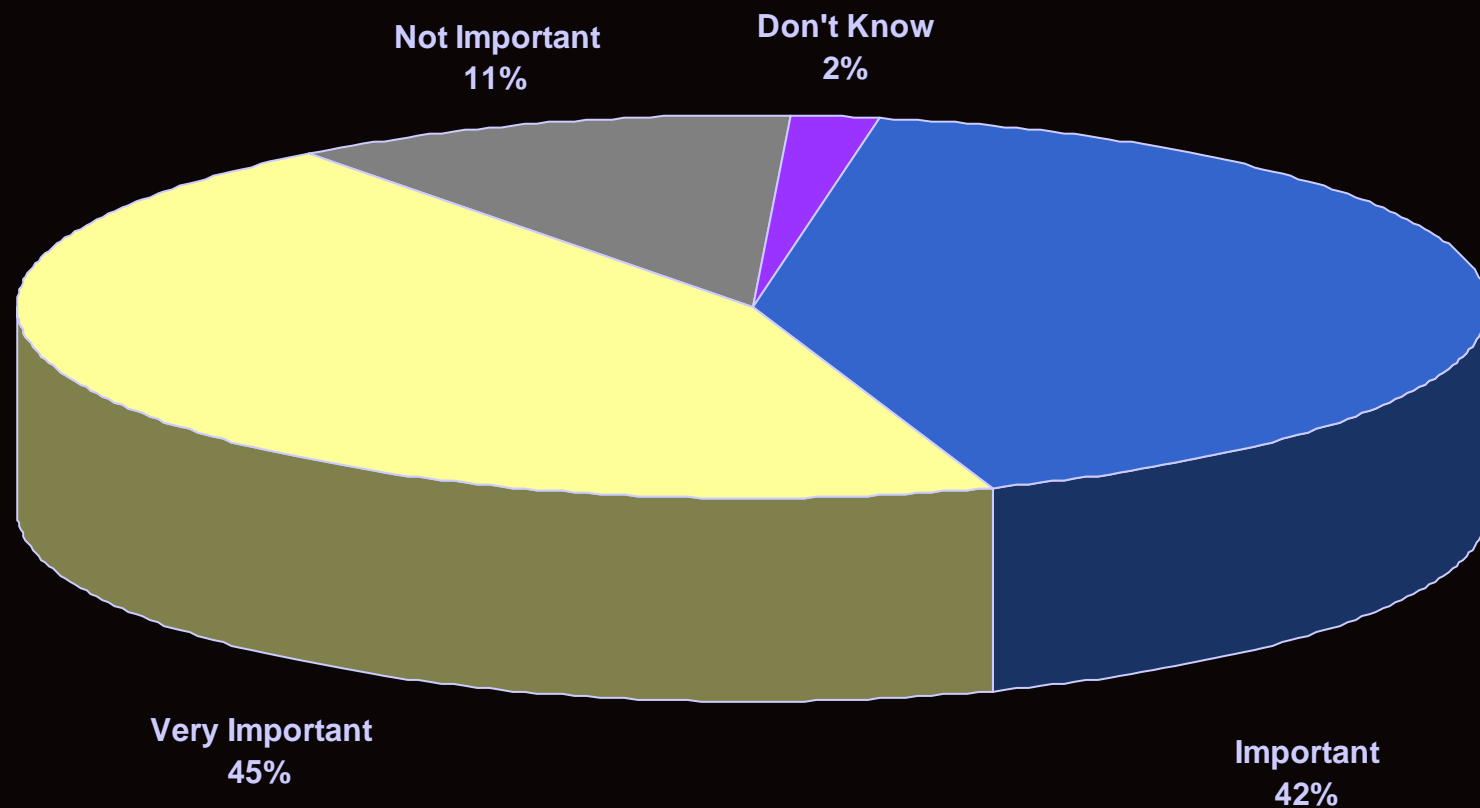
In 2002 Congress approved funding for the establishment of a nationwide environmental public health tracking program.

Original EPHT Funded Programs

CDC-Funded Environmental Public Health Tracking Projects

- • Planning & Capacity Building Activities
- • Infrastructure Enhancement & Data Linkage Demonstration Projects (with a planning & capacity building component)
- • Academic Partners for Excellence
- • Data Linkage Demonstration Projects

II. Introduction to Environmental Public Health Tracking in Massachusetts

Initial goal: Through demonstration projects, evaluate data linkage that will provide methods, tools, and best practices using existing health effects surveillance systems and environmental hazard surveillance systems to advance the development and implementation of the EPHT Network.

