

ENVIRONMENTAL HEALTH

The air we breathe, the water we drink or swim in, the soil beneath us, even the buildings that surround us—all make up our environment. Sometimes our surroundings harbor health hazards, both natural and man-made. CDC's responsibility is to monitor these hazards, discover how to minimize or eliminate them, and share that information to improve health.

Monitoring environmental hazards is technically challenging because it often requires techniques that can detect infinitesimally small levels of exposure—such as parts per trillion. CDC's environmental health laboratories have met this challenge many times, advancing the scientific frontiers of measuring environmental hazards. For example, CDC developed a breakthrough technique that can measure exposure to environmental tobacco smoke in small amounts of blood or urine.

Measuring exposure and levels of toxins is critical to surveillance, scientific leadership, and the design of effective interventions. CDC's environmental health programs address threats as diverse as asthma (the leading cause of missed school days), lead poisoning, radiation, response to natural and man-made disasters (such as the use and safe disposal of chemical weapons), radiation exposure, food safety, and even the sanitation on cruise ships. Whether on land, in the air, or on the water, CDC works to make the environment that surrounds us as safe and healthy as possible.

CHEMICAL WEAPONS DISPOSAL PROGRAM

WHAT IS THE PUBLIC HEALTH ISSUE?

The Department of Defense (DOD) is in the process of destroying the entire U.S. stockpile of aging and obsolete chemical weapons. The original stockpile contained 63 million pounds of chemical weapons disseminated at eight sites in the continental United States and at Johnston Atoll in the Pacific. Additional non-stockpile materials, such as buried chemical warfare materiel, are located at more than 200 sites in the United States and U.S. territories. The entire stockpile must be destroyed to comply with the Chemical Weapons Convention Treaty. The health of workers and the public near the storage and disposal sites must be protected during this process.

WHAT HAS CDC ACCOMPLISHED?

Congress has charged CDC with public health oversight of DOD's chemical weapons disposal program. To ensure protection of the public's health, CDC reviews all disposal plans. As of March 2003, more than 15.8 million pounds of chemical agents and weapons have been safely destroyed. CDC will continue to protect the public's health while managing the safe disposal of the remaining 47 million pounds of chemical agents and weapons.

Buried or abandoned chemical weapons have been removed from several sites, including Rocky Mountain Arsenal, Spring Valley (a Washington, D.C. suburb), Memphis Army Depot (TN), a residential site in Guam, England Air Force Base (LA), Raritan Depot (NJ), and Fort Meade (MD). With CDC guidance and technical assistance, the Army has implemented a rigorous chemical agent quality assurance monitoring program to ensure that appropriate corrective actions are taken if the release of a lethal chemical agent is detected. Additionally, CDC has developed baseline community guidelines for medical readiness in case of such a release.

WHAT ARE THE NEXT STEPS?

CDC has proposed revised recommendations for exposure limits to the chemical agents during disposal. Using the most up-to-date toxicity information, the revised limits will ensure that workers and persons living in nearby communities are protected from potential adverse health effects.

CDC is also helping the Army evaluate new monitoring techniques, destruction technologies (such as chemical neutralization at two sites), and system safeguards for existing disposal facilities and for those under construction. CDC provides advice regarding medical readiness at each site before disposal operations begin.

CHILDHOOD LEAD POISONING PREVENTION PROGRAM

WHAT IS THE PUBLIC HEALTH ISSUE?

- Childhood lead poisoning remains a major preventable environmental public health problem in the United States. According to recent data, an estimated 434,000 U.S. children 1 to 5 years of age have blood lead levels greater than 10 micrograms per deciliter, a level at which harmful health effects are known to occur.
- Lead poisoning can affect nearly every system in the body and cause learning disabilities and behavioral problems. At very high levels, lead poisoning can cause seizures, coma, and death. Lead poisoning often occurs with no obvious symptoms and frequently goes unrecognized.
- Children from all social and economic levels can be affected by lead poisoning. However, children living near the poverty level and in old, poorly maintained housing are disproportionately affected as are children from some racial and ethnic groups.
- The economic benefit of preventing lead exposure among children reaching 2 years of age was estimated to be on average \$213 billion in 2000.

