



CHILDREN'S ENVIRONMENTAL HEALTH

Children are not small adults. Their bodies function differently than adults' bodies—they breathe more air, drink more fluids and eat more food in relation to their body weight. As a result, children receive higher doses of everything they are exposed to, including chemicals and pollutants.

In the world of standard setting, one standard is applied to everyone. When standards are set for chemicals, they usually are based on the reactions of a 180-pound adult male, not a child. Chemicals, pollutants, food additives and even drug dosages are based on the effect they have on adults. For children, doses are higher because they eat more fruits and drink more juices, play in sand and soils and put more things in their mouths. In many instances, exposures considered safe for adults have been shown to adversely affect children. For most chemicals, data are not available on whether the current exposure standards are safe for children.

Unique Susceptibilities of Children

Children's brains and nervous, immune and hormonal systems continue to mature throughout childhood into adolescence, making them more susceptible to contaminants found in the environment. A chemical that is harmless for an adult can be devastating to a child. Children's internal organs are also still developing, which means that their liver and kidneys may not remove toxic substances as efficiently as an adult's, their gastrointestinal tract may absorb more of a pollutant and their maturing skin can more easily absorb chemicals.

Because children breathe, eat and drink more than adults relative to their body mass, they ingest more pollutants per pound of body weight, which translates to a higher dose. Children's diets often include larger amounts of raw fruits and vegetables, water and other foods, which can increase pesticide exposure. Finally, children have increased exposure to chemicals because they tend to play on the ground, where they inhale ground-level contaminants and put contaminated objects or their own dirty hands and fingers in their mouths. These behaviors dramatically increase exposure to lead and pesticides. Combined, these factors increase a child's risk of receiving harmful doses chemicals and pollutants, yet standards designed to protect the health of all people may not be protecting the most vulnerable population—children.

Setting Standards for Children

State and federal regulators are beginning to revise their standard-setting protocol to address the unique nature of children. The Food Quality Protection Act (FQPA) fundamentally changed the way EPA regulates pesticides, requiring the agency to address risks to infants and children. The act also provides for an additional safety factor, which means the maximum allowable dose is divided

by 10 to account for children's special sensitivities, unless reliable data show that a smaller safety factor will be acceptable. The safety factor is designed to ensure that tolerances are safe for infants and children. The Safe Drinking Water Act Amendment (SDWA) also requires special consideration for children.

Still, fewer than 25 percent of the 3,500 chemicals produced in amounts greater than 1 million pounds per year have been tested for their toxic effects on children. Less than half of them have been tested at all, and no data exists on whether these chemicals harm children.

Some states are acting on children's environmental health issues where the federal government is not. In California, for example, the Children's Environmental Health Act, passed in 1999, requires the state to assess air quality and toxics to ensure that standards protect infants and children, not only adults. Maryland House Bill 313, enacted in 2000, creates a children's environmental health panel to review statutes, regulations and proposed regulations to determine whether they adequately address children's needs. The panel makes recommendations to the regulatory agencies to ensure that state laws address children's vulnerabilities.

Many other states regulate specific chemicals or diseases. Almost every state has laws to protect children from lead poisoning (children are five times more likely to have lead poisoning than adults). Legislation seeking to regulate or ban uses of mercury appeared in 17 states in 2001 and passed in four—Indiana, Maine, Maryland and Minnesota. Asthma, a disease that is on the rise, was addressed in a number of states, most notably Virginia. There the Department of Health will develop a statewide comprehensive asthma management strategy.

Environmental Health Tracking

The foremost problem facing scientists and policymakers who work on children's environmental health issues is the lack of data on the effects chemicals in the environment have on children. To help fill the gap, the Centers for Disease Control and Prevention released the National Chemical Exposure Report, which documents national levels of 27 chemicals in the population. The report found that levels of lead and nicotine—which include second-hand smoke—dropped significantly in the past 10 to 20 years. The report indicated that levels of mercury and phthalates (a chemical softener used in plastics), however, may pose a risk to certain portions of the population, including children.

