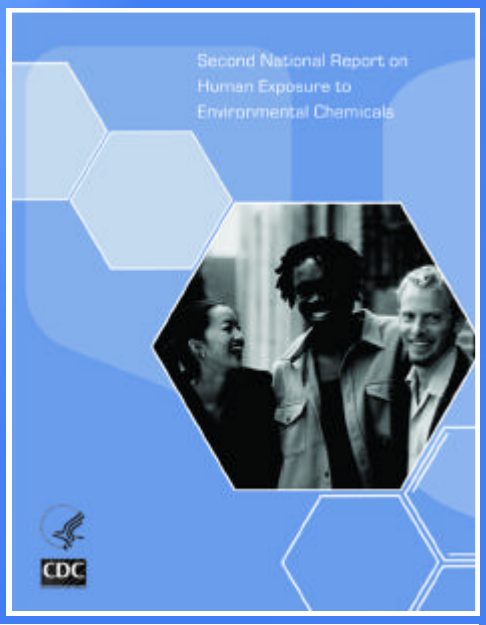
Environmental Public Health at CDC



DEPARTMENT OF HEALTH & HUMAN SERVICES · USA

CDC

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Environmental Public Health at

CDC's environmental public health work cuts across several centers. Here at the National Center for Environmental Health (NCEH), we focus on the following program areas:

- Safeguarding the health of people from environmental threats
- Providing leadership in the use of environmental health sciences—including environmental epidemiology, environmental sanitation, and laboratory sciences—to protect public health
- Responding and sharing solutions to environmental public health problems worldwide

"We" are—

- The Division of Laboratory Sciences, which develops and applies laboratory science to—
  - Prevent disease and death caused by exposure to toxic substances that result from chemical emergencies or chemical terrorism
  - Assist disease-prevention programs requiring special laboratory expertise
- The Division of Emergency and Environmental Health Services, which provides national and international leadership for coordinating, delivering, and evaluating emergency and environmental public health services
- The Division of Environmental Hazards and Health Effects, which investigates the relation between human health and the environment

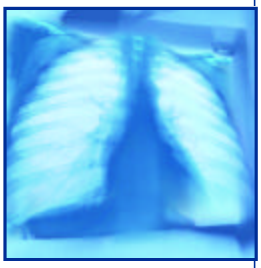
This brochure provides an "A-to-Z" overview of the many environmental public health programs and activities in which we are engaged. Each of our programs and activities not only advances the mission of NCEH—to promote health and quality of life by preventing or controlling those diseases or deaths that result from interactions between people and their environment—but also the overall mission of CDC—to promote health and quality of life by preventing and controlling disease, injury, and disability.

CDC

Air Pollution and Respiratory Health

NCEH researches and investigates the effects of airborne environmental agents on respiratory diseases. Focus areas include asthma and mold.

Asthma



Despite some evidence of stabilizing death rates and declining hospitalization rates, asthma remains an important cause of illness and death in the United States. Rates of emergency department visits have continued to slowly increase, and large disparities persist, with African Americans having rates of emergency department visits, hospitalizations, and death three times higher than those for whites.

Through its National Asthma Control Program, NCEH works with state grantees to reduce the number of deaths, hospitalizations, emergency department visits, school days or work days missed, and limitations on activity due to asthma. The program focuses on three main activities: (1) tracking asthma: collecting and analyzing data on an ongoing basis to understand when, where, and in whom asthma occurs; (2) implementing scientifically proven interventions: ensuring that scientific information is translated into public health practices and programs to reduce the burden of asthma; and (3) establishing and maintaining partnerships: ensuring that all stakeholders have the opportunity to be involved in developing, implementing, and evaluating local asthma control programs.

Mold

Mold exposure does not always present a health problem indoors; however, people who are allergic to mold may commonly experience allergic symptoms when exposed to it. Certain people with chronic respiratory disease may have trouble breathing, although mold does not appear to represent a major public health burden in terms of illness and death.

Because we know that mold can cause illness in some people, NCEH is developing an agenda for research, service, and education related to mold. NCEH has funded the Institute of Medicine to conduct a study on the relation between damp or moldy indoor environments and the manifestation of adverse health effects. NCEH also is working with the Council of State and Territorial Epidemiologists to develop an inventory of state indoor air quality programs.

