

## Environmental Health Tracking:

Partnering with  
Communities to  
Prevent Disease

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and Geoffrey Loma

### Unanswered Questions

Leslie Guttierrez lives in rural Kern County, California. She had eagerly awaited the births of her twin daughters, already named Marie and Maria. Suddenly, she was mourning their unexplained deaths soon after their premature births.

According to the *San Francisco Chronicle* reporters who featured her story in an investigative series on toxic contamination and infant mortality, Leslie was healthy. She did not

smoke, drink, or take drugs. And she received regular medical care during her pregnancy. So, why did Leslie's babies die?

Kern County is heavily agricultural. With its high levels of biological and chemical waste, it ranks as one of the nation's most

**Under Proposition 65 in California, businesses are being required to post warnings about the dangers of mercury contamination in some fish.**

polluted counties. The *Chronicle* analyzed infant mortality information between 1992 and 2001 and found that the death rate among Hispanics was twice as high in Leslie's zip code than in California as a whole.

### Conflicting Messages

In San Francisco, Matthew Davis was by all measures a healthy child. However, as reported by the *San Francisco Chronicle* and *The Wall Street Journal*, Matthew's school performance began to drop in the 5<sup>th</sup> grade. This sudden



decline followed the appearance of problems that were later diagnosed by a neurologist as symptoms of mercury poisoning. The suspected cause was high consumption of canned tuna. Tuna was Matthew's favorite food, and it was considered a healthy choice by his parents.

Fortunately, Matthew's symptoms have ceased since he stopped eating canned tuna. However, public policies have not changed, and consumers are not alerted to the risks of exceeding the U.S. Food and Drug Administration's recommended consumption of canned tuna (not more than one 6-ounce serving—one average meal—of canned albacore tuna or two 6-ounce servings of canned light tuna per week).

Stories like these are common in newspapers across the country. There is growing concern about the link between environmental pollutants and a wide range of illnesses, from respiratory, neurological, and immune disorders to cancer. These concerns led to the creation of the Pew Environmental Health Commission, which in September 2000 issued a report calling for the creation of a nationwide environmental health-tracking network.



*“Disease tracking is the most basic and necessary tool for disease prevention and control. The fact that America, the most technologically advanced country in the world, does not have such a national system in place in the 21<sup>st</sup> century is a tragedy. This is the key to saving millions of lives.”*

Shelley Hearne  
Trust for America's Health

### A National Call to Action

In 2001, in response to the Pew Commission report and other calls to action, Congress appropriated funds to the Centers for Disease Control and Prevention (CDC) to “improve the health of communities” by developing a system to assess data on environmental hazards and exposures in relation to data on health conditions. In 2002, the CDC awarded grants to 17 states, 3 local health departments, and 3 schools of public health to begin to develop a national environmental public health-tracking network. The CDC noted, “The environment plays an important role in human development and health. Researchers have linked exposures to some environmental hazards with specific diseases; for example, exposure to asbestos and lung cancer. Other associations between environmental exposures and health effects are suspected but need further research; for example, the link between bladder cancer and exposure to disinfectant by-products.”

Through the CDC grants in 2002, California received funds to establish a center of

excellence in Environmental Public Health Tracking at the University of California, Berkeley. The state also received funds to establish the California Environmental Health Tracking Program, under the joint administration of the Department of Health Services and the California Environmental Protection Agency.

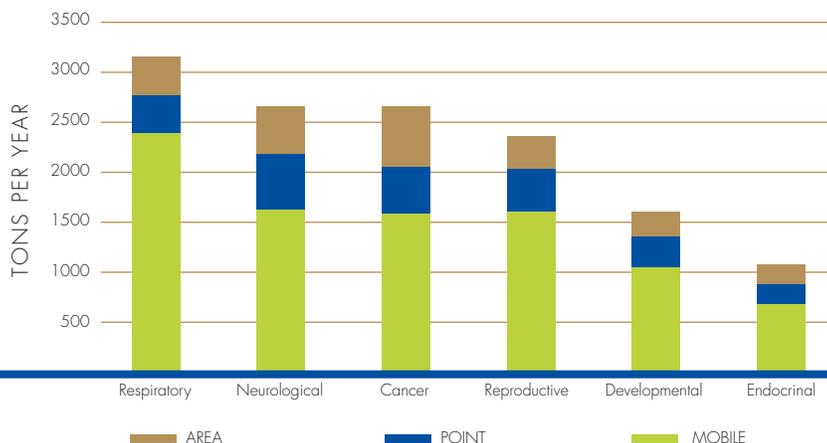
### Cause for Concern

The two stories cited above are just a few of many recent warning signs. Approximately 7 out of every 10 deaths in the United States are caused by chronic diseases, and there is growing scientific evidence that environmental factors (e.g., pesticides and toxic air pollutants) are strongly linked to many chronic diseases, including asthma, birth defects, and cancers. For example, benzene exposure is known to cause cancer in humans. Benzene is commonly found in the air, and the exposure allowable by current law is <1ppm. A recent study led by Martyn Smith and published in the journal *Science* found that even lower exposures to benzene are associated with reduced blood cell counts and that people with certain genetic traits are particularly susceptible to benzene's toxic effects.