WHAT HAS CDC ACCOMPLISHED?

In 1990, CDC established the Childhood Lead Poisoning Prevention Program which provides leadership to state and local health departments in developing comprehensive childhood lead poisoning prevention programs. Additionally CDC has

- Funded nearly 60 childhood lead poisoning prevention programs to develop, implement, and evaluate lead poisoning prevention activities.
- Provided technical assistance to support the development of state and local lead screening plans.
- Fostered agreements between state and local health departments and state Medicaid agencies to link surveillance and Medicaid data.
- Provided training to public health professionals through CDC's National Lead Training Resource Center.
- Supported the formation of collaborative relationships between CDC's funded partners and other lead poisoning prevention organizations and agencies (e.g., community-based, nonprofit, and housing groups).
- Developed the Childhood Blood Lead Surveillance System through which 46 states report data to CDC.
- Expanded public health laboratory capacity in states to analyze blood and environmental samples and to ensure quality, timely, and accurate analysis of results.

In 2003, CDC awarded \$31.7 million to 42 state and local health departments to continue their comprehensive childhood lead poisoning prevention efforts to achieve the *Healthy People 2010* goal of eliminating childhood lead poisoning as a public health problem.

WHAT ARE THE NEXT STEPS?

CDC is committed to the *Healthy People 2010* goal. CDC continues to assist state and local childhood lead poisoning prevention programs, provide a scientific basis for policy decisions, and ensure that health issues are addressed in decisions about housing and the environment.

For additional information on this or other CDC programs, visit www.cdc.gov/program

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COMMUNITY ENVIRONMENTAL HEALTH ASSESSMENT IN PERU

WHAT IS THE PUBLIC HEALTH ISSUE?

- Poverty-stricken informal settlements in peri-urban areas of Latin America have numerous environmental health problems, typically related to a lack of infrastructure and basic services.
- Residents of these communities suffer ongoing health problems related to environmental health conditions, including lack of water, sanitation, and solid waste services; poor air quality; and deficient food safety.
- National and local environmental health programs have neither the resources nor the personnel to prevent or respond to these problems. For example, the District of San Juan de Lurigancho has a population of about 750,000 people but has only 12 staff members in the local environmental health program.

WHAT HAS CDC ACCOMPLISHED?

CDC, in collaboration with CARE/Peru, applied the *Protocol for Assessing Community Excellence in Environmental Health* (PACE-EH) in the Peruvian communities of San Juan de Lurigancho and Iquitos. PACE-EH guides communities in defining and prioritizing environmental health problems and planning interventions. Members of both communities effectively worked together to define their top priority areas. For example, San Juan de Lurigancho citizens identified three problems as top priorities for intervention: lack of safe drinking water; inappropriate food handling and hygiene habits; and erratic and inefficient solid waste services.

Examples of Program in Action

- The Peru PACE-EH process has brought together various stakeholders (including community groups, government agencies, local municipalities, private enterprises, and nongovernmental organizations) to define and prioritize local environmental health problems and to develop action plans to overcome those problems. Thus, problems can be addressed more quickly and efficiently. For example, in Iquitos, the PACE-EH process has resulted in funding to implement a water and sewer project, an intervention that would not have taken place for at least 20 years according to the local public utility.
- CDC, in cooperation with CARE/Peru, has translated the PACE-EH guidebook into Spanish.

WHAT ARE THE NEXT STEPS?

CDC continues to work in cooperation with CARE/Peru to implement the PACE-EH process in three additional Peru communities: Tarapoto, Puno, and Arequipa. In addition, CDC will provide technical assistance in the implementation and evaluation of water and sanitation interventions in Iquitos.