Initial EPHT Projects (2002)

* Pediatric Asthma Surveillance linked with indoor air quality (IAQ) data in public schools

➢ Developmental disabilities surveillance linked with environmental contaminant data (PCBs) Berkshire County

* Systemic lupus erythematosus (SLE) surveillance linked with state hazardous waste sites database in the city of Boston

Pediatric Asthma Surveillance

- Began in 2002-2003

- Mailed survey to 2100 public and private schools

- Request asthma information by gender, grade (K-8) and community of residence using school health records

- Surveys returned by fax or US mail to MDPH/BEH

- 2007-2008 response rate 99.5%

Verification Effort

- In 2001, MDPH/BEH conducted a verification effort during the Merrimack Valley Pediatric Asthma study to determine the validity/reliability of school based health reporting. The verification effort consistently supported the high quality and significant reliability of school health asthma data as reported by school nurses/administrative personnel

III. Methods for Collecting Pediatric Diabetes Data

- In 2007-2008 MDPH began collecting diabetes data from school health records.

- As with pediatric asthma, data are reported by school nurses and/or administrative staff at public and private schools in Massachusetts.

Methods

- Counts were by type of diabetes (Type 1, Type 2, Unknown Type) and school only (no other demographic breakdown).

- Type 1 diabetes is usually diagnosed in children; Type 2 is usually adult onset but an increasing number of children are being diagnosed with Type 2 diabetes

- Rates were estimated by community (but community based on location of school not residence of child).

- Approximately 98% of schools provided data.

IV. Results of Pediatric Diabetes Surveillance

- 2007 – 2008 prevalence of diabetes in grades K-8 estimated at 265 per 100,000 persons

- According to CDC (based on 2005-2006 data), the roughly equivalent age group of our surveyed student population is 183 per 100,000

Prevalence of total diabetes among people <20 yrs of age- United States 2002 (ADA)

- About 206,000 people under 20 years of age have diabetes. This represents 0.25% of all people in this age group.

- Approximately one in every 400 to 500 children and adolescents has type 1 diabetes.

- Type 2 diabetes is becoming more common among Native American, African American, Hispanic & Latino children and adolescents.

Results (cont.)

- Children with Type 1 diabetes represented 92% of cases (n=1,761).

- Children with Type 2 diabetes = 7% (n=129).

- Unknown type was 1% (n=30).

Results (cont.)

- Although the national rate is lower than the MA rate, the methods for determining the rates were very different and could account for some of the difference

- CDC estimates are based on a small sample of individuals who participate in their National Health and Nutrition Examination Survey

- MDPH rates are based on school health information for all children who attend grades K-8 in public and private schools in MA

V. Risk Factors for Pediatric Diabetes

- Type 1 diabetes is thought to be autoimmune in nature; genetic factors and a family history are thought to play a role in the development of Type 1

- Type 2 diabetes has some environmental risk factors including persistent organic pollutants (e.g. PCBs)

