

University of California Berkeley, School of Public Health

Center for Environmental Public Health Tracking

Description of Projects and Investigators

March 2006

Vision for EPHT

We are working to advance the vision of a nationwide Environmental Public Health Tracking (EPHT) network that provides and communicates information about relationships between environmental factors and health to all relevant audiences, including policy-makers and community stakeholders.

One focus of our academic center is to work toward drawing upon the full body of knowledge available from the research community in assessing options and making decisions about use of tracking resources. We see a need for a process for making such decisions that is transparent, recognizes other concerns that are also relevant, and includes information needed to address disparities in exposures and outcomes.

We support a sustainable network that has a governance structure that represents the necessary partnership among environmental and public health agencies at the federal, state, and local levels.

What We've Been Doing

Since its inception, the Berkeley Center for Environmental Public Health Tracking (BCEPHT) has worked with the CDC and partner health departments to achieve the national goals:

- 1) build a sustainable national EPHT network;
- 2) enhance EPHT workforce and infrastructure;
- 3) disseminate information to guide policy, practice, and other actions to improve the nation's health;
- 4) advance environmental public health science and research; and
- 5) foster collaboration among health and environmental programs.

During our first three years, the BCEPHT worked in five component areas. The work of these components included efforts to improve asthma surveillance for EPHT, better understand uncertainties inherent in the use of biomonitoring data, develop measures to represent and interpret data about environmental factors and exposures, integrate EPHT activities across public health and environmental sectors to support policy action, develop approaches to the incorporation of environmental justice and health disparities in EPHT, conduct an epidemiological study of the relationships of asthma outcomes with air pollutant exposures using

California Health Interview Survey (CHIS) and air quality monitoring data, and provide training to state partners relevant to the building of the EPHT network. With the significant funding reductions and diminished scope of activities in the 2005 RFA for Academic Partners, the CHIS study and the training component for state partners will no longer be supported.

A few of the notable achievements of the BCEPHT during the first phase of EPHT were the facilitation of an ongoing regional-level dialogue among Western State Tracking Partners, facilitation of the development of a regional collaboration among EPHT state programs and the CDC-funded Rocky Mountain Biomonitoring Consortium (the Western Tracking and Biomonitoring Collaborative), leadership roles in a national dialogue about the role of indicators in EPHT, the organization of the national EPHT workshop held in San Francisco in October 2004, development of an analysis of issues related to the use of birth defects data in tracking, and discussions about the inclusion of metrics that capture disparities in EPHT and the generation of information from EPHT that is of value to policy audiences.

What We Plan to Do

Overall Goal

Our overall goal is to continue our work to support increased capacity for EPHT by developing methods and analyses that can contribute to better ability of both technical and non-technical audiences to understand relationships among environmental factors (hazards), exposures, and health outcomes and to act on this knowledge to protect health at the national, regional, and community levels. Our projects related to each of the areas noted in our vision statement are briefly described below, along with the lead investigator for each topic.

Goal I. Work toward the integration of the full body of knowledge available from research in decisions about use of tracking resources and support a process for making such decisions that is transparent, recognizes relevant policy and stakeholder concerns, and includes information needed to address disparities in exposures and outcomes.

Asthma Surveillance

Asthma has been identified as a priority condition for the national EPHT program. Unfortunately, asthma surveillance data, like surveillance data for most chronic diseases, remain relatively limited. Existing surveys provide prevalence data with inadequate geographic resolution to be useful for specifically characterizing asthma burden in local communities. Hospitalization and emergency department visit data do not adequately capture the burden of asthma in communities. We are using our experience in conducting research regarding the impact of environmental factors on asthma in an effort to provide improved surveillance of asthma for EPHT. We sponsored a workshop in October 2004 that allowed for discussion among researchers on the effects of air pollution on asthma and state partners to identify strategies to improve asthma surveillance for EPHT. Consensus emerged at this workshop on several key points: 1) a focus on asthma among children has the greatest potential public health impact; 2) school-based approaches are efficient for surveillance of asthma among children; 3) some state programs have had

success with surveillance conducted by school nurses; 4) in school districts that do not have many nurses, the use of a brief, self-administered student questionnaire [specifically, the survey instrument developed for the CDC-funded “Oakland Kicks Asthma” (OKA) program] may be an alternative approach.