Beyond the federal effort, states have introduced legislation to identify and track the links between environmental hazards and illnesses. An Indiana bill seeks to establish a state registry of health problems and environmental conditions. California legislation looked at tracking chronic illness, offering information on these illnesses as they relate to the environment. Maryland, Nevada and Montana also introduced legislation to track links between the environment and health. ✦

In The Abstract

CHILDREN'S ENVIRONMENTAL HEALTH

America's Children and the Environment: A First View of Available Measures

STUDY AND RESULTS: Data was collected from the Environmental Protection Agency, National Center for Health Statistics, National Cancer Institute, Census Bureau and state environmental agencies.

The report was designed to present quantifiable measures for key factors relevant to the environment and children in the United States, to provide baseline data for analyzing trends in children's environmental health in the future, and to generate discussion between the public and policy makers and data collection related to children and the environment.

WHAT'S IMPORTANT: While some measures of environmental quality and disease morbidity decreased between 1990-1998, there remain issues of concern including:

- ✦ 1.5 million children aged 17 and younger had elevated blood lead levels. Race and poverty continue to affect a child's likelihood of having elevated concentrations of blood lead.
- ✦ The prevalence of asthma among children in the U.S. increased 75 percent between 1990-1994.
- ✦ The frequency of cancer in childhood increased from 130 cases per million children in 1975 to 150 cases per million in 1995, though this increase appears to have leveled off since 1990.

FIND THIS STUDY: *America's Children and the Environment: A First View of Available Measures* U.S. EPA's first-ever agency assessment of trends in environmental factors that may affect the health of America's children. <http://www.epa.gov/children/indicators/>

Blood Lead Levels in Young children - United States and Selected States, 1996-1999

STUDY AND RESULTS: Researchers reported on elevated blood lead levels (>10 m g/dL) for children younger than 6 years of age. Data for children ages one through five years was taken from the Center for Disease Control and Prevention's Third National Health and Nutrition Examination Survey for 1999 and data for children <6 years from 19 state surveillance systems during 1996-1998.

Overall, average blood lead levels in young children decreased approximately 80percent since the late 1970s. Across the 19 states that reported state and county level data, the county-specific proportion of children whom tested positive for elevated blood lead levels varied from 0.5percent to 27.3percent. This indicates high blood lead levels concentrated in specific geographic areas and populations.

WHAT'S IMPORTANT: Although average blood lead levels have declined, elevated blood lead levels still remain more common among low-income children, urban children, and those living in older housing. As it is a local issue, researchers suggest surveillance efforts to better target screening efforts to communities at risk.

CAVEAT: NHANES is a nationally representative survey. It cannot be used to provide prevalence estimates at the state or local level.

FIND THIS STUDY: This study can be found in the CDC's Morbidity and Mortality Weekly Report, December 22, 200/49(50); 1133-7 or at <http://www.cdc.gov/mmwr/preview/mmwrhtml/mm4950a3.htm>

National Report on Human Exposure to Environmental Chemicals

STUDY AND RESULTS: This is the first report to provide information on the U.S. population's exposure to 27 environmental chemicals including metals, organophosphate pesticides, phthalate metabolites, and cotinine (a marker of environmental tobacco smoke exposure). Data is based on blood and urine samples taken from the Center for Disease Control and Prevention's Third National Health and Nutrition Examination Survey (NHANES).

The report establishes a normal ranges for 24 environmental chemicals, found a decline in elevated blood lead levels in U.S. children as a whole; reported a 75percent decrease in cotinine levels (the marker for exposure to environmental tobacco smoke); provided a baseline to assess women and children's exposure to mercury; assisted in setting research priorities for studies on how phthalates, compounds found in consumer products, are entering the population's blood stream.

