

Greenbaum Testifies on “Producing Credible Science for Decisions”

In February, HEI President Dan Greenbaum testified in Washington, D.C., before the Subcommittee on Energy and the Environment of the U.S. House Committee on Science, Space, and Technology. The purpose of the hearing was to air perspectives



Greenbaum at the congressional subcommittee hearing on February 3.

PHOTO BY JAY MALLIN

on the quality of scientific research that the U.S. Environmental Protection Agency (EPA) uses to inform regulatory policy and to invite suggestions for improvement in the agency’s research efforts. Greenbaum, who was invited by both parties, highlighted several of the guiding principles of HEI — which receives balanced funding from the EPA and industry — such as engaging independent, objective scientists, subjecting all research results to intense peer review, and conducting and reporting science with full transparency. “From its inception HEI has sought to produce its work with the widest degree of disclosure of results and underlying data,” Greenbaum said, addressing an issue emphasized by other witnesses. “This

is critical to ensuring that all results — both positive and negative — are reported, and that the broader science community can fully access, and further analyze, the results and data.” 



All new trucks and buses must comply with the latest (2010) EPA emissions standards for heavy-duty diesel engines. Pictured is a 2010 Freightliner Cascadia.

PHOTO COURTESY OF DAIMLER TRUCKS NORTH AMERICA LLC

New HEI Health Effects Study of Modern Diesel Engine Emissions

HEI will release in mid-April the first results of health effects testing from exposure of animals to emissions from a modern diesel engine, as part of its Advanced Collaborative Emissions Study (ACES). Investigators at the Lovelace Respiratory Research Institute in Albuquerque, New Mexico, are exposing mice and rats 16 hours each day, 5 days a week, to diluted emissions from a 2007-model heavy-duty engine equipped with a diesel particle filter. HEI-sponsored work has previously shown that emissions from such engines contain very low levels of diesel particles and other pollutants. Emissions from older diesel engines have been evaluated by HEI and others in similar studies in the past, but this is the first, and so far only, study to focus on emissions from new engines now on the market, which comply with stringent emission regulations now in force.

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New Health Outcomes and Biomarkers Studies

Recently approved by HEI's Board of Directors:

Studies on Air Quality and Health Outcomes

HEI is continuing its commitment, with four new studies getting under way, to being the leading supporter of health outcomes research — studies aimed to test whether air quality actions are having health benefits. A 2011 HEI request for applications (RFA 11-1) solicited proposals for studies on the effectiveness of complex, longer-term regulatory actions in improving air quality, with a special focus on the subcategory of regulations affecting major ports. Because of the difficulty of conducting such evaluations and the need for fresh approaches, the RFA included a call for methods development, either separately or as part of designs of studies evaluating long-term regulatory actions. HEI recently approved two studies of long-term regulatory actions and a third study that will develop statistical methods and apply them to evaluating such actions. A fourth study will evaluate a set of regulations designed to improve air quality in the “goods-movement” corridors of California.

Frank Gilliland and colleagues at the University of Southern California, Los Angeles, will evaluate the relationship of long-term changes in air pollution with changes in lung-function growth and chronic respiratory symptoms in children with asthma, using data from three cohorts of the Children's Health Study (1993–1997, 1996–2000, and 2008–2012). The investigators will evaluate lung-function growth and chronic respiratory symptoms in children with asthma 10 through 14 years of age and compare pediatric health outcomes in communities with high levels of air pollution and those with lower levels. Gilliland and colleagues will focus on nitrogen dioxide (NO₂) and particulate matter ≤ 2.5 and ≤10 μm in aerodynamic diameter (PM_{2.5} and PM₁₀) and use multilevel, mixed-model statistical approaches to evaluate differences across cohorts, associations between health outcomes and pollutants, and differences in the effects of pollutants across cohorts. Their analysis will include an examination of whether long-term air quality improvements during the study period (1993–2012) can be linked to specific air quality regulations implemented in Southern California during that time.