Chemical Weapons Disposal Oversight

The Department of Defense (DOD) is destroying the entire U.S. stockpile of chemical weapons. These aging weapons pose a potential health risk to nearby communities. Congress has charged CDC with public health oversight of this program. NCEH reviews all chemical weapons elimination plans and works closely with DOD throughout the disposal process. As of March 2003, more than 15.8 million of 63 million pounds of chemical weapons have been safely destroyed. NCEH also evaluates the medical response capacity of local communities to ensure that responders are prepared for any emergencies that may occur during the disposal process.

Childhood Lead Poisoning Prevention

Approximately 434,000 U.S. children aged 1-5 years have blood lead levels greater than 10 micrograms per deciliter. Lead poisoning often occurs with no obvious symptoms, but it can cause learning disabilities; behavioral problems; and at very high levels, seizures, coma, and death. Today, most children who are at high risk for lead poisoning live in deteriorating inner-city housing that contains lead-based paint.

NCEH provides technical and financial assistance to state and local childhood lead-poisoning prevention programs. These programs promote screening and lead-poisoning prevention. Recently, NCEH has targeted grants to states and localities in which the highest percentage of at-risk children live.

Emergency Preparedness and Response Efforts

Whether the emergency deals with anthrax-contaminated letters or natural disasters, public health preparedness is critical to our nation's front-line response. NCEH is involved in several types of emergency preparedness and response efforts.

Chemical Terrorism and Emergencies

In the event of a chemical terrorism incident, NCEH will coordinate federal, state, and local partners in assessing human health risks from chemical contamination of water, air, and food.

NCEH's environmental health laboratory develops and maintains the capacity to respond not only to chemical terrorism events but to chemical emergencies as well. The environmental health laboratory has developed the Rapid Toxic Screen, which is a set of analyses that can quickly measure blood and urine samples for 150 chemical agents. The Rapid Toxic Screen identifies who has been exposed, the chemical agent, and the level of exposure. This information is important for the public health management of people affected by a terrorism incident or other chemical emergency. The environmental health laboratory also maintains a team that is prepared to respond to terrorism and other emergencies on a 24-hour basis.

Radiologic Terrorism and Emergencies

NCEH is developing guidelines for emergency department management of casualties following a radiologic event. NCEH participates regularly in emergency response drills, working closely with other federal, state, and local agencies to develop, test, and implement extensive national radiologic emergency response plans.

Guidance to State and Local Public Health Agencies

NCEH provides guidance to state and local public health agencies to help them respond to public health emergencies. NCEH integrates epidemiologic and scientific principles into public health guidance for emergency preparedness operations. NCEH also identifies and shares best practices from academic trainings and field operations for all-hazards preparedness and response.

Environmental Public Health Services Activities

NCEH provides technical assistance and guidance to state, local, and tribal agencies engaged in environmental public health service programs.

EHS-Net

Many environmentally related conditions affect people's health. Foodborne diseases cause approximately 76 million cases of illness, 325,000 hospitalizations, and 5,000 deaths in the United States each year.

NCEH, along with the U.S. Food and Drug Administration and eight participating states, has established the Environmental Health Specialists Network (EHS-Net), a network of environmental public health specialists and epidemiologists who work to improve environmental health. For example, EHS-Net is working on a project to better understand food-handling practices and how they relate to foodborne illness. The objective is to determine the causes of foodborne outbreaks and to develop prevention strategies. When disease outbreaks do occur, NCEH is on the front line, investigating environmental factors that may have contributed to the outbreak.

Capacity-Building Efforts

West Nile virus was not detected in the Western Hemisphere until 1999, when it sickened 55 people in New York City and killed seven. By 2002, 40 states reported 4,156 cases and 294 deaths.

Many emerging public health problems require innovative environmental public health service interventions. NCEH funds programs to build state and local capacity to better prevent or respond to emerging environmental public health problems. These problems include environmentally caused diseases and environmental public health concerns related to terrorism or other emergencies. NCEH will tailor future efforts to accommodate environmental public health practitioners' specific needs.

Workforce Development

Today's environmental public health challenges extend beyond food, water, and sanitation issues. The emergence of infectious diseases such severe acute respiratory syndrome (SARS) and the re-emergence of diseases such as tuberculosis have prompted environmental health practitioners to examine how environmental health fits into the future of public health.

To better prepare our nation to respond to complex environmental public health issues, NCEH is developing strategies to revitalize the environmental public health services workforce. NCEH will recruit and train the next generation of environmental public health leaders in state-of-the-art environmental public health practices.