Advantages of the OKA survey instrument are that it can provide information on severity as well as prevalence of asthma and on children with probable, but undiagnosed asthma. Potential disadvantages are that limited school resources might be impacted and Family Education Rights and Privacy Act (FERPA) restrictions might be invoked in certain school districts. Because of its potential advantages to school districts with low numbers of school nurses, this survey approach to asthma surveillance in schools should be validated through comparison with other methods, such as school nurse reporting. Because school surveys may be difficult to implement in some districts, feasibility and costs need to be carefully evaluated.

To develop capacity to obtain ongoing local-level asthma prevalence and severity data for EPHT, we will “beta-test” this school-based, survey approach in Fresno, CA; compare prevalence estimates from the school survey instrument with prevalence estimates from school nurse-based surveillance programs in CT and MA; and collaborate with the CA EPHT program to determine whether any indicators used in that program’s managed care-based surveillance pilot project can estimate asthma prevalence and/or severity in Oakland and to study the relationship of exposure to pesticides (and other environmental factors) and asthma outcomes in Fresno. One of the main products of this research will be a careful “real-world” testing of a promising alternative approach to asthma surveillance for EPHT. (Balmes, Mann, Tager)

Assessment and Characterization of Environmental Factors (Hazards) and Exposures

Hazard and exposure information relevant to EPHT includes source/emissions data, environmental monitoring data, biological monitoring data, and time-activity-location data for target populations when available and relevant data. In spite of the clear need for EPHT to make use of data about environmental factors to characterize populations with respect to hazards, there is limited capacity for such activities within communities, state agencies and federal agencies. To improve methods to assess and characterize environmental hazards and exposures, we will merge biomonitoring data with geographically based emissions and environmental sample data to increase the relevance of hazard indicators; and develop new approaches to combine the geographic distributions of environmental factors with information on human population distributions and activities. This is important because biomonitoring data alone do not always capture exposures to environmental hazards. (McKone)

Western Tracking Biomonitoring Collaborative

We helped to establish this new group with the goal of facilitating dialogue among state EPHT programs, the Rocky Mountain Biomonitoring Consortium programs, and other state public health laboratories and departments about possible regional biomonitoring projects. We look forward to participating with our WTBC partners in the important discussion of how biomonitoring data might best be used in EPHT. We will also be participating in a project run by the Berkeley Superfund Basic Research Program that

addresses issues related to the use of biomonitoring data in environmental health research and surveillance. (Balmes, McKone)

Environmental Justice and Health Disparities for EPHT

We will develop methods to address environmental justice and health disparities in EPHT. We plan to assess the capacity and limitations of key data sets for integration of environmental justice and health disparities information into EPHT, including major national data sources and those identified by EPHT partner states; identify current practices, and propose a set of recommended practices for tracking environmental factors (hazards) and exposures by race/ethnicity and socioeconomic status (e. g., income, education, occupational status); continue to explore and assess conceptual approaches for environmental justice and health disparities information in EPHT; and disseminate key findings. We plan to collaborate with colleagues from Brown University, the states of California and Oregon, the US EPA, the National Center for Health Statistics, and other interested parties in this project. We also plan new analyses to assess factors that influence the school environment, indoors and outdoors, how these vary by race/ethnicity and SES, and how they are related to performance metrics. We plan to collaborate with colleagues from Brown University and others on this project. (Kyle)

Goal II. Advance a nationwide Environmental Public Health Tracking (EPHT) network that provides and communicates information about relationships between environmental factors and health to all relevant audiences including policy-makers and community stakeholders in ways that support policies to prevent disease.