Armistead Russell at the Georgia Institute of Technology and collaborators at Emory University, both in Atlanta, will study changes in air quality and health outcomes in the southeastern United States from 1993 to 2012. Their focus will be on regulatory programs to reduce emissions from stationary and mobile sources, such as the Clean Air Interstate Rule and national regulations affecting light-duty and heavy-duty gasoline and diesel vehicles. Russell and colleagues will conduct detailed modeling of emissions and air quality, with a special focus on eliminating effects of meteorologic trends that could obscure air quality trends. They plan to evaluate whether specific pollutants — sulfur dioxide (SO₂), nitrogen oxides (NO_x), carbon monoxide (CO), ozone (O₃), PM₁₀, PM_{2.5}, and speciated PM_{2.5} — can be linked to sources affected by specific regulations. They will then look for associations between air quality changes and daily rates of emergency department visits and hospital admissions for cardiovascular and respiratory disease in Atlanta, and evaluate whether concentration–response functions have changed over the study period.

Corwin Zigler, Francesca Dominici, and colleagues at the Harvard School of Public Health in Boston will develop statistical methods to study long-term regulatory actions, applying newly developed

“causal inference” methods. They will evaluate regulations and other actions resulting from the 1990 Clean Air Act Amendments, with a focus on U.S. counties designated as not in compliance with National Ambient Air Quality Standards (NAAQS) for PM₁₀, O₃, CO, and SO₂. Counties so designated are required to take measures to reduce the ambient concentration of the relevant pollutant in order to meet the standard. Initially, Zigler and Dominici's team will model the pathways leading from regulation to changes in levels of single pollutants and, finally, to changes in health, using Medicare data on all-cause mortality and hospital admissions for cardiovascular diseases. They will then use these methods to compare changes in air quality and health outcomes among counties designated as either in or out of attainment of the NAAQS. Ultimately they intend to extend their approach to estimate the combined impact of a regulation affecting multiple pollutants.

Ying-Ying Meng and colleagues at the University of California–Los Angeles, in collaboration with scientists at the University of California–Berkeley, plan to evaluate the impact of the 2006 Emission Reduction Plan for Ports and Goods Movement issued by the California Air Resources Board (ARB). Many large ports have long-standing air quality issues that are now being addressed through comprehensive plans at the federal and state levels that target a complex mix of sources, including marine shipping, long-haul trucking, non-road harbor equipment, and rail transport. In the first phase of this project, Meng and colleagues will evaluate air quality improvements before (2003–2007) and after (2008–2010) the Goods Movement Plan went into effect, focusing on NO₂, O₃, CO, PM_{2.5}, and PM₁₀. They will develop geostatistical models to estimate pollutant concentrations before and after the implementation of these policies in goods-movement corridors within 500 meters of ports, railways, and freeways. The investigators hypothesize that, as a result of the targeted regulatory actions, the corridors will have greater improvement in air quality than other areas. If this difference can be demonstrated, a follow-up study would compare health outcomes within and outside the corridors.

For more information on the studies funded through RFA 11-1, contact Annemoo van Erp (avanerp@healtheffects.org) or Aaron Cohen (acohen@healtheffects.org).

Surrogate Biomarkers of Air Pollution Exposure

Gunnar Boysen and colleagues at the University of Arkansas Medical Center in Little Rock plan to develop a novel method for measuring biomarkers of exposure to air pollutants by profiling a broad spectrum of reactive compounds and their metabolites. Exhaust from diesel and gasoline engines contains many reactive compounds known to bind to DNA and proteins, some resulting in the formation of stable adducts (that is, the compound is attached to the DNA or protein, which changes the molecular structure and may impair proper functioning). The investigators will use hemoglobin adducts as surrogate biomarkers that would allow for quantitative profiling of a wide range of carcinogens. In their one-year HEI study, which was funded through HEI's Request for Preliminary Applications 09-5, the investigators aim to demonstrate proof of principle of the proposed adduct-profiling method. If this phase is completed successfully, the investigators will establish the method's suitability for in vivo biomonitoring of mice exposed to diesel and gasoline exhaust and for measuring biomarkers in hemoglobin samples from humans exposed to diesel exhaust. [HEI]

For more information, contact Annemoo van Erp (avanerp@healtheffects.org).