Environmental Public Health Tracking

The environment plays a significant role in human development and health. Some links between environmental exposures and disease, such as lead and impaired cognitive development in children, are well documented. Others, such as a possible link between disinfectant by-products and bladder cancer, are suspected but not yet proven.

NCEH defines environmental public health tracking as the ongoing collection, integration, analysis, and interpretation of data on environmental hazards, exposure to environmental hazards, and health effects potentially related to exposure to environmental hazards. NCEH is leading the creation of the National Environmental Public Health Tracking Network. The standards-based network will allow direct electronic data reporting and linkage within and across data on health effects, exposure, and hazards and will interoperate with other public health systems. NCEH also develops innovative methods and tools for tracking environmental hazards and associated health effects; disseminates environmental public health information to diverse audiences; and studies the links between environmental hazards, exposures, and health effects.

Exposure Assessment

NCEH's environmental health laboratory develops methods to measure toxic substances in blood, urine, and other biological specimens. Assessing exposure using these measurements is called biomonitoring, or biological monitoring. Biomonitoring provides information about what chemicals people have been exposed to and how much of those chemicals have gotten into them. Biomonitoring is important to help understand the level of exposure to chemicals that can cause illness, such as cancer or birth defects. The environmental health laboratory currently has biomonitoring measurements for approximately 300 chemicals in the following categories: heavy metals, dioxins, furans, polychlorinated biphenyls, organochlorine pesticides, organophosphate pesticides, carbamate pesticides, volatile organic compounds, polyaromatic hydrocarbons, phytoestrogens, phthalates, herbicides, pest repellents, disinfection by-products, and tobacco smoke.

Development of Improved Methods

NCEH's environmental health laboratory conducts applied research that leads to improved methods for biomonitoring. The goal is to

develop methods that are more accurate, precise, sensitive, specific, rugged, and cost effective. One aspect of this activity is making these analyses more available to laboratories through the use of less expensive instrumentation and portable analytic devices. For example, through a partnership with private industry, the environmental health laboratory helped develop a portable hand-held blood lead analyzer that public health workers can take to neighborhoods to screen children for elevated blood lead levels. The laboratory also transfers biomonitoring capacity to state and other labs.

Support for States

In addition, NCEH supports state investigations of chemical exposures and clusters of adverse health effects by providing biomonitoring exposure assessment. Recently, NCEH investigated a cluster of childhood leukemia cases in Fallon, Nevada, by measuring people's exposure to 132 different chemicals. Some residents had been exposed to large amounts of arsenic and tungsten. Exposure to these two chemicals did not appear to be related to the leukemia cases. However, because of the unexpectedly high levels of tungsten found in this study, the National Toxicology Program is now evaluating this chemical to determine if it causes cancer.

Health Studies

NCEH investigates the human health effects of exposure to environmental hazards ranging from chemical pollutants to natural, technologic, or terrorist disasters. The results are used to develop, implement, and evaluate strategies for preventing or reducing harmful exposures. NCEH also supports health studies through collaborative efforts with partners. Following are examples of current NCEH health studies subject areas:

Cancer Clusters

A cancer cluster is a greater-than-expected number of cancer cases that occurs within a group of people in a geographic area over a period of time. NCEH provides cancer cluster information and resources through its Web site, responds to inquiries about cancer clusters, and works with state health departments to address public health concerns about potential cancer clusters.

Environmental Chemicals

NCEH supports studies to determine the harmful effects of environmental chemicals and the exposure levels that cause ill effects. Lack of information about the exposure levels that cause health problems is the single greatest barrier to protecting the population from toxic chemicals. NCEH is helping to address this problem by collaborating with federal, state, and academic partners on approximately 80 studies that relate levels of chemicals in humans to adverse health effects. Studies are usually prompted by a known or suspected high exposure or by an investigation of a cluster of adverse health effects potentially related to chemical exposures.

Confined Animal Feeding Operations

NCEH is working with states to define routes of exposure and potential human health effects from exposures to wastes and residues from confined animal feeding operations.

Disasters

NCEH conducts research related to acute and chronic health effects from exposures to extreme heat and cold and to hazards related to natural (e.g., earthquakes, floods, hurricanes, tornadoes) and other (e.g., industrial chemical accidents, terrorism) disasters.

Pesticides

NCEH evaluates the public health impact of nonwork-related exposures to pesticides, investigates reports of pesticide poisonings, and conducts prevention activities.