Measures for hazards and exposures

Develop sets of measures that represent and interpret currently available data about hazards and exposures. We will extend our work on the development of measures and indicators to consider hazardous air pollutants, to better reflect the different kinds of information that can be relevant to EPHT (i.e., the differences between data about sources, releases, ambient concentrations, and concentrations in exposure media of environmental agents), and to address biomonitoring data. We will also continue to participate in and support the work of the State Environmental Health Indicators Collaborative. (Kyle)

Data for policy audiences on environmental factors and childhood asthma

Use a case study focused on environmental factors that contribute to asthma in children to develop communication tools to disseminate to state health and environmental agencies information that will support actions to address pertinent environmental factors. This work will be done in collaboration with the Environmental Council of the States and the Association of State and Territorial Health Officials, as well as the Office of Children's Health Protection at the US Environmental Protection Agency, and address issues related to the development and presentation of information to policy will audiences. (Kyle)

Monitoring and surveillance for lead

Conduct a case study of possible approaches to surveillance of lead, including sources, exposures, and health effects, to consider whether there are options or approaches that may allow for earlier identification of targets for intervention than use of blood lead levels. We will also consider the implications of universal compared to targeted surveillance of blood lead. This project will be done in collaboration with the Missouri EPHT program and US EPA. (Kyle)

Goal III. Support a sustainable network that has a governance structure that represents the necessary partnership among environmental and public health agencies at the federal, state, and local levels.

Tracking Consultative Group

We have established a consultative group among EPHT program partners, including those of our former western state partners who are interested, but also including other states, as well as other partners to build capacity through on-going communication of relevant knowledge, project accomplishments, barriers, and lessons learned. (Kyle and Balmes)

Training for the nation's future EPHT workforce

We will establish internships for students at UC Berkeley that will train them in EPHT through participation in a research project relevant to tracking, involvement in the activities of the BCEPHT and its partners, and appropriate course work (all BCEPHT investigators).

About Us

The BCEPHT is a multi-disciplinary team of investigators with expertise in the fields of occupational and environmental medicine, toxicology, environmental epidemiology, exposure analysis, statistical and probabilistic modeling, risk assessment, environmental justice, and environmental policy.

Our web site is: <http://ehtracking.berkeley.edu>

John Balmes, MD

Dr. Balmes has been the Director of the BCEPHT since its inception in 2002. He is a pulmonary physician who is Professor of Medicine at UCSF and Chief of the Division of Occupational and Environmental Medicine at San Francisco General Hospital. He is also Professor of Environmental Health Sciences in the School of Public Health at UC Berkeley where he is Director of the Northern California Center for Occupational and Environmental Health. Dr. Balmes has an active research program in the area of occupational and environmental respiratory disease that involves controlled human exposure studies of acute effects and epidemiological studies of chronic effects of air pollutants. He is currently funded to investigate genetic risk factors for ozone-induced airway inflammation, the long-term effect of exposures to air pollutants in a cohort of

children with asthma in Fresno (the Fresno Asthmatic Children's Environment Study), the effects of various environmental factors on lung function and severity of disease in a cohort of asthmatic adults in northern California, and the chronic respiratory effects of biomass smoke exposure in a cohort of children in rural Guatemala.

E-mail : john.balmes@ucsf.edu

Phone: 510-643-4702

Patricia A. Buffler, PhD MPH

Patricia A. Buffler is professor of epidemiology and Dean *Emerita* at the University of California Berkeley's School of Public Health. In addition to teaching, Professor Buffler is the Principal Investigator of the NIH-funded, Northern California Childhood Leukemia Study (NCCLS), an epidemiological investigation of childhood leukemia in Northern and Central California. Other research interests include evaluating the role of genetic factors and environmental exposures, including exposure to tobacco smoke, in the etiology of childhood leukemia and childhood brain tumors. Professor Buffler has served on numerous national and international advisory groups, and was recently appointed to the Kenneth and Marjorie Kaiser Endowed Chair. She is a member of the Institute of Medicine.