A research team led by Patricia Buffler is examining the links between leukemia risk and exposures to pesticides, metals, solvents, polychlorinated biphenyls (PCBs), and polyaromatic hydrocarbons (PAHs). Buffler's team has found that indoor exposure to pesticides early in life may increase the risk of developing childhood leukemia, which was the most common cancer diagnosis for children in the 25 years from 1973 to 1998.

Children are particularly vulnerable to environmental disease, including asthma, and the incidence of childhood asthma is increasing dramatically. Several studies have demonstrated a rise in the morbidity, mortality, and prevalence of asthma. One recent study attributed 30% of

**Estimated Tons per Year of Hazardous Air Pollutants by Potential Health Effects in California**



Source: ARB, 2003. Reprinted from *Strategies for Establishing an Environmental Health Surveillance System in California*.



such as pesticides, industrial chemicals, and emissions. It would take into account stationary sources of pollution (such as factories and farms) as well as mobile sources such as cars, trucks, trains, and shipping. Using an innovative technique

called geocoding, researchers can estimate the total exposure in a specific geographic area, such as a community, city, or county.

This ability to estimate geographically related exposure has immense value for scientific inquiry. It allows researchers to generate hypotheses about the relationships between pollution levels and people’s health. A health-tracking network also allows researchers to monitor pollution levels over time and evaluate the effectiveness of policies intended to prevent or control pollution. Further, the tracking provides reliable information about potential health risks and thereby enables local residents to undertake their own prevention efforts.

### Potential Benefits

As part of its planning efforts, the California Environmental Health Tracking Program (CEHTP) conducted a needs assessment with representatives of local health and environmental agencies and community-based and non-governmental organizations. The responses underscored the new program’s potential. According to respondents, the information yielded by environmental health tracking can help communities:

- advocate for changes in land use policies
- track changes in air quality
- [track] changes in the health status of residents
- implement environmental justice policies in our communities.

Increasingly, people want access to local data, and they want to be involved in discussions of environmental health hazards.

asthma exacerbations to environmental exposures. Research is also showing that prenatal exposures to environmental contaminants like secondhand smoke can increase the risk of childhood asthma.

While asthma is increasing significantly across all age groups, among children it is the leading cause of hospitalization and school absenteeism, and the most common chronic health condition. Asthma disproportionately affects residents of lower-income communities, who are more likely to live near factories and highways and are thus exposed to more air pollution. Asthma problems in these communities are compounded by the fact that residents often lack health insurance and generally have less access to preventive health care.

### A New Tool

Environmental Health Tracking is the ongoing and systematic collection, analysis, and dissemination of information about environmental hazards and exposures, and the health effects that are potentially related to these exposures. An environmental health-tracking network would compile information about major pollutants,

## Examples of Environmental Hazards for Tracking

### Persistent Organic Pollutants

PCBs and Dioxin

Polybrominated Flame Retardants

Phthalates

### Metals

Chromium

Lead

Mercury

### Pesticides

Carbamate

Organophosphorous

Organochlorine

Other Pesticides

### Proposition 65 Chemicals

### Air Pollutants

Criteria Air Pollutants

Hazardous Air Pollutants

### Water Pollutants

Chemical Pollutants

Pathogens

### Hazardous and Solid Waste

### Indoor Hazards

Environmental Tobacco Smoke

Molds

Radon

Asbestos

Volatile Organic Compounds

### Occupational

Radiation

Lead

Other OSHA Hazards

Reprinted from *Strategies for Establishing an Environmental Health Surveillance System in California*.

**“We would have a better sense of which chemicals or exposures to target and ... stronger cases in pushing for progressive policies, either to phase out the worst chemicals or to push for safer alternatives.”**

*Needs assessment respondent*



However, they have limited information about the health effects of exposures to environmental contaminants and about specific local hazards.

Up to now, government

agencies have poorly understood local needs.

Local input is not comprehensively sought and local participation in statewide planning efforts has not been adequately facilitated.

Public health surveillance systems were developed with the assumption that researchers and government officials are the primary users of environmental and health information. The CEHTP needs assessment identified a much broader constituency.