WHAT'S IMPORTANT: The report represents an initial effort to track the U.S. population's exposure to environmental chemical for use in research, program development, and policy initiatives. It establishes "reference ranges" for 24 previously undocumented environmental chemicals. The references ranges will serve as background exposure levels or baseline levels for the general population which physicians and researchers may use to test elevated exposure for targeted community populations or individual patients.

CAVEAT: The annual sample size for NHANES is relatively small. In addition, in 1999, data was collected from only 12 locations across the country. Findings from additional years will need to be combined in order to confirm the validity of the findings.

FIND THIS STUDY: This report is available online at <http://www.cdc.gov/nceh/dls/report/default.htm>

HEALTH TRACKING

The Need for a Nationwide Health Tracking Network

STUDY AND RESULTS: This testimony from Dr. Lynn Goldman to the U.S. Senate Environment and Public Works Committee outlines the need and recommends approaches for establishing a national health tracking system. Dr. Goldman, with the Johns Hopkins Bloomberg School of Public Health, examined the increase of chronic disease in America and the inability to adequately collect and analyze nationwide data. They base the proposed Nationwide Health Tracking Network is based on the principles of building a standard, coordinated collection system; providing for analysis by local health departments; immediate response to problems identified through the system; and national leadership at the federal level to prevent program isolation.

WHAT'S IMPORTANT: The report stresses the need for a tracking network for preventive purposes. The study found that comprehensive analysis of chronic disease is impossible due to inconsistent tracking and a lack of uniform state-to-state data collection standards or no tracking whatsoever. The proposal calls for tracking not only chronic diseases such as asthma, cancers and birth defects, but

also environmental factors such as exposure to heavy metals, and pesticides and drinking water contaminants. The report outlines five basic components a tracking system would need, as well as some of the costs associated with initiating such a project.

FIND THIS STUDY: This report is available online at http://www.senate.gov/~epw/gol_0611.htm

Testimony of Philip J. Landrigan, M.D., Before the U.S. Senate Committee on Environment and Public Works

STUDY AND RESULTS: This testimony highlights a study by Dr. Philip Landrigan on chronic disease, particularly the occurrence of cancers, and the need for more adequate tracking. Dr. Landrigan's study examines environmental factors contributing to the occurrence of cancers and the rise in cancer rates during the previous century. The testimony offers a "Blueprint for Cancer Prevention in the United States," consisting of disease and exposure tracking; premarket testing of all new chemical compounds for toxic and carcinogenic potential; a right-to-know policy for full public information of their communities' environmental safety; adjustment of regulatory standards to protect infants and children; and further research on cause, treatment and prevention.

WHAT'S IMPORTANT: Although the knowledge base on cancer prevention and treatment is growing, the effort to implement a prevention strategy remains stagnant. The study calls for tracking, analysis and education as a cost-effective method to prevent further rise in cancer rates. This report provides a sound, quick view of the qualitative and medical evidence for its policy proposal.