Amy D. Kyle, PhD, MPH

Dr. Kyle holds research and teaching appointments in the Environmental Health Sciences Division at the School of Public Health at the University of California, Berkeley and is a co-investigator of the BCEPHT, a co-investigator on a multi-year project to develop measures reflecting children's environmental health, and director of the research translation core for the UC Berkeley Superfund Basic Research Program. Early in her career, she spent 13 years in public service in environmental protection, natural resources management, and public health and retains a keen interest in improving public health practice. Her research currently focuses on translation of scientific results for policy and stakeholder audiences; development of methods to represent multiple exposures and multiple effects; approaches to integrate expert and lay views into analytic-deliberative processes relevant to policy discussions with technical elements; policy approaches relevant to persistent pollutants; and children's environmental health. She teaches graduate students in environmental health science disciplines about the role of science, as well as other factors, in policy and how to communicate with non-technical audiences. She works with a variety of non-governmental and public interest organizations and serves on the California Breast Cancer Research Council, the board of counselors for the Environment Section of the American Public Health Association, and the Committee on Emerging Contaminants of the National Academy of Sciences. She has traveled extensively in the backcountry of Alaska, particularly the Arctic Wildlife Refuge (by foot) and fiord country of Southeast Alaska (by kayak) and has an enormous number of slides on her laptop.

E-mail: adkyle@berkeley.edu

Phone: 510-642-8847

<http://socrates.berkeley.edu/~adkyle/>

Jennifer Mann, PhD, MPH

Dr. Mann holds a research appointment in the Environmental Health Sciences Division at the School of Public Health at the University of California, Berkeley and is a co-investigator of the BCEPHT as well as on the Fresno Asthmatic Children's Environment Study. She has worked in public health departments at both the state (CA) and local (San Francisco) levels for many years. She is an environmental epidemiologist with research interests in both the health effects of air pollution and asthma surveillance. She organized and led the Asthma Surveillance for EPHT workshop at the national EPHT meeting in San Francisco in October, 2004.

E-mail: jennman@berkeley.edu Phone: 510-643-4531

Thomas E. McKone, PhD

Thomas E. McKone is a Senior Staff Scientist and Deputy Department Head at the Lawrence Berkeley National Laboratory and an Adjunct Professor and researcher with the School of Public Health at the University of California, Berkeley. His research interests include the development, use, and evaluation of models and data for human-health and ecological risk assessments; chemical transport and transformation in the environment; and the health and environmental impacts of energy, industrial, and agricultural systems. He is responsible for the development of CalTOX, a model first used by the California Environmental Protection Agency to conduct multimedia risk assessment for hazardous waste and air pollutants. More recently, CalTOX has been used for assessing the behavior of persistent pollutants and for life-cycle impact assessments. In addition to his research and teaching activities with the University of California, Dr. McKone is active in other research, regulatory, and professional organizations. He has been a member of several National Academy of Sciences Committees and served six years on the EPA Science Advisory Board. He is past-president of the International Society of Exposure Analysis (ISEA) and has been on consultant committees for the Organization for Economic Cooperation and Development (OECD), the World Health Organization, the International Atomic Energy Agency, and the Food and Agriculture Organization. He was a member of the Expert Working Group, California Environmental Health Tracking Planning Project and is also currently a member of the Advisory Council of the American Center for Cycle Assessment and a member International Life-Cycle Initiative Panel, a joint effort of the United Nations Environment Program (UNEP) and the Society for Environmental Toxicology and Chemistry (SETAC). The ISEA awarded him the 2003 Constance L. Mehlman Award for "contributions in exposure analysis research" that have provided "new approaches for the reduction or prevention of exposures" and have "helped shape national and state policies." Dr. McKone received his M.S. and Ph.D. in engineering from the University of California at Los Angeles.