Coordinated Research in Latin America

First Multicity Time-Series Study of Air Pollution and Mortality in the Region

Coordinated multicity time-series studies can provide systematic estimates of the health effects of short-term (daily) exposure to air pollutants. As a result, they can play a valuable role in environmental policy. Over the years HEI has funded multicity projects in Asia, Europe, and the United States that have made critical contributions to the study of air pollution and health; now it is preparing to publish a new Research Report, *Multicity Study of Air Pollution and Mortality in Latin America*, the first coordinated multicity study to be conducted in that region. The research project — Estudio de Salud y Contaminación del Aire en Latinoamérica (ESCALA) — was supported by a grant from the William and Flora Hewlett Foundation.

Principal investigator Isabelle Romieu of the National Institute of Public Health in Mexico (now at the International Agency for Research on Cancer in Lyon, France) and coinvestigators Nelson Gouveia of the University of São Paulo in Brazil and Luis Cifuentes of the Catholic University of Chile in Santiago worked with teams of investigators in each country. Their task was to develop and implement a consistent approach for examining the association between daily exposure to air pollution and mortality in nine major cities in Mexico, Brazil, and Chile; the pollutants considered were particulate matter with an aerodynamic diameter of 10 μm or smaller (PM_{10}) and ozone (O_3). (The ESCALA results from the Mexican cities have already played an important role in supporting the



Mexico City, one of the nine cities investigated.

PHOTO BY JULIO ETCHART

Program to Improve the Air Quality in the Metropolitan Area of the Valley of Mexico [PROAIRE] 2011–2020 initiative; see www.sma.df.gob.mx/proaire2011_2020/index.php?opcion=2.)

Romieu and her colleagues first collected data on mortality, air pollution, and climatic and socioeconomic characteristics for the years 1997 through 2005 using standardized protocols. They assembled mortality data for a range of end points: all-cause, cardiopulmonary,

respiratory, cardiovascular, cerebrovascular–stroke, lower respiratory infection, and chronic obstructive pulmonary disease. Air pollution data collected over the same period were represented by daily 24-hour average PM_{10} and daily 8-hour maximum moving average O_3 concentrations. As in other time-series studies, the ESCALA investigators examined mortality rates in all ages combined as well as in people 65 years or older. A notable feature of this study was the effort to examine mortality from respiratory disease and lower respiratory infections in infants (less than a year old) and children (1–4 or 1–14 years of age) in the three largest cities (São Paulo, Mexico City, and Santiago).

The teams followed a consistent, common protocol for estimating health effects associated with pollutant levels in each of the cities while controlling for alternative explanatory factors (temperature, humidity, season, and day of the week, among others). These city-specific estimates were then combined in a meta-analysis to provide regional estimates that could be compared with data from other regions of the world. The investigators also used meta-regression techniques to explore the ability of various geographic, climatic, and demographic characteristics to explain differences in the effects of air pollution from city to city.

In its independent evaluation, the HEI Health Review Committee commented that the ESCALA study is an important extension of coordinated multicity time-series methods to the study of the effects of ambient PM_{10} and O_3 in a region of the world where such methods

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Map in the report's Commentary section shows cities where data were collected.

Air Pollution and Children's Health in Vietnam

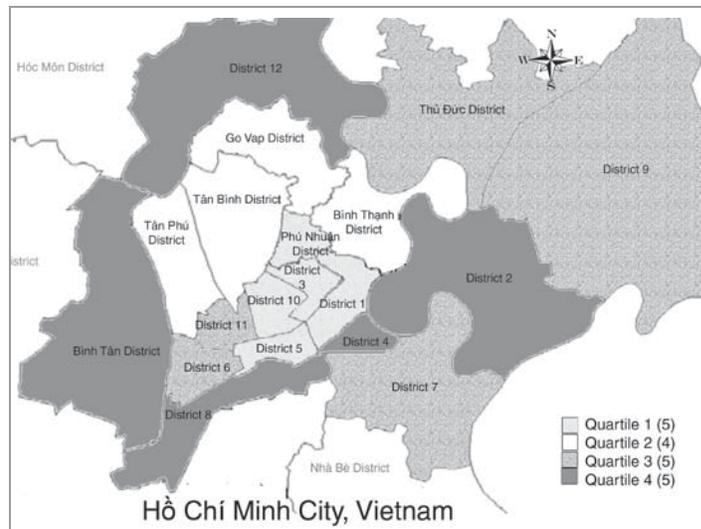
In the past decade, HEI has made a commitment to furthering air pollution science in Asia by funding studies by local research groups that build capacity and contribute to informing regional regulatory decisions. A recent result is HEI Research Report 167, *Effects of Short-Term Exposure to Air Pollution on Hospital Admissions of Young Children for Acute Lower Respiratory Infections in Ho Chi Minh City, Vietnam*. The Asian Development Bank supported the study at HEI with funds the bank had received from the United Kingdom Department for International Development.