Meena Palaniappan of the Pacific Institute for Studies in Development, Environment, and Security in Oakland, California points out that “Community-driven environmental health research has led to many key victories in improving health and quality of life in communities that suffer the most. In West Oakland, putting research in the hands of residents led to the closure of the Red Star Yeast factory, the number one fixed source of toxic air pollution, leading the way for the development of a transit village in the community.

Environmental health tracking puts residents in a powerful position to identify and solve problems in their communities and build safer, healthier places to live.”

### Essential Partners

Tracking uses current information sources, such as disease registries and environmental monitoring, but new data sources are needed to fill gaps in our knowledge. In addition, for an environmental health-tracking network to be effectively implemented, community needs must

be considered—in planning, outreach, education, and capacity building.

A comprehensive data system depends on community partnerships. Community members can play useful roles in both collecting and using data. They have knowledge of local health risks and health problems. However, there is often a disconnect between the evidence that community members believe warrants action and the evidence that technical experts accept as sound science.

### Good Science vs. Bad Science

When experts say that they base conclusions on sound or good science, they imply that policies should only be based on certain kinds of evidence. This approach undermines constructive partnerships with communities. First, it suggests that other kinds of knowledge are based on bad science. Second, it perpetuates the assumption that non-experts advocate positions based on ideology, not scientific evidence. As a result, a subtle division takes place, where some ways of knowing are accepted while others are marginalized.

Ronnie Neff and Lynn Goldman of Johns Hopkins University recently noted that pressures to adhere to “sound science” elevate the value of technical information above other values in decision-making. This leads to the exclusion of the public, which in turn leads to both public distrust and the loss of potential public health safeguards. For example, insistence on “sound science” in assessing the health risks from dioxin, a byproduct of the manufacture of chlorine, has resulted in “almost 20 years of waiting for regulation...for a substance still classified as the most potent carcinogen.”

Communities are looking for scientifically valid information on health and the environment. Where the public and professional sectors tend to differ is in the interpretation of scientific knowledge and its application to policy. For example, both researchers and community groups agree that emissions from power plants are a major

*“Community-driven environmental health research has led to many key victories in improving health and quality of life in communities that suffer the most.”*

*Meena Palaniappan  
The Pacific Institute*

*While researchers point out that dioxin in the environment has not been linked to any particular health problems, community members believe the carcinogenic effects of dioxin shown in laboratory studies are sufficiently serious to warrant regulatory action.*

source of mercury contamination in fish. Neither sector can yet prove that mercury poisoning caused Matthew Davis's illness. However, community groups are pursuing policy change to reduce what they conclude is a serious health risk. They are advocating for changes to the Clean Air Act to reduce contamination of an important food source.

### **Risk Assessment**

The common framework today for environmental regulation is risk assessment. Risk assessors utilize information about the biological effects of chemical agents in models designed to quantify the probability of disease, generally cancer, resulting from exposure to a chemical agent. Regulatory action taken to reduce, eliminate or otherwise control exposure depends on predicted probability of harm. The combined effect of (1) limitations in knowledge about biological effects in human populations (data generally come from rats and mice), (2) lack of consideration about the combined effects of multiple chemical exposures, and (3) uncertainty resulting from the extrapolation procedures used in models, results in a high degree of uncertainty in predictions. Risk assessment is a tool for making consistent regulatory policy decisions, but it is clearly not an exact science. It is useful to keep in mind when setting policy that, as such, risk assessment is itself a social construct.

### **The Precautionary Principle**

Community and non-governmental organizations in the United States, along with governments in Europe, have articulated an alternative policy framework for addressing environmental health hazards. Known as the precautionary principle, it is based on the conclusion that risk assessment is an inadequate tool for assessing the effects of simultaneous exposure to hundreds of known toxic compounds. Jeanne Rizzo, executive director of the Breast Cancer Fund, notes that, "while we cannot possibly track everything and ... there will be limitations of science, ... we can, as citizens of this planet, parents, partners, and friends, call for the paradigm shift that will serve the next generation—one of precaution, rather safe than sorry, do no harm."

Policies based on the precautionary principle are supported by science, as are policies based on risk assessment. Communities and local governments

*Communities and local governments are embracing a precautionary policy framework due to frustration over increases in chronic diseases, such as asthma, that are strongly associated with environmental exposures.*



are embracing this new policy framework due to frustration over increases in chronic diseases, such as asthma, that are strongly associated with environmental exposures. However, current efforts advocating the formal adoption of the precautionary principle are viewed by some as leading to costly regulatory action without sufficient scientific basis.