CDC continues to translate PACE-EH guidance documents for others in Latin America and Spanish-speaking areas in the United States. For example, CDC is preparing an implementation manual titled *PACE-EH en la Práctica: La Experiencia Peruana de CARE Perú y el CDC* (*PACE-EH in Practice: The Peruvian Experience of CARE Peru and CDC*) which shares lessons learned from experiences in the first two Peruvian communities.

ENVIRONMENTAL HEALTH SERVICES WORKFORCE

WHAT IS THE PUBLIC HEALTH ISSUE?

- State and local health departments historically have been responsible for providing essential environmental health services to protect the public's health, including preventing or addressing problems with potable water, sewage systems, food safety, and vector control. However, new and emerging issues (e.g., highly toxic wastes, terrorism, newly discovered diseases) have arisen at a time when state and local capacities are limited.
- Local environmental health practitioners are the “frontline troops” in the public health battle to prevent disease, yet many have no formal training in environmental health or public health. There are currently only 23 accredited undergraduate and 3 accredited graduate programs in the field of environmental health.
- State and local environmental health programs do not have performance standards, and their activities may not coincide with community needs.
- Some state and local environmental health programs do not have the capacity to use the essential public health service approach to solve environmental health problems. Environmental health practitioners have inadequate resources to determine the role the environment plays in disease transmission. It was estimated in the year 2000 that 19,431 people are a part of the environmental health workforce employed by local health departments. This workforce makes up a small percentage of the total public health workforce and continues to shrink, further diminishing workforce capacity.

WHAT HAS CDC ACCOMPLISHED?

CDC provides funding and technical assistance to public health agencies, associations, and universities to establish programs for developing a competent and effective environmental health services workforce. The following are recent examples:

- Funded the Association of Environmental Health Academic Programs to expand the number of accredited programs teaching environmental health and to increase the number of graduates.
- Funded Tulane University and the University of Washington to develop training modules based on environmental sciences and public health for practitioners entering the field.
- Partnered with the American Public Health Association to sponsor the *Environmental Health Competency Project*, which outlines core competencies needed by environmental health practitioners to anticipate, recognize, and respond to environmental health challenges.

WHAT ARE THE NEXT STEPS?

- Create an environmental health problem-solving methodology for environmental health practitioners.
- Develop the National Environmental Health Services Corps modeled after the Epidemic Intelligence Service. This 2-year program would teach and implement problem-solving methodology as part of a state or local field assignment.
- Implement an environmental health leadership institute.
- Make available to state and local programs environmental health performance standards based on the 10 essential services of public health.

EXPOSURE INVESTIGATION

WHAT IS THE PUBLIC HEALTH ISSUE?

- According to the Pew Commission on Environmental Health, 90% of the registered voters in the United States believe that the environment plays a significant role in their health.
- More than 1,600 hazardous waste sites are included on the National Priorities List (NPL) and are targeted for clean up by the Environmental Protection Agency. About 15 million people live within 1 mile of NPL sites.
- Environmental public health is responsible for identifying and reducing adverse health effects that may be associated with exposure to hazardous substances in the environment.

WHAT HAS ATSDR ACCOMPLISHED?

The Agency for Toxic Substances and Disease Registry (ATSDR) conducts exposure investigations (EIs) to gather and analyze site-specific information to determine whether human populations have been exposed to hazardous substances. An EI is often conducted as part of a site public health assessment. EIs include

- Biomedical testing (e.g., urine, blood samples), which often indicates exposure to a contaminant.
- Environmental testing (to detect contamination of soil, water, or air) at locations near where people live, spend leisure time, or might come into contact with contaminants under investigation.
- Exposure-dose reconstruction analyses, which are used to estimate the contaminant levels that people may have been exposed to in the past or may be exposed to in the future.

ATSDR staff and partners conducted 19 EIs in 2002. Environmental risk managers and public health professionals use the information to assess the effectiveness of previous remedial efforts and intervention strategies in minimizing or eliminating human exposures.