The HEI Collaborative Working Group on Air Pollution, Poverty, and Health in Ho Chi Minh City (HCMC) investigated associations between pediatric hospital admissions for acute lower respiratory infection (ALRI) and air pollution levels in HCMC. This is the first study of health and air pollution ever conducted in Vietnam, and one of the first studies in Southeast Asia involving air pollution and children's health.

ALRI, a disease category comprising bronchiolitis and pneumonia, is the chief cause of death among children under age 5 worldwide. This study was designed to explore relationships among outdoor air pollution, hospital admissions of young children for ALRI, and poverty in HCMC, focusing on the short-term effects of daily average exposure to nitrogen dioxide (NO₂), particulate matter ≤10 μm in aerodynamic diameter (PM₁₀), sulfur dioxide (SO₂), and ozone (O₃).

The investigators collected data on ALRI admissions of children under age 5 to HCMC's two major pediatric hospitals in 2003 through 2005. They obtained air pollution data from four air quality-monitoring stations operated by the HCMC Environmental Protection Agency. The investigators used both time-series and case-crossover analyses to search for statistical associations between ALRI cases and pollution levels, taking into account patients' socioeconomic status and neighborhood poverty rates.

An association between excess risk of hospitalization and dry-season NO₂ exposure was the strongest and most consistent link found. Some associations of ALRI with PM₁₀ and SO₂ were found in the dry-season and overall analyses, but they were not consistent between the time-series and case-crossover analyses. Levels of O₃ had no significant positive links with admissions for ALRI in any dry-season analysis.



Map shows HCMC districts by quartiles of socioeconomic position, based on 2004 district-level poverty prevalence. (From HEI Research Report 167.)

All pollutants had some significant negative associations with ALRI admissions in the rainy season; such results were potentially confounded by hospital admissions due to respiratory syncytial virus infection, which peaks during the rainy season, a time of low pollutant levels. Attempts to evaluate how the effects of pollutants were modified by individual patients' level of poverty were inconclusive, as only 1% of patients were identified in medical records as being poor.

In its independent evaluation, HEI's Review Committee concluded that this study provides useful information on associations between individual pollutants and ALRI in children. The findings with respect to NO₂ during the dry season, in particular, suggest a potential role of pollution exposure in the development of ALRI. [HEI]

Research Report 167 will soon be available for downloading, free of charge, at <http://pubs.healththeeffects.org>; printed copies can be purchased from HEI. For more information, contact Kate Adams (kadams@healththeeffects.org).

HEI in the News

An HEI health outcomes study published in December made headlines in several media outlets. As described in HEI Research Report 162, *Assessing the Impact of a Wood Stove Replacement Program on Air Quality and Children's Health*, epidemiologist Curtis Noonan of the University of Montana–Missoula and colleagues evaluated a program to swap 1,200 older-model stoves in the rural mountain community of Libby, Montana, for newer, less polluting ones (see *HEI Update*, Winter 2011–2012). Exposure to wood smoke, a probable carcinogen, is associated with a range of respiratory problems and increased emergency department visits and hospitalizations. The investigators found

that the stove upgrade led to significantly improved air quality and a marked reduction of symptoms in local children, especially wheezing, itchy or watery eyes, sore throat, bronchitis, influenza, and throat infection.