- Recognized risk factors for Type 2 include family history, obesity, physical inactivity, race/ethnicity and others
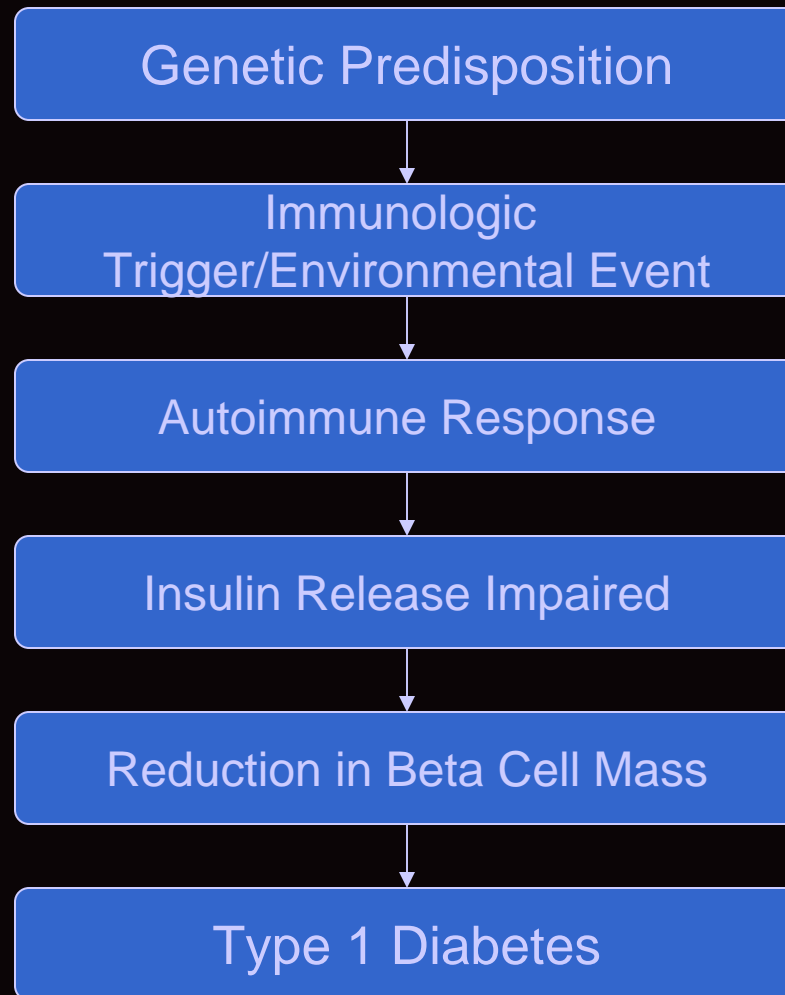
Table 2. Potential Environmental Risk Factors Associated with Type I Diabetes

Class	Specific agent
Viruses	**Enteroviruses**
	Rubella (congenital)
	Coxsackie B
	Rotaviruses
Nutritional	**Cow's milk and cow's milk-based infant formulas**
	Duration of breast-feeding
	Gluten
	Exposure to Bafilomycin A1
	Nitrates (N-nitroso compounds)
	Vitamin D Deficiency
Life-style/ Other	*Exposure to b-cell toxins (e.g. the rat poison, Vacor)*
	Smoking (Family members, indoors)
	Older maternal age
	Birth order
	Infant Growth
	Birth weight
	Stressful life events

Bold text indicates risk factors with strongest evidence of an association with Type I diabetes

*Based on Table 2 from Zvi Laron's Interplay Between Heredity and Environment in the Recent Explosion of Type 1 Childhood Diabetes Mellitus

The Development of Type 1 Diabetes Mellitus*

Genetic Predisposition

↓

Immunologic Trigger/Environmental Event

↓

Autoimmune Response

↓

Insulin Release Impaired

↓

Reduction in Beta Cell Mass

↓

Type 1 Diabetes

VI. Autoimmune Diseases and Environmental Exposures

- Literature suggests that petroleum distillates (products, such as diesel fuel created from processing crude oil), mercury, silica and chlorinated hydrocarbons may be associated with lupus and other undifferentiated connective tissue diseases