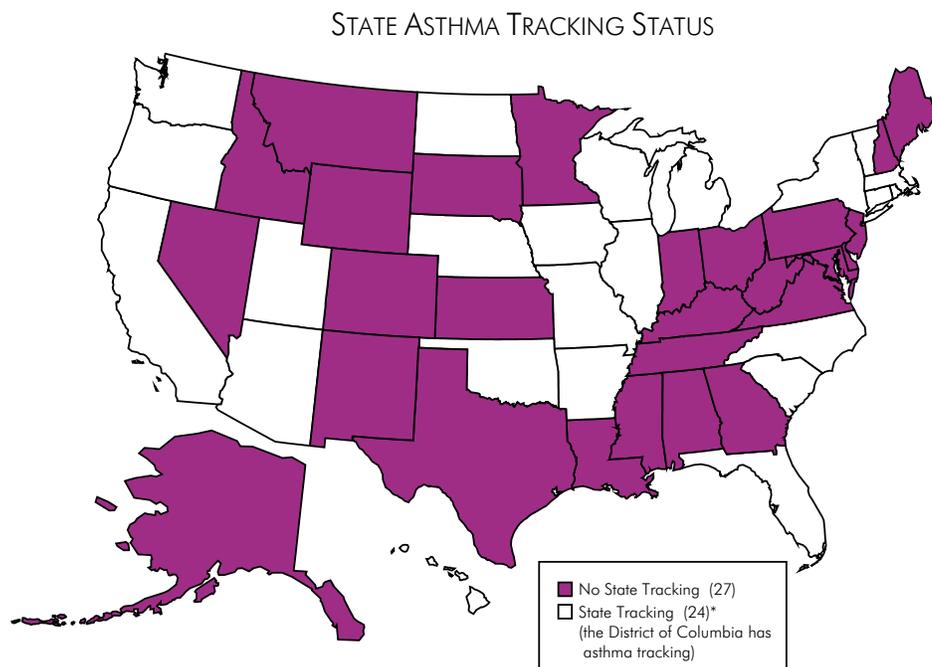
FIND THIS STUDY: This report is available online at http://www.senate.gov/~epw/lan_0611.pdf or at http://www.senate.gov/~epw/stm1_107.htm#06-11-01

Short of Breath: Our Lack of Response to the Growing Asthma Epidemic and the Need for Nationwide Tracking

STUDY AND RESULTS: This study from the Trust for America's Health examines Centers for Disease Control and Prevention data on state-level asthma tracking. The CDC data revealed that 27 states do not track the disease at all, with 12 of the 20 states with the highest exceedences of federal standards of air pollution levels among this group. The study highlights the need for a system that can determine disease prevalence and mortality rates at the local level; identify emerging problem clusters and provide quick response; reveal potential causes for further investigation; and plan, enact and evaluate long-term policies for mitigation. The report proposes a three-year action plan for the federal government to establish the Nationwide Health Tracking Network.

WHAT'S IMPORTANT: The Trust for America's Health study found that, although while health officials are receptive to the establishment of a health tracking system, many lack the resources to begin such an undertaking. The report proposes establishment of a standardized, nationwide system, using the New England Asthma Tracking Initiative as a pilot study. This pilot study then could serve as the framework for a national asthma tracking system within a broader chronic disease network

FIND THIS STUDY: This report is available online at <http://healthyamericans.org/resources/reports/shortofbreath.pdf> ✦



SOURCE: The Trust for America's Health, "Short of Breath: Our Lack of Response to the Growing Asthma Epidemic and the Need for Nationwide Tracking," July 2001, The Trust for America's Health.

Who Knows

Dr. J. Routh Reigart is a professor of Pediatrics and director of General Pediatrics at the Medical University of South Carolina. **Kimberly M. Thompson, Sc.D.**, is assistant professor of Risk Analysis and Decision Science at the Harvard School of Public Health and director of the Kids Risk Project.

Are children more susceptible to environmental pollutants than adults?

Routh Reigart: The answer clearly is yes and no. Under some circumstances children are more resistant to environmental injury, and under others they are more susceptible. However, if I had to generalize I would say children are more susceptible than adults. Virtually all environmental toxicants will have a greater effect on a developing child than on a mature adult. Children also are more affected by elements like lead and mercury.

Kim Thompson: Sometimes, but not always. Adults can be more sensitive in some instances. With acetaminophen, which is a common ingredient in pain medications such as Tylenol, it turns out that kids are less susceptible. Kids can't metabolize acetaminophen as well as adults and it's the metabolite that is harmful. In terms of children being more susceptible, most people are familiar with the dangers of lead exposure in children. It's really important to appreciate that kids are different from adults, and that they face different risks as they develop into adults.

Do current standards adequately protect children?

RR: In many cases, no. The air standards are under the most scrutiny right now people are concerned with indoor and outdoor air pollutants that may contribute to asthma. There is also particular concern about the effects of certain pesticides on children. In these cases, we need to set standards that are specifically protective of children.