Associated Press

Wood Stove Upgrades Improve Health of Children in Libby (*Billings Gazette* headline, January 1, 2012)

The *Gazette* and other major daily newspapers in Montana were among numerous print and online outlets to pick up a detailed Associated Press article on the HEI study. Describing the broader scope of wood stove pollution in the mountainous

West and elsewhere in the United States, the article paraphrased Noonan as saying the study results “underscored the potential benefits of upgrading stoves in rural towns where residents have few home heating options.”

Clean Air Report

Study Touts Wood Stove Replacements as EPA Readies Air Rule Changes (January 5, 2011)

Clean Air Report, published biweekly by the U.S. Environmental Protection Agency (EPA), demonstrated the link between HEI's work and government-level policy decisions, noting that the wood stove study “could

(Continued on page 6)

Communication 17 Describes ACES Exposure Atmosphere

Before investigators for the Advanced Collaborative Emissions Study (ACES) began animal exposure and toxicity testing, a special facility was constructed at the Lovelace Respiratory Research Institute (LRRRI) in Albuquerque, New Mexico, to house a dynamometer and a 2007-compliant engine — considerably larger than engines previously tested at LRRRI — and to deliver exhaust to the animal exposure chambers. In phase 3A of ACES, investigators conducted extensive

The authors provide important background information on the characterization of pollutant emissions and their concentrations in the animal exposure chambers.

emissions testing of the selected 2007-compliant diesel engine and its backup. The recently released HEI Communication 17, *Advanced Collaborative Emissions Study (ACES) Phase 3A: Characterization of U.S. 2007-Compliant Diesel Engine and Exposure System Operation*, by Joe L. Mauderly and Jacob D. McDonald, provides results of the exhaust characterization under various operating conditions in the dilution tunnel and in the animal exposure chambers before the start of inhalation exposures in phase 3B (see related story).

To represent several types of urban and highway driving conditions, the investigators used the Federal Test Procedure (FTP) used by the Environmental Protection Agency for engine certification and segments of the California Air Resources

Board (ARB) heavy heavy-duty diesel truck 5-mode test cycle. In addition, they used a 16-hour cycle specially designed during phase 1 of ACES that included a combination of FTP and ARB 5-mode segments. The 16-hour cycle was subsequently used for the animal inhalation exposures.

After testing the engine and a backup engine to make sure they were operating as intended, the investigators measured exposure concentrations in the animal inhalation chambers (without the animals present). Because particle concentrations in exhaust from 2007-compliant engines are very low by design — in order to meet stringent particle emissions standards — exhaust dilutions were chosen based on predetermined nitrogen oxide (NO₂) concentrations in the chambers. In exhaust from 2007-compliant engines, NO₂ is the gaseous component with the highest concentration (other than carbon dioxide and water vapor) and has health effects of its own.

Communication 17 provides important background information on the characterization of pollutant emissions and their concentrations in the animal exposure chambers. Optimal conditions found during phase 3A are now being used for the ongoing 24-month study of chronic effects in animals. [HEI](#)

Communication 17 is available for downloading, free of charge, at <http://pubs.healtheffects.org>; printed copies can be purchased from HEI. For more information, contact Maria Costantini (mcostantini@healtheffects.org) or Annemoon van Erp (avanerpb@healtheffects.org).

ACES RESULTS (Continued from page 1)

The new publication will report results from mice exposed for 1 and 3 months and rats exposed for 1, 3, and 12 months, and will include data on respiratory, inflammatory, and cardiovascular function, together with lung histopathology, genotoxicity, and other end points. Consistent with the study hypothesis, the investigators have not so far found evidence of significant changes in key health end points, except for certain mild changes in the lung that are consistent with exposure to nitrogen dioxide (NO₂), a major component of the emissions. The rat exposures are continuing at Lovelace and are likely to be extended for up to 30 months — until December 2012 — thus providing information on health effects of long-term exposure to emissions from the new engines that has not been available up to this point.