Example of Program in Action

ATSDR, in conjunction with its cooperative agreement partner, the South Carolina Department of Health and Environmental Control, conducted an EI to assess human exposure to uranium from well-water in two South Carolina communities where drinking water had high levels of uranium. Urine samples for 105 residents were tested for uranium 1 to 3 months after the residents had stopped drinking well-water. The concentration of uranium in urine samples from 94 (90%) of the residents exceeded the 90th percentile of the national comparison population. ATSDR and state health department physicians were available for consultation with physicians about their patients' test results and follow-up medical management. Residents were supplied with an alternative water source while municipal water lines were under construction.

WHAT ARE THE NEXT STEPS?

ATSDR continues to conduct EIs for a particular site when people have been exposed to hazardous contaminants, additional information related to the exposure is needed, and/or the results from the EI could affect public health decisions. In addition, ATSDR is investigating ways to improve the EI, including using data from unexposed populations to provide comparison information and adopting innovative environmental sampling techniques.

FOOD SAFETY ENVIRONMENTAL PRACTICE

WHAT IS THE PUBLIC HEALTH ISSUE?

Foodborne diseases cause about 76 million illnesses, 325,000 hospitalizations, and 5,000 deaths in the United States each year. FoodNet data indicate that eating outside the home poses an increased risk of developing a foodborne illness. Food preparation is a complex process with many factors that may influence the safety of the food. Some of those factors include the knowledge and hygienic practices of the people who prepare food, as well as the equipment used the preparation process and inherent qualities of the food itself. To prevent foodborne illness, it is necessary to understand the factors that set the stage for outbreaks and illness to occur.

WHAT HAS CDC ACCOMPLISHED?

CDC, in collaboration with the Food and Drug Administration and eight states (California, Colorado, Connecticut, Georgia, Minnesota, New York, Oregon, and Tennessee), has established the Environmental Health Specialists Network (EHS-Net), a network of environmental health specialists who work to improve environmental health. Although EHS-Net plans to address various environmental health issues such as air and water quality, the current focus is food safety. EHS-Net has designed a project to better understand food-handling practices and how these practices relate to foodborne illness. Environmental health specialists will gather information from restaurants and other facilities where food is served outside the home. The objective is to determine what causes foodborne outbreaks and why these outbreaks occur.

Environmental health specialists evaluate food-handling practices and policies in food establishments that have had recent outbreaks, as well as in establishments with no known recent history of outbreaks or illness complaints. Data collected from these evaluations are entered into an electronic database and analyzed to identify underlying factors related to foodborne disease. This information will help environmental health specialists determine the effectiveness of existing strategies and also help them develop new prevention strategies for foodborne illness.

WHAT ARE THE NEXT STEPS?

As data from EHS-Net activities are collected, CDC will share findings with federal, state, local, and tribal food protection programs so that they can design effective food safety programs. Results anticipated for 2004 include

- Establishing policies associated with food-handling practices in restaurants that prepare eggs all day and support an egg-handling study to identify the rate of high-risk egg-handling practices.
- Conducting focus groups with food workers to determine behavioral factors, barriers, and motivations that influence safe food-handling practices.
- Evaluating the knowledge, attitudes, and behaviors of environmental health specialists regarding food safety and food establishment inspections.
- Assessing the prevalence of self-reported safe food handling practices of food workers.

HEALTH ASSESSMENT

WHAT IS THE PUBLIC HEALTH ISSUE?

- About 40,000 uncontrolled hazardous-waste sites have been reported to the federal government. Additionally, thousands of inadvertent environmental releases of toxins occur each year.
- More than 1,600 hazardous waste sites are included on the National Priorities List (NPL) and are targeted for clean up by the Environmental Protection Agency (EPA). About 15 million people live within 1 mile of NPL sites.

WHAT HAS ATSDR ACCOMPLISHED?

The Agency for Toxic Substances and Disease Registry (ATSDR) public health assessment process reviews available information about hazardous substances onsite and evaluates whether exposure causes harm to people. ATSDR assesses public health issues for every site included or proposed on the NPL and EPA maintains the information.