KT: The question you have to start with is whether current standards adequately protect humans. I think there is some question about how we set standards: whether we go far enough in some cases and too far in others. For carcinogen risk assessment, standards usually take into account lifetime risk of getting cancer from an exposure, so children should be adequately protected in this case. There is a question, however, about how well these cancer standards were set to begin with, and whether they are appropriate for both children and adults. There might be some non-cancer health risks that would need extra protection for kids, as is the case for lead.

There tends to be a lot of uncertainty about the effects that many environmental exposures have on children's health. There is debate about whether we should act on issues of concern before that uncertainty is resolved.

RR: Clearly, you will never remove all uncertainty in every situation. But erring on the side of protection is preferable to waiting 20 to 30 years for certainty. The classic example is the lead story—it was pretty clear going into the 1900s that lead was injurious to children in many countries, but the United States waited for more perceived certainty about the child health risks. Australia got rid of lead in paint 70 years

before the United States. As a result, many millions of children were unnecessarily affected by lead. Whenever there is reasonable cause to suspect injury or potential injury, it's better to protect than to wait for scientific certainty, which may never be established.

KT: There is always uncertainty; we always try to do our best with the information that we have. We should act on issues of uncertainty by evaluating all our choices, getting better information when we can, using risk analysis to make better decisions, and reassessing as we go along. We shouldn't pass up cost-effective ways to reduce risk just because there is uncertainty. However, it's important to realize that action to reduce one type of risk might require a trade-off. If you are looking at risks in isolation, you might not see how reducing one risk might increase others.

How do we balance risks of health outcomes with costs of preventing exposures?

RR: The policy of the American Academy of Pediatrics is that we need health-based standards to protect children, meaning that if we know something is a risk, we need to fix it almost without regard to cost. Our experience is that when industries say it will cost too much to address a risk, the actual cost often is 10 or 20 times lower and the benefits are much higher. One of the classic examples was getting lead out of gasoline. The petroleum and automotive industry said it would cost too much, but we did it, and the benefits far outweigh the cost.

KT: The question boils down to how we set priorities—what are the most important things to invest in for our kids? I think we do a horrible job in this area. Most states have very little idea how much money they spend on kids and what the pay-off is for their investment. We need to evaluate programs better so we can invest in the things that are working.

What can state legislators do to help ensure that children are adequately protected?

RR: The states have a role because many environmental problems are not national in scope and the states know better than anyone else what's going on in their state. What state legislators can do is educate themselves about the risks to children. A few states, have state commissions or boards that look at children in the environment and make recommendations to legislators. These panels of experts give legislators a new perspective on the risks to children. Legislators might not be able to pick up this kind of information if they rely on things they hear or read here and there.

RT: Legislators should pay attention to how kids are doing in the state, not just in the environment but in health overall. Kids don't vote, so they don't have a lot of political power. In some respects, they are certainly an underrepresented community. That makes it more challenging to make sure people are truly representing their interests and not just putting a "kids" spin on an issue to give it more political force. ✦

What Works

ASTHMA SURVEILLANCE SYSTEMS

Statement of the problem

According to the Centers for Disease Control and Prevention (CDC), asthma affects more than 17 million Americans - including almost 5 million children - and costs the nation an estimated \$14.5 billion each year. For children age 19 and younger the death rate attributable to the disease increased by 78 percent between 1980 and 1993. In addition, asthma is the number one chronic condition that causes children to be absent from school, accounting for more than 10 million days of missed school annually. It is also the highest ranked cause of pediatric hospitalizations in the United States. On average, a child with asthma will miss one full week of school each year due to the disease. Recent reports also suggest that the incidence of childhood asthma may be increasing due to poor asthma management and education, more air pollution and limited access to care, particularly for those in inner-city neighborhoods. Some researchers suspect that reduced exposure to certain allergens and respiratory illnesses like colds as a young child may be partially responsible for the increase. It is theorized that these exposures may help build the immune system and prevent it from becoming hypersensitive to allergens.