The HEI results are being released after rigorous peer review and are accompanied by a Commentary from an expert ACES Review Panel. The April release will meet the deadline for information submission set by the International Agency for Research on Cancer (IARC); an IARC expert working group is scheduled to meet in June to evaluate the carcinogenicity of diesel and gasoline exhaust and some nitroarenes, which it last did in 1989 (see story on page 8). The U.S. National Toxicology Program has also announced its intention to consider an evaluation of diesel emission particles as part of its Report on Carcinogens process. HEI has provided extensive data from its current and previous studies to both of these organizations. The ACES animal bioassay results will also be featured at the HEI Annual Conference in April during the opening session, “Diesel Emissions and Cancer: What Is the New Evidence?”

HEI, with support from a consortium of sponsors, launched ACES in 2006 to characterize the emissions — and their health effects — from heavy-duty engines that use new technology to reduce emissions. In the first ACES studies, research showed that emissions from 2007-compliant engines fitted with diesel particle filters contain highly reduced levels of particulate matter and other pollutants (with the exception of NO₂) as compared with older engines. ACES investigators are now characterizing emissions from 2010-compliant engines, which are outfitted with both enhanced nitrogen oxide (NO_x) control devices and particulate filters. This new report is the first product of ACES investigations into health effects, with core animal exposures being conducted at Lovelace and ancillary studies, which measure several additional end points, being performed at other research centers across the nation. [HEI](#)

For more information, contact Geoffrey Sunshine (gsunshine@healtheffects.org).



Annual Report Now Available

HEI's 2011 Annual Report, *The Road Ahead ...*, describes the prominent role of HEI science in addressing continuing air pollution challenges and regulatory deliberations in the United States and Europe. The report also describes many strong scientific contributions HEI made this past year, including recent studies of air pollution hot spots and HEI's growing portfolio of air pollution research in developing countries of Asia. To read more about HEI's accomplishments and future goals, download the report at <http://pubs.healtheffects.org>.

Estimating the Impact of Air Pollution on World Health

New Global Burden of Disease Analysis to Be Released Shortly

New, carefully constructed global estimates of deaths and illnesses attributable to outdoor air pollution will soon be published in the British medical journal *The Lancet*. These estimates have been developed by an international expert group cochaired by HEI Principal Scientist Aaron Cohen and H. Ross Anderson, University of London, and subjected to extensive peer review. They are part of a larger project, the “Global Burden of Diseases, Injuries, and Risk Factors Study 2010” (GBD 2010), that is analyzing a wide range of potential risk factors in order to compare their relative importance for public health. GBD 2010 is a collaborative effort of the Institute for Health Metrics and Evaluation (an organization funded by the Gates Foundation), the World Health Organization, and leading academic centers.

This comprehensive update of the influential GBD estimates — the first in more than 10 years — will quantify the role played by a broad range of potentially modifiable risk factors in the global and regional burden of disease from 1990 through 2010. The project will estimate numbers of deaths and years of

healthy life lost as a result of major environmental risk factors such as poor water quality and sanitation, household air pollution, secondhand smoke, and outdoor air pollution.

In its 2000 estimate, the GBD study estimated that urban ambient air pollution (measured in terms of PM_{2.5}, or particulate matter with an aerodynamic diameter of 2.5 µm or smaller) contributed to 800,000 deaths and 6.4 million lost years of healthy life in 2000. For 2010, using new approaches, the expert

The project will estimate numbers of deaths and years of healthy life lost as a result of major environmental risk factors such as poor water quality and sanitation, household air pollution, secondhand smoke, and outdoor air pollution.

group will estimate exposure to PM_{2.5} and ozone and will quantify the relationship between mortality (from chronic disease in adults and respiratory infections in children) and exposure to air pollution worldwide. These new estimates will include risks to rural as well as urban populations.

Preliminary estimates suggest the burden attributable to outdoor air pollution in GBD 2010 will be higher than the previous estimate, owing to several factors. For instance, newer epidemiologic evidence provides larger risk estimates than earlier studies. The estimates also add data on rural populations and reflect the dual influences of development-associated increases in levels of combustion-derived air pollution in some large Asian cities and increasing rates of cardiovascular disease — the health outcome that contributes the largest share of disease burden, both worldwide and in East Asia.

Following the publication of the new global burden estimates in *The Lancet*, HEI will partner with key project participants and leading Asian scientists to communicate the results to government officials, scientists, stakeholders, and the media in China and India, where the burden of disease due to air pollution is expected to be the greatest. 