Harmful Algal Blooms

NCEH is supporting surveillance programs, epidemiologic studies, and laboratory research to further define the relation between human illness and exposure to organisms involved in harmful algal blooms, such as *Pfiesteria piscicida*.

Water, Air, and Food

NCEH works with laboratory partners to determine whether human exposure to environmental pollutants in water, air, or food has occurred; to measure the extent of exposure to chemicals or toxins; and to assess ground-water and surface-water contamination.

Human Nutrition

NCEH's environmental health laboratory measures nutritional factors (e.g., vitamin A, B vitamins, beta carotene) that can affect disease risk both in the general U.S. population and in specific vulnerable populations throughout the world. The laboratory develops analytical methods, performs measurements in major surveys and disease studies, performs quality assurance for other labs, and transfers technology to other laboratories.

International Emergency and Refugee Health

In 2002, the United Nations High Commissioner for Refugees estimated that 20 million people were refugees. Refugees are often traumatized and have poor nutritional status and high rates of disease.

NCEH provides technical assistance on all health issues (including mental health issues) related to war and other complex humanitarian emergencies. NCEH often provides this assistance at the request of other U.S. government agencies, nongovernmental organizations, and United Nations agencies. CDC is the leading provider of public health-based assistance in complex humanitarian emergencies. NCEH develops operational research projects, technical guidelines, and training courses to improve the international community's response to complex humanitarian emergencies. NCEH sends staff to countries to assist emergency-affected populations by conducting health and nutrition assessments, public health surveillance, epidemic investigations, and communicable disease and war-related injury prevention and control activities.

National DNA Bank

NCEH's environmental health laboratory has established a large DNA bank from a nationally representative sample of the U.S. population. This bank is unique and valuable because it enables scientists to research genetic risk factors and determine their frequency in the general U.S. population.

National Report on Human Exposure to Environmental Chemicals

NCEH's environmental health laboratory measures the exposure of the U.S. population to environmental chemicals as part of the National Health and Nutrition Examination Survey. The *Second National Report on Human Exposure to Environmental Chemicals* was published in January 2003 and contains information about 116 different chemicals measured in the U.S. population. Mean levels and percentiles are provided for the population overall and for different age, sex, and race/ethnic subgroups. The *Second Report* is available at www.cdc.gov/exposurereport.

Newborn Screening and Chronic Disease Prevention Programs

To improve the diagnosis, treatment, and prevention of selected chronic and newborn diseases, NCEH's environmental health laboratory conducts national and international programs, including–

- CDC Lipid Standardization Program, which standardizes measurements for cholesterol and other lipids, both domestically and abroad

- Newborn Screening Quality Assurance Program, which assists labs that conduct tests to detect treatable, inherited metabolic disorders (e.g., sickle cell disease and phenylketonuria) by providing the labs with quality-control materials and technical support

- Diabetes Reference Laboratory Program, which helps improve measurements of glucose and hemoglobin A_1C

Radiation Studies

NCEH identifies potentially harmful environmental exposures to ionizing radiation and associated toxicants, conducts energy-related health research, and responds to protect the public's health in the event of an emergency involving radiation or radioactive materials.

Tobacco Activities

NCEH's environmental health laboratory develops laboratory methods and conducts smoking-related analyses, including measurements of the tobacco itself, tobacco smoke, and tobacco by-products in people. The laboratory is able to perform special measurements of cotinine (a marker of tobacco smoke exposure) that track human exposure to environmental tobacco smoke. These measurements help determine the effectiveness of tobacco-control measures, such as laws that curb smoking indoors. The environmental health laboratory collaborates on studies to understand how exposure to tobacco smoke is connected to sudden infant death syndrome, birth defects, respiratory diseases, and other serious health conditions.

Vessel Sanitation

Some of today's larger cruise vessels have the capacity to carry as many as 5,000 passengers and crew. These passengers and crew not only are at risk for illness from contaminated food and water, but also from viruses that are transmitted from person to person.

CDC established the Vessel Sanitation Program (VSP) in 1975 to protect the health of cruise ship passengers and crew. VSP is the only CDC program funded by user service fees. VSP develops comprehensive sanitation programs to minimize risks for gastrointestinal diseases. VSP not only conducts sanitation seminars for crew members but also inspects cruise ships. VSP's collaborative efforts with the cruise ship industry have resulted in an 87% decrease in disease outbreaks among passengers and crew.

For more detailed information about NCEH programs and activities, go to http://www.cdc.gov/nceh/.

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