

Linking: Hazards, Exposures, & Health Effects

Environmental Public Health Tracking is the ongoing collection, integration, analysis, interpretation, and dissemination of data on environmental hazards, exposures to those hazards, and related health effects. The goal of tracking is to provide information that can be used to plan, apply, and evaluate actions to prevent and control environmentally related diseases. In many cases, however, data are not available on what substances are getting into people and at what levels (exposure data).

Biomonitoring—the direct measurement of chemicals in human specimens such as blood or urine—is a powerful tool essential for closing the gaps in exposure data. CDC and its partners, including the Association of Public Health Laboratories (APHL), are supporting state and local agencies in building their tracking and biomonitoring capacity.

Why does my child have cancer?

Is my drinking water safe?

Why does my son have asthma?

Are chemicals making me sick?



Closing America's Environmental Public Health Information Gap

Hazards

Mercury: Released into the air by industrial processes, mercury enters surface water, where it can bioaccumulate in fish tissue as methylmercury, its most toxic form.

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What are environmental hazards?

An environmental hazard is an agent or factor in the environment that may adversely affect human health. People can be exposed to physical, chemical, or biologic agents from various environmental sources through air, water, soil, and food.

Examples of environmental hazards include the following:

Criteria Air Pollutants: These pollutants include lead, particulate matter, carbon monoxide, nitrogen and sulfur dioxides, lead, and ozone.

Arsenic: Arsenic can be found naturally in many states' ground-water and in runoff from agricultural, industrial, and mining operations.

Lead: Lead can be found in paint in some U.S. homes built

before 1978, some hazardous waste and industrial sites, and some imported products.

Pesticides: When misused, agricultural and home-use pesticides, which include chemicals such as organophosphates, carbamates, and pyrethrins, can be hazardous.

Hazardous Waste Sites: Physical, chemical, and biologic hazards from waste sites can enter the air, soil, water, and food.

Temperature Extremes: Extreme cold or heat can disrupt normal body functions.

Biotoxins: Some microorganisms produce and release poisons called biotoxins into air, water, soil, or food.

Exposures

Methylmercury: Fish consumption is the primary source of methylmercury exposure in people. Total blood mercury is a biomarker of methylmercury exposure.

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What is biomonitoring?

Biomonitoring is the assessment of exposure through direct measurement of environmental chemicals or their metabolites in human specimens such as blood or urine. CDC is working with partners such as APHL to increase biomonitoring capacity at the state and local level.

CDC's National Report on Human Exposure to Environmental Chemicals

The Report is an ongoing assessment of the U.S. population's exposure to environmental chemicals. Scientists at CDC's Environmental Health Laboratory use biomonitoring to assess this exposure in samples from people who took part in the National Health and Nutrition Examination Survey.

www.cdc.gov/exposurereport.

Two Important Findings in the Report

DDT: Banned by the Environmental Protection Agency in 1973, this pesticide was clearly measurable in teens and young adults aged 12-19 years who were born after DDT was banned. For people of all ages, levels were three times as high in Mexican Americans as in whites and twice as high as in African Americans.

Lead: Elevated blood lead levels in young children have decreased by 50% since the early 1990s, but public health concern remains about children who are still exposed to lead-based paint and lead-contaminated dust.

Health Effects

Neurological Defects: Exposure of the fetus to mercury during pregnancy can result in neurological abnormalities ranging from cerebral palsy to learning disorders.

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What are health effects?

Health effects are chronic or acute health conditions that affect the wellbeing of an individual or community. Effects are measured in terms of illness and death and understood in terms of environmental, psychological, physiological, or genetic factors and conditions that predispose an individual to the development of a disease or health condition.

Examples of health effects include the following:

Birth defects: One in 33 U.S. babies born has a birth defect.

Developmental disabilities: About 17% of children under 18 years of age have a developmental disability.

Cancer: More than 1 million new cancer cases were diagnosed in 2001.

Chronic respiratory disease:

An estimated 10 million adults reported physician-diagnosed chronic obstructive pulmonary diseases in 2000.

Asthma: In 2001, an estimated 31.3 million Americans reported having been diagnosed with asthma during their lifetime.

Neurologic diseases:

Neurologic disorders strike an estimated 50 million Americans each year.

Childhood lead poisoning:

Approximately 434,000 U.S. children aged 1-5 years have elevated blood lead levels.

Carbon monoxide poisoning:

More than 500 Americans die from unintentional carbon monoxide poisoning each year.

Biomonitoring and Health Tracking in Action

CDC is providing national leadership to develop integrated biomonitoring and health tracking programs at the state and local level.

Program Information

Biomonitoring: CDC awarded \$1.9 million in implementation funds to 8 states (3 grantee states plus 5 states that are a part of a consortium). Funds were awarded in September, 2003.

Tracking: In 2003, CDC awarded \$18.8 million to 21 states, 3 local health departments, and 3 schools of public health to continue developing a national environmental public health tracking network and to increase capacity in environmental public health at the state and local levels.

Iowa, Minnesota, North Dakota, South Dakota, and Wisconsin:

A biomonitoring consortium of 5 Upper Midwest states would use a biomonitoring communication module within Wisconsin's Health Alert Network, which is being integrated into Wisconsin's Environmental Public Health Tracking System. The 5 states also intend to share biomonitoring data and samples on toxicants such as metals and pesticides.

Pennsylvania: Pennsylvania's biomonitoring planning grant currently funds an epidemiology research associate in the state's Bureau of Epidemiology. This position is responsible for supporting biomonitoring as well as environmental health tracking and establishing a working relationship between the two. People living in the vicinity of coal-burning power plants will be evaluated and tracked for heavy metal exposure including lead, arsenic, and mercury.

Washington: Washington's primary tracking project involves enhancing the Washington Electronic Disease Surveillance System's electronic hospital reporting of birth defects, the development of population-based exposure data—including a state biomonitoring program, and the enhancement of environmental monitoring and data analyses of persistent toxicants such as mercury and Polychlorinated Biphenyls (PCBs).

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