For more information on the Global Burden of Disease Project, contact Aaron Cohen (acohen@healtheffects.org), or visit www.healthmetricsandevaluation.org/research/project/global-burden-diseases-injuries-and-risk-factors-study-2010.

HEI IN THE NEWS (Continued from page 4)

inform EPA as it revises its air rules for wood stoves that could include continued agency support for change-out programs for existing stoves.” The article later adds: “The study comes as EPA is considering issuing a new proposal to [revisit] its new source performance standards (NSPS) for wood stoves, which have not been revised since EPA issued the NSPS in 1988.”

Greenwire

Mont. City Breathes Easier After Phasing Out Old Wood Stoves: Report (December 21, 2011)

Greenwire, an online news service that focuses on environmental and energy issues, quoted HEI Vice President Robert O’Keefe as saying, “This is a study in one city, but with [about] 10 million wood stoves in operation across the U.S., it’s nice to know that moving to less polluting wood stoves can result in an improvement in air quality.” 



This older-model wood stove was among those replaced in Libby, Montana, with new, cleaner-burning stoves. PHOTO BY BUD JOURNEY

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HEI is a nonprofit organization funded jointly by government and industry to research and evaluate the health effects of air pollution. An overview of HEI, information on its current research program, and a list of published HEI Research Reports are available on request or from the Web site.

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New Investigator Wins Haagen-Smit Prize



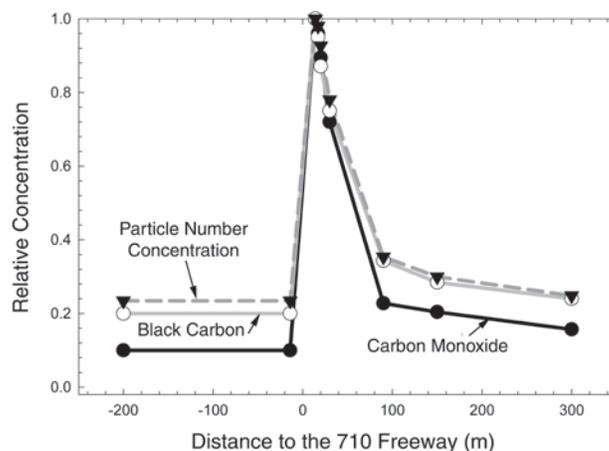
Yifang Zhu.

PHOTO BY JAY MALLIN

Yifang Zhu of the University of California–Los Angeles School of Public Health, a 2007 recipient of HEI’s Walter A. Rosenblith New Investigator Award, is the lead author of a paper that received a 2011 Haagen-Smit Prize from the journal *Atmospheric Environment*. The prize is named in honor of Arie Jan Haagen-Smit, a pioneer in the field of air pollution, and is given annually to all the authors of two outstanding papers published in the journal. The winning entry submitted in last year’s competition by Zhu and colleagues was “Study of Ultrafine Particles Near a Major Highway with Heavy-Duty Diesel Traffic”

(*Atmos Environ* 36: 4323–4335), published in 2002.

In his nominating letter, James Schauer, University of Wisconsin–Madison (principal investigator of two HEI studies), noted that this study “provided important data on ultrafine particle concentrations near roadways for use in exposure studies and spurred a number of subsequent urban roadway measurements worldwide” and that it is cited in major federal and state regulatory documents.



An often-cited figure from the prize-winning paper shows the relative particle number, black carbon, and carbon monoxide concentrations versus distance from the 710 freeway. COURTESY OF YIFANG ZHU

Zhu is using her New Investigator Award to support a study of children’s exposure to ultrafine particles from vehicular emissions, which will be completed this summer. [H]

For more information, see <http://geo.arc.nasa.gov/sgg/singh/winners/1.html>.