Density of Tier-Classified 21e Sites with Lupus-Suspected Chemicals and Neighborhoods with the Highest Rates of Lupus
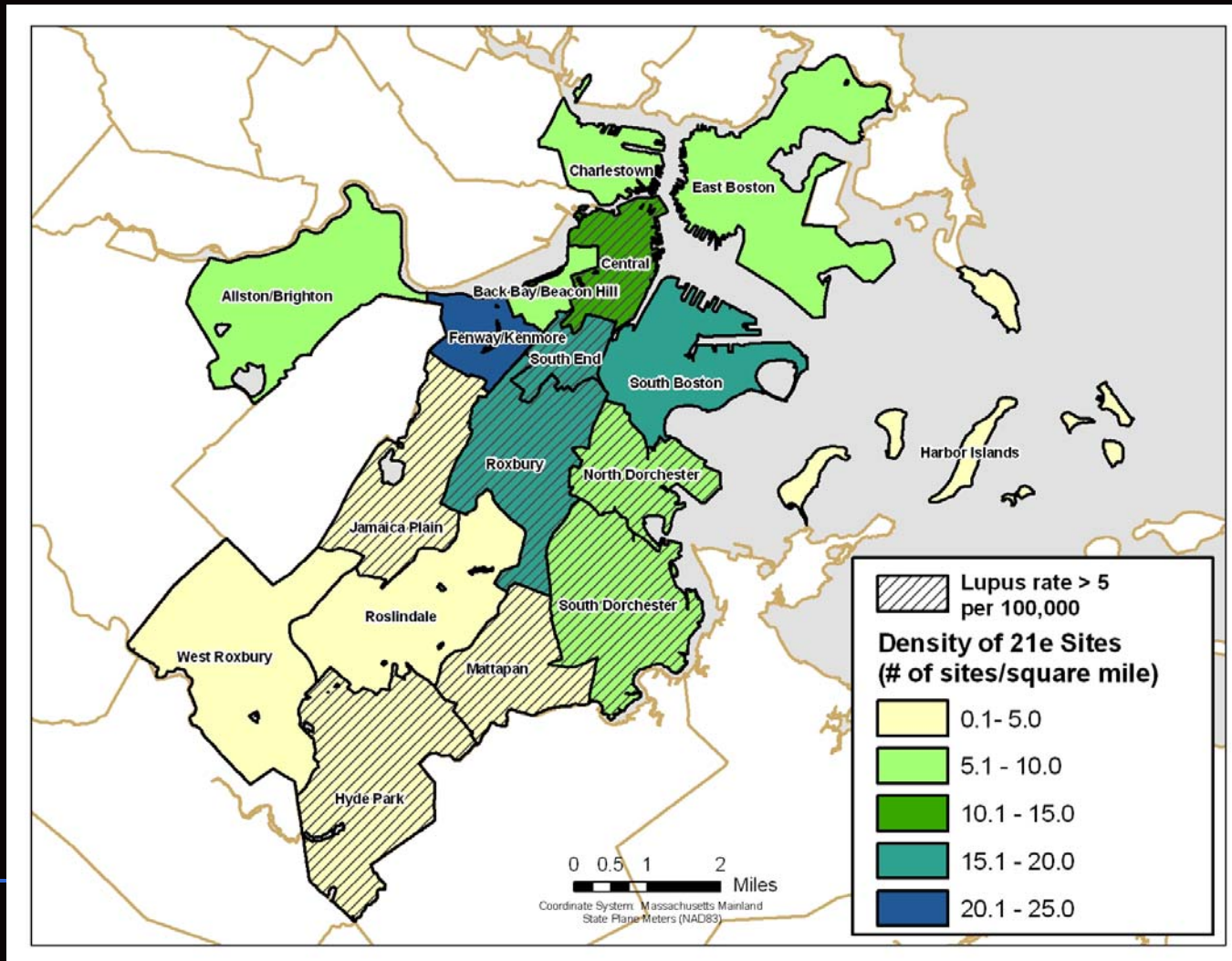
The FERPA Barrier

- Family Educational Rights and Privacy Act of 1974 (20 U.S.C. 1232g)

- Protects students' privacy for educational records/Cannot be released w/o parental consent

- Applies to all educational institutions that receive funds from U.S. Dept of Education

- Applies to entire content of the student's record

Access Problems Related to FERPA

➢ Massachusetts DoE regulation allows DPH access to records.

➢ New DPH regulations allow access to records for certain outcomes

➢ But FERPA takes precedence

➢ Thus, DPH can't access DoE records

➢ Unable to access DPH Early Intervention (EI) records. The Individuals with Disabilities Education Act (IDEA), which covers EI, states that the protections of FERPA apply.

VII. Next Steps related to investigating Diabetes in Weston, Wellesley and Newton

- ❑ Working with school nurses to coordinate mailing to all parents of children diagnosed with diabetes to complement information from Ann Marie Kreft

- ❑ Need to determine who lived in Weston, Wellesley and Newton prior to diagnosis

- ❑ Using data from the MA Department of Environmental Protection to identify 21e sites that may contain petroleum distillates

- ❑ Evaluating data from Department of Agricultural Resources relative to pesticides applied to rights of way

Next Steps related to investigating Diabetes in Weston, Wellesley and Newton, cont.

- ❑ Development of geographical information system to link health and environmental data

- ❑ Continuing meetings with Dr. Laffel from Joslin Diabetes Center and reaching out to Juvenile Diabetes Research Foundation

- ❑ Obtaining further information on biological sample collection from The Environmental Determinants of Diabetes in the Young (TEDDY) Study

- ❑ Establish communication plan to keep communities apprised of status of activities

Questions?