ATSDR looks at three primary sources of information in the public health assessment process:

- Environmental data, including information about contaminants and how people could come in contact with them.
- Health data, including available information on community-wide rates of illness, disease, and death compared with national and state rates.
- Reports evaluating if certain sites affect the health and/or quality of life in communities.

ATSDR's public health assessment process identifies health studies or other public health actions that might be indicated. The public health assessment process enables ATSDR to provide advice to EPA and other federal, state, and local agencies on actions to prevent or reduce people's exposure to hazardous substances.

In 2002, ATSDR and its cooperative agreement states performed more than 1,481 health assessment activities and prepared 159 public health assessment documents for 122 sites. Of the sites ATSDR assessed, 28.5% were found to pose a public health hazard. Of the 122 sites, 88 were NPL sites, 34 non-NPL, 4 were sites for which the community or others had petitioned ATSDR to conduct a public health assessment, and 6 were sites that were covered by the *Resource Conservation and Recovery Act* (RCRA). RCRA is a legislative act that addresses the control of hazardous substances at operating facilities. ATSDR's resulting site-specific recommendations have been widely accepted by individual sites.

WHAT ARE THE NEXT STEPS?

ATSDR is developing a certification program for those who conduct health assessments at sites. The certification program, piloted in 2003 and implemented in 2004, will provide minimum training requirements and certification testing. The health assessor certification protocol is intended to standardize the basic skills for health assessors. Continuing education requirements are also being established.

HIGH-INTENSITY TARGETED SCREENING FOR CHILDHOOD LEAD POISONING

WHAT IS THE PUBLIC HEALTH ISSUE?

- Lead poisoning is one of the most preventable environment-related health problems affecting young children, but nearly 1 million children under 6 years of age have elevated blood lead levels (BLLs) (i.e., above 10 micrograms per deciliter).
- Lead poisoning, which can affect virtually every body system, can result in learning disabilities, behavior problems, and at very high levels seizures, coma, and even death.
- To reach the goal of eliminating childhood lead poisoning by 2010, the process of screening children for lead poisoning must be improved.

WHAT HAS CDC ACCOMPLISHED?

In 2001, CDC developed the High-Intensity Targeted Screening (HITS) approach for improving the nation's ability to target and screen children for lead poisoning and prevent exposure to lead. HITS consists of the following components:

- *Door-to-Door Screening:* Teams of staffers from local childhood lead poisoning prevention programs and community members, assisted by CDC, visit homes in high-risk communities to screen children for lead poisoning.
- *Intervention:* When children are found to have elevated BLLs, their families are offered appropriate medical treatment and an evaluation of the presence of lead within their homes.
- *Capacity Building:* Local programs will use HITS data to improve lead screening plans, better direct resources, increase technical capacity, and monitor progress toward lead poisoning elimination.
- *Partnership Building:* The HITS approach requires partnerships to be developed between community members and multiple federal, state, and local agencies, which will result in a more comprehensive approach to eliminating childhood lead poisoning at the local level.

Example of Program in Action

In November 2001, the screening phase of the first HITS project in two inner-city communities in Chicago was completed. Blood samples were collected from 580 children aged 12–71 months. Preliminary analyses indicate that about 30% of these children have elevated BLLs. Data analysis is ongoing and will direct interventions. The cost of the project is estimated at \$62,000.

WHAT ARE THE NEXT STEPS?

CDC and its partners will share the results of the first HITS project and use the lessons learned to implement HITS projects in additional communities. In 2002, CDC spent \$120,000 on planning and implementing at least two HITS projects in new locations.

NON-FEDERALLY REGULATED DRINKING WATER SYSTEMS

WHAT IS THE PUBLIC HEALTH ISSUE?