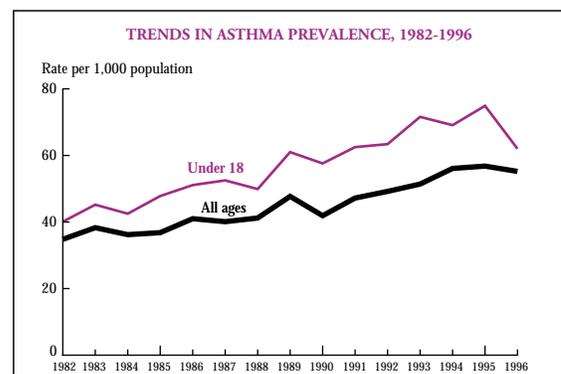
To properly respond to what is being viewed as an epidemic, public health officials and legislators are working to understand the extent of the illness and the relationship between asthma and environmental triggers. A critical element of a response to the asthma problem is a tracking or surveillance system. According to Dr. Rick Kruezer, chief of the Environmental Health Investigations Branch in the California Department of Health Sciences, characterizing the scope of asthma presents challenges to public health officials because the disease presents itself across the spectrum of the health care system. To obtain an accurate picture of the severity of the problem and guide program efforts, states will need to gather data from a variety of sources in order to target outreach and evaluate program effectiveness. Otherwise, he said, public health officials are "simply working in the dark." In a report released in July 2001 by The Trust for America's Future, researchers used CDC data to determine that most states have no ongoing asthma monitoring program. According to the study, 27 states have no timely information that describes asthma within their borders and 12 of the 20 states with the highest levels of outdoor air pollutants do not have any mechanisms for tracking respiratory disease.

Some states are beginning to respond and are developing comprehensive asthma management and tracking programs using existing state or federal data sources. Approximately 17 states have emergency room data available for surveillance purposes, 44 states have hospitalization data, and 50 have mortality data. North Carolina uses a modified version of the questionnaire from the International Study of Asthma and Allergy in Children to measure prevalence of wheezing in schools. California, Massachusetts, Michigan and New Jersey partici-

pate in the Sentinel Events Notifications Systems for Occupational Risk (SENSOR) to assess the prevalence of work-related asthma. Maine uses a respiratory health surveillance system that collects information on self-reported medications to estimate disease severity. In 2000, Virginia became the first state to pass a law that requires the development of a comprehensive asthma strategy, including disease surveillance; public and professional education; and public and private partnerships with health care providers, local school divisions and community coalitions.

In Michigan, public health officials analyze hospital discharge and mortality data on asthma to guide program efforts and inform activities of the 11 asthma coalitions across the state. In 1993, Michigan was using hospitalization reports on asthma to look for high-prevalence counties. In 1998, the state began working with local coalitions to conduct outreach and education. Recognizing the need for better surveillance data, the state conducted a needs assessment to determine the data elements and reporting format that would be most useful to the coalitions. As a result, a surveillance system was begun that will continue to evolve as the nature of the disease in the state is better understood.

The asthma program in Oregon seeks to develop an infrastructure to address asthma, a statewide asthma coalition, and a comprehensive surveillance system. Since 1999, Oregon has been using the Behavioral Risk Factor Surveillance System (BRFSS), the hospital discharge database, and death certificates to monitor the severity of the asthma problem among the adult population. Collecting data on children remains a challenge that state officials continue to address. In 2001, questions on children in the household diagnosed with asthma were added to the BRFSS. In addition, the state is working with the local school health systems and are able to use health enrollment statistics in eight school districts. Three questions have been added to the state's Youth Risk Behavioral Surveillance System (YRBSS) in their state eighth and 11th graders. California also uses the BRFSS to track prevalence in the adult population and is using the California Healthy Kids Survey (its version of the YRBSS) to monitor prevalence in fifth, seventh and 11th graders. ✦



SOURCE: Centers for Disease Control and Prevention, National Center for Health Statistics, Current Estimates from the National Health Interview Survey. Vital and Health Statistics, series 10. Hyattsville, Maryland: National Center for Health Statistics Annual.