E-mail: temckone@lbl.gov Phone: 510-642-8771

Ira B. Tager, MD, MPH

Dr. Tager is Professor in the Division of Epidemiology at the School of Public Health at the University of California, Berkeley and is a co-investigator of the BCEPHT. He is an environmental epidemiologist with a long interest in the effects of environmental factors on children's respiratory health. He is the principal investigator of both the Fresno Asthmatic Children's Environment Study and the CDC-funded "Oakland Kicks Asthma" inner city asthma intervention study that provide important resources and relevant information for the BCEPHT asthma surveillance and environment component. He is also a co-investigator of the Center for the Health Analysis of Mothers and Children of Salinas project, which is designed to study the neurodevelopmental and respiratory effects of early-life exposure to pesticides and is funded jointly by the U.S. Environmental Protection Agency and the National Institute for Environmental Health Sciences. He has been a member of several National Academy of Sciences Committees and currently serves as a member of the Health Research Committee of the Health Effects Institute.

E-mail: ibt.berkeley.edu

Phone: 510-642-9533

Selected Publications

Kyle AD, Balmes JR, Buffler PA, Lee PR. Integrating research, surveillance, and practice in environmental public health tracking. *Environ Health Perspect*. [Online 27 February 2006]
<http://www.ehponline.org/docs/2006/8735/abstract.html>

Kyle AD, Woodruff TJ, Axelrad DA. Integrated assessment of environment and health: America's children and the environment. *Environ Health Perspect*. 2006 Mar;114 (3):447-52.
<http://www.ehponline.org/members/2005/8321/8321.pdf>

Morello-Frosch R, Jesdale BM. Separate and unequal: residential segregation and estimated cancer risks associated with ambient air toxics in U.S. metropolitan areas. *Environ Health Perspect*. 2006 Mar;114 (3):386-93.
<http://www.ehponline.org/docs/2006/114-3/ss.html#thec>

Blanc PD, Yen IH, Chen H, Katz PP, Earnest G, **Balmes JR**, Trupin L, Friedling N, Yelin EH, Eisner MD. Area-level socio-economic status and health status among adults with asthma and rhinitis. *European Respiratory Journal*. 2006 Jan;27 (1):85-94.

Magzamen S, Mortimer KM, Davis A, **Tager IB**. School-based asthma surveillance: a comparison of student and parental report. *Pediatric Allergy Immunology*. 2005 Dec; 16(8):669-78.

Ritz B, Tager I, **Balmes J**. Can lessons from public health disease surveillance be applied to environmental public health tracking? *Environ Health Perspect*. 2005 Mar; 113(3):243-9.

Marshall JD, **McKone TE**, Deakin E, Nazaroff WW. Inhalation of motor vehicle emissions: effects of urban population and land area. *Atmos Environment*. 2005 Jan;39 (2):283-95.

Lobscheid AB, **McKone TE**. Constraining uncertainties about the sources and magnitude of polycyclic aromatic hydrocarbon (PAH) levels in ambient air: the state of Minnesota as a case study. *Atmospheric Environment*. 2004 Oct;38 (33):5501-15.

MacLeod M, **McKone TE**. Multimedia persistence as an indicator of potential for population-level intake of environmental contaminants. *Environmental Toxicology Chemistry*. 2004 Oct;23 (10):2465-72.

Sohn MD, **McKone TE**, Blancato JN. Reconstructing population exposures from dose biomarkers: inhalation of trichloroethylene (TCE) as a case study. *Journal of Exposure Analysis and Environmental Epidemiology* 2004;14:204-213.

Woodruff TJ, Axelrad DA, **Kyle AD**, Nweke O, Miller GG, Hurley BJ. Trends in environmentally related childhood illnesses. *Pediatrics* 2004;113(4 Suppl):1133-1140.

Woodruff TJ, Parker JD, **Kyle AD**, Schoendorf KC. Disparities in exposure to air pollution during pregnancy. *Environ Health Perspect* 2003;111:942-946.

Kyle AD, Woodruff TJ, **Buffler PA**, Davis DL. Use of an index to reflect the aggregate burden of long-term exposure to criteria air pollutants in the United States. *Environ Health Perspect* 2002;110(Suppl 1):95-102.

Kyle AD, Wright CC, Caldwell JC, **Buffler PA**, Woodruff TJ. Evaluating the health significance of hazardous air pollutants using monitoring data. *Public Health Reports* 2001;116: p. 32-44.