- About half of the residents of some states drink water from small drinking water systems not regulated by the *Safe Drinking Water Act* (SDWA). Forty-two million of these people obtain their drinking water from private wells.
- The quality of these non-federally regulated drinking water supplies is largely unknown, but recent well surveys, periodic outbreaks of waterborne diseases, and anecdotal evidence suggest that major public health problems exist with these water systems.
- State, tribal, and local environmental health programs do not have the resources or personnel to effectively deal with these small, non-federally regulated drinking water systems.

WHAT HAS CDC ACCOMPLISHED?

CDC convened two workshops where state and local representatives from 16 states discussed concerns regarding small drinking water systems not regulated under SDWA. Participants in the workshops identified three broad areas of concern regarding the public health impact of small drinking water systems:

- State and local resources are inadequate to address small systems issues.
- Members of the public served by these small systems are often complacent about or unaware of the quality of their drinking water.
- States need technical assistance and guidance in developing and maintaining these types of small systems.

WHAT ARE THE NEXT STEPS?

CDC will work to help workshop participants implement the following:

- Provide technical assistance to state, tribal, and local environmental health agencies through regional CDC offices staffed with laboratory, epidemiology, and environmental health personnel.
- Increase public awareness of the importance of safe drinking water through public information campaigns and translate into consumer-friendly language technical information about potential adverse human health effects from drinking water contaminants.
- Consider expanding non-regulatory provisions within SDWA to include small drinking water systems.

VESSEL SANITATION PROGRAM

WHAT IS THE PUBLIC HEALTH ISSUE?

New and larger cruise vessels are being built each year, with the largest vessels carrying as many as 5,000 passengers and crew members. In 2002, about 7.4 million (up from 6.8 million in 2001) passengers took cruises to North-American ports. Both passengers and crew members are at risk for illness from contaminated food and water and other environmental sources including person-to-person disease transmission.

WHAT HAS CDC ACCOMPLISHED?

CDC established the model Vessel Sanitation Program (VSP) in 1975, which combines industry cooperation with CDC's ability to take aggressive actions to protect the health of travelers. Currently, VSP is the only CDC program funded completely by user-service fees; each vessel owner pays a fee, based on tonnage, for all inspections. The program assists the industry in developing and implementing comprehensive sanitation programs to minimize risks for gastrointestinal diseases. Every vessel that has a foreign itinerary and carries 13 or more passengers is subject to two unannounced inspections each year. Additionally, since 1989, CDC staff have offered sanitation seminars to shipboard management five times a year. In 2002, more than 140 cruise ships participated in this innovative program. VSP has demonstrated amazing success working with the cruise ship industry, resulting in an 87% decrease in disease outbreaks among passengers during the last 25 years.

In 2002, VSP's highlighted accomplishments include the following:

- Instituted an automated e-mail-based Gastrointestinal Illness Surveillance System to receive and process more than 300 cruise vessel reports per month.
- Conducted 17 gastrointestinal illness investigations.
- Conducted 235 routine unannounced inspections of cruise vessels in U.S. ports.
- Conducted 12 detailed new construction plan/drawing reviews and more than 37 final construction inspections.
- Provided several training sessions to Egyptian Inspectors and managers responsible for inspections of Nile cruise boats and hotels, which serve more than 500,000 passengers each year.
- Served on the World Health Organization committee charged with revising the *Guide to Ship Sanitation*.
- Streamlined inspection report delivery process by providing an instant draft report at the close of inspections.
- Added cruise vessels' Corrective Action Statements to the detailed online database of VSP inspection reports.

WHAT ARE THE NEXT STEPS?

CDC will continue to focus VSP operations on identifying critical areas to prevent potential disease from food, water, and other environmental sources. CDC will continue to assist U.S. and international public health agencies, the public, and the cruise ship industry in maintaining the highest public health standards for passengers and crew members aboard cruise vessels by conducting training sessions, construction plan reviews, and vessel inspections. CDC will continue its efforts to use this model cooperative voluntary public health service program as a basis for improved land-based public health programs. Finally CDC will continue working with the cruise lines to institute the most advanced measures needed to ensure the highest level of safety possible.