On The Horizon

As the causes for children's diseases become more closely linked to environmental hazards, health officials and environmental officials will be forced to work more closely together. Chemicals entering the environment affect every stage of a child's physical and mental development. Humans are affected from the womb through adulthood by chemicals, toxic emissions, hazardous waste, and pesticides.

There is increasing evidence of the importance of linking environmental and public health policy as they relate to children, including the following:

- ❖ The amount of chemicals released into the environment has grown significantly since the end of World War II, making this generation the most chemical-exposed in history. According to EPA's Toxic Release Inventory (TRI), 7.7 billion pounds of chemicals were released in 1999. Fewer than half of high production chemicals (chemicals produced in quantities greater than 1 million pounds per year) have been tested for toxicity, and less than 25 percent have been tested for their toxic effects on children.
- ❖ Seventeen percent of children under age 18 have a developmental disability, such as mental retardation, autism or cerebral palsy. Environmental agents may be a factor in 25 percent of these cases.
- ❖ In 2001, an estimated 553,400 Americans will die of cancer—more than 1,500 people per day. Genetics and personal habits (such as smoking) will cause some of these deaths, but many will be caused by environmental factors. Asbestos, cigarette smoke, and a host of other chemicals have been identified as cancer-causing.
- ❖ The CDC has initiated a national report on human exposure to environmental chemicals. This report provides an ongoing assessment of the U.S. population's exposure to environmental chemicals through biomonitoring, which assesses human exposure by measuring chemicals in human blood and urine. The report currently tracks 27 chemical

agents, but will track more than 100 in the future. As the data sets grow, enough information will become available to predict levels for individual states.

- ❖ Industry is curbing the amount of chemicals released to one-quarter of what they released previously. A review of similar TRI releases from 1988 to 1999 indicates that industry dramatically reduced the amounts released, from 6.9 billion pounds in 1988 to 1.7 billion pounds in 1999. However, because the EPA now requires more industries to report and more chemicals to be reported, it sometimes appears that the amount of chemicals being released is increasing when, in fact, it is decreasing.

Yet, public health policy often remains separate from environmental policy. State health agencies act under different legislative authority, utilize different offices, and follow different missions than their counterparts in environment. The federal agencies suffer from the same fate—the U.S. Environmental Protection Agency resides in Washington, D.C.; the Centers for Disease Control and Prevention is housed 400 miles south, in Atlanta, Georgia.

In the future, chemicals will be regulated based not only on their affect on adults, but also on their effects on children. A child's smaller size; the amount of air, water and food taken in, and potential exposure levels differ from those of adults and call for different regulations. The levels of pesticides that are permitted to be released into residential areas and near schools will be child-safe; some may even be prohibited. The amount of mercury, lead and other heavy metals released into the environment also could be limited, based on their effect on children.

These acts will be accomplished by coordinated efforts between health and environmental agencies, working to ensure that children are not adversely affected by chemicals or other environmental contaminants. As the responsibilities of state health and environmental officials expand, their policies will become intermingled. Environmental health and the protection of children will bring together the two agencies. ✦

Digging Deeper

Pew Charitable Trusts funds a good information source for up-to-date news on environmental health and policy at - www.health-track.org/

CDC's National Center for Environmental Health - www.cdc.gov/nceh/

Children's Environmental Health Network - One of the original and largest children's health and environment organizations - www.cehn.org

EPA Office of Children's Health Protection - www.epa.gov/children/

Improving Kids' Environment is another source for state-oriented information - www.ikecoalition.org/

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