**West Oakland residents demonstrate against a source of pollution in their neighborhood.**

Photos courtesy of the Pacific Institute.

### **Precaution Isn't New**

In 1964, the U.S. Surgeon General issued a precedent-setting report calling for action to reduce tobacco smoking, despite the lack of absolute causal evidence linking smoking to lung cancer. The Surgeon General convened an Advisory Committee to examine the available evidence on smoking and lung cancer; their report concluded, "Cigarette smoking is a health hazard of sufficient importance in the United States to warrant appropriate remedial action."

Environmental health advocates suggest that this precedent should be applied to other exposures of concern, and there are some

indications of change. In 2003, California passed a law to phase out products containing PBDEs (polybrominated diphenyl ethers) flame retardants beginning in 2006. High levels of PBDEs have been found in wildlife, women's tissue and breast

milk, raising concern about potential long-term damage to children's brains during pregnancy.

### **Prescription for Change**

The assumption that technical knowledge and policy action is strictly the domain of scientific experts leads to the marginalization of differing points of view. Recognizing the validity of multiple points of view, both technical experts and laypersons are seeking ways to collaborate effectively.

**Resist false dichotomies.** The creation of dichotomies is reinforced in many social contexts. Dichotomies are frequently used in political discourse, for example, to define opposition. However, they oversimplify issues and breed resentment and distrust. We need to avoid creating a dichotomy between policies based on risk assessment and policies based on

precaution. Both approaches have a scientific basis; both offer valid rationales for taking action. And when we rely only on a risk assessment approach we often miss health problems at earlier stages, when prevention is still possible.

**Embrace ambiguity.** Environmental problems are social constructs informed by social values as well as science. How we conceive a problem will define the solutions we seek. Thus, many people believe that sustainable solutions must be developed through broad policies, such as those designed to encourage clean energy and green production processes.

**Allow for complex solutions.** A good or effective solution can accommodate many perspectives on the problem. We need to trust that the process will support the best solution for any particular problem and take into account the importance of the problem's social context.

For example, we issue a fish advisory to address the problem of people eating mercury-contaminated fish. However, we could, with equal validity, define the problem as the lack of clean energy and green production processes in power plants and mines. This construction of the problem does not diminish the value or need for a fish advisory, but it serves to articulate an "up stream" and sustainable solution to an exposure of concern.

For this to happen, it is important that technical experts recognize the legitimacy of a focus on the primary sources of pollution, not just a specific chemical or compound as it shows up in a food or place.

**Recognize diverse values, especially when setting policies.** Technical expertise is a good thing, but should not be placed above other human values, including the value placed on a non-harmful environment. Technical knowledge is one kind of knowledge that can help stakeholders define issues. Professionals such as regulators may be required to apply a specific scientific approach. But when it



comes to creating policy, it is important to consider other kinds of expertise.

**Create open dialogue.** Technical experts often feel compelled to respond to every issue that emerges in a discussion, and they may be so focused on the technical content that they fail to hear people's stories and values. Using a facilitator or otherwise delegating control of a dialogue can help create an atmosphere where everyone's voice is heard. Stakeholder participation should not be used to confer a stamp of approval on a "cloaked" predetermined position. Participatory action is an art.

**Develop tools for clear communication.** We need to develop a common and understandable language for discussing environmental health issues and sharing data and research results. Communities need and want technical assistance to help them understand and use environmental health tracking data, and experts need to find ways to communicate technical information to the general public.

## A Common Goal

Both community members and technical experts are stakeholders in the fight to reduce disease. Both need better information on environmental health hazards. We need to work together to analyze and disseminate this information, so that we can take action to prevent illness. The ability to act on early warnings is a fundamental goal of environmental health tracking: to identify and mitigate risks, such as the high concentration of toxins that may have contributed to the premature death of Leslie Guttierrez's twins and compromised Matthew Davis's central nervous system. Informed and involved communities can play a critical role in alerting scientists to emerging problems, in defining issues and generating data, and in developing policy interventions that prevent—not just treat—disease.

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## To Learn More

- Berkeley Center for Environmental Public Health Tracking: <http://ehtracking.berkeley.edu>
- CDC National Environmental Public Health Tracking Program: <http://www.cdc.gov/nceh/tracking/>
- California Environmental Health Tracking Program: <http://www.catracking.com>

## **About the Center**

Health Research for Action—formerly the Center for Community Wellness—is a center in the U.C. Berkeley School of Public Health. Our mission is to conduct and translate research into successful resources and programs for the public to reduce health disparities and create more hopeful, empowered communities. This issue of Perspectives was produced in collaboration with the Berkeley Center for Environmental Public Health Tracking.

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