Workshop on Assessing Exposure to Pollution from Traffic

On April 17, just after HEI’s Annual Conference adjourns at the Drake Hotel in Chicago, Illinois, HEI will hold a workshop there entitled “Approaches to Improving Assessment of Exposure to Traffic-Related Pollution.” This topic was identified as a high priority for additional research in HEI Special Report 17, *Traffic-Related Air Pollution: A Critical Review of the Literature on Emissions, Exposure, and Health Effects*, published in 2010. Before embarking on additional health effects studies, HEI’s Research Committee felt it was crucial to improve assessment of exposure by identifying better surrogate measures of traffic pollution or by validating exposure models. The workshop’s goal is to help the committee develop important areas for research.

Questions to be addressed include the following:

- What transformations do pollutants undergo in space and time and how could these changes affect exposure assessment?
- What are the optimal monitoring strategies for assessment of exposure from traffic sources? What minimal measurement should be made, and how should spatial and temporal variations be captured?

LATIN AMERICA STUDY (Continued from page 3)

had not yet been applied. The PM₁₀ findings in ESCALA are broadly consistent with findings from time-series studies of air pollution and mortality from other parts of the world, particularly in adults. The effects of O₃ on mortality in adults differed substantially across cities but showed the most consistent associations with mortality in the three cities with the highest O₃ concentrations. Given limited data, the analyses of the effects of PM₁₀ and O₃ exposure on mortality in children were restricted to three cities; the effects across cities were inconsistent.

As in other multicity, multicountry studies, the ESCALA investigators faced substantial challenges in their efforts to standardize and

- What are the strengths and limitations of various models for assessing traffic-related exposure?
- How can investigators best combine measurements of pollutants with results of modeling?
- Are there ongoing studies of exposure to traffic pollution to which measurements could be added or models could be applied for validation purposes?

The last public session of HEI’s Annual Conference will set the stage for the workshop. The workshop itself will consist of an opening session during which preselected discussants will present short reviews of specific topics. Participants will then break up into working groups for more in-depth discussions of research needs and possible study designs. General topics to be covered include atmospheric chemistry, measurement, and models. Later, major recommendations of the workshop will be summarized for the Research Committee, which intends to issue a request for applications proposing studies on traffic-related pollution next fall or winter. [H]

For more information, contact Maria Costantini (mcostantini@healtheffects.org).

integrate preexisting data from different countries. Basic differences among countries in underlying methods of air and health data collection, and in availability of air pollutant monitoring data, mortality data, and sociodemographic data, are difficult to address by analysis. Nonetheless, the Review Committee concluded that, given the relative rigor with which ESCALA was carried out, their main findings of an effect of PM₁₀ and of O₃ on the more common types of mortality are likely the most reliable estimates in the region to date. [H]

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HEI Gears Up for IARC Review of Diesel and Gasoline Exhaust

The International Agency for Research on Cancer (IARC), an arm of the World Health Organization, has announced its plan to review the carcinogenicity of diesel and gasoline engine exhausts this June. IARC regularly holds extensive meetings at its headquarters in Lyon, France, convening experts from around the world to review the literature on a range of chemical and other exposures, with the aim of determining whether they are possible, probable, or known human carcinogens. HEI research has often been at the center of these discussions.

This is the first time IARC has reviewed diesel and gasoline emissions since 1989, when it decided that diesel was a “probable human carcinogen” and gasoline a “possible” carcinogen. Rashid Shaikh, now HEI director of science, served as an observer at that meeting on HEI’s behalf. Given its long history of research and other activity on diesel, HEI is actively planning for the new IARC review. This includes providing a complete compendium (on compact disc) of all relevant HEI research reports, special reports, and communications and preparing a

synthesis of this work. HEI President Dan Greenbaum has been nominated for observer status for HEI at the meeting, scheduled for June 5 through 12.

One key challenge for the review is how to distinguish between emissions from the widely used, older type of diesel engines and the new, much cleaner engines that HEI has been testing in its Advanced Collaborative Emissions Study (ACES). The latest results of that project have now been peer-reviewed (see related article) and will be communicated to IARC and its panel of experts in time for the meeting.

HEI has also scheduled a major session at its Annual Conference this April to highlight and discuss significant changes that have occurred in diesel technology, the first important results from the ACES program regarding potential health effects of emissions from the new engines, and the newest occupational epidemiology studies of workers exposed to exhaust from older diesel engines. [HEI](#)