



Key HEI Ozone Study Data Now Available

In accordance with its longstanding [Data Access Policy](#), HEI is making available to the public the database and specimens of the [Multicenter Ozone Study in older Subjects \(MOSES\)](#), a large HEI-funded study that investigated cardiovascular health markers in older adults who were exposed in a laboratory to levels of ozone that are relevant to real-world conditions. As the largest and most comprehensive data set ever generated for controlled ozone exposure, this rich resource is expected to facilitate further advances toward understanding ozone's health effects.

In the interest of scientific transparency, and to encourage the broadest possible use of the MOSES data and the material, HEI has set up a streamlined process for obtaining access to them. The process is explained in the [Data Sharing Plan](#) and [Material Sharing Plan](#), currently available at www.healtheffects.org/announcements/making-moses-data-and-specimens-available.

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The accountability study led by Ted Russell and a separate study on traffic-related exposure by Jeremy Sarnat and colleagues (page 5) were both based in Atlanta. ISTOCK PHOTO/ANDREY KRAV

NEW HEI RESEARCH REPORT

Major Study Evaluates Impact of Air Quality Actions

Did Curbs on Emissions Improve Air and Health in Atlanta?

Although it is assumed that air quality actions, once adopted, will reduce air pollution and improve public health, studies demonstrating this relationship are limited. Through its [Accountability Research Program](#) HEI is evaluating whether regulatory and other interventions indeed achieve their intended environmental and health benefits. In April HEI released a major study funded under this initiative, *Impacts of Regulations on Air Quality and Emergency Department Visits in the Atlanta Metropolitan Area, 1999–2013*, by Armistead (Ted) Russell and colleagues from the Georgia Institute of Technology and Emory University.

As described in [Research Report 195](#), Russell and his team examined the extent to which national and state regulations targeting power plants and mobile sources in the Atlanta area were effective in reducing pollutant emissions, improving air quality, and ultimately reducing cardiorespiratory emergency department visits. Using an innovative approach, the investigators compared the observed conditions from 1999 to 2013 with carefully estimated quantitative projections of emissions, air quality, and emergency department visits that likely would have occurred in the absence of six national and state-level regulatory programs. This is one of few accountability studies to follow changes of individual regulations on emissions all the way to

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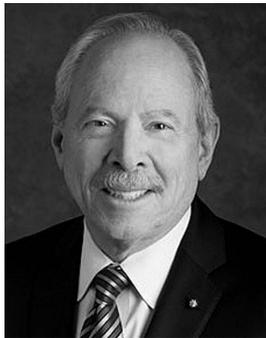
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HEI Board Welcomes Alan Leshner, Homer Boushey

Two distinguished members of the medical and scientific communities have been appointed to HEI's Board of Directors: Alan I. Leshner, who for much of his career has held top-level scientific posts, including CEO of the American Association for the Advancement of Science (AAAS — the publishers of the journal *Science*); and Homer A. Boushey, a world-renowned expert on asthma at the University of California–San Francisco (UCSF) and a former HEI Review Committee chair. Members of HEI's Board of Directors are drawn from distinguished leaders in science and policy whose principal responsibilities are to ensure the integrity and scientific quality of HEI's research and review.

Leshner served as chief executive officer of AAAS and executive publisher of *Science* from December 2001 through February 2015, when he became CEO emeritus. Previously he was director of the National Institute on Drug Abuse at the National Institutes of Health, and prior to that he had been deputy director and acting director of the National Institute of Mental Health. He also held a variety of senior positions at the National Science Foundation, focusing on basic research in the biologic, behavioral, and social sciences; science policy; and science education.



Alan Leshner.
PHOTO COURTESY OF AAAS

A member of the National Academy of Medicine, Leshner served two terms on its governing council. He also served two terms on the National Science Board, appointed first by President George W. Bush in 2004 and reappointed by President Barack Obama in 2010. He received his master's and PhD degrees in physiological psychology from Rutgers University.

Boushey is a professor of medicine, chief of the Asthma Clinical Research Center, and director of the Division of Allergy and Immunology at UCSF, where he received his MD degree. He has a distinguished career investigating the pathogenesis and treatment of asthma for more than three decades. He is a past president and the current chairman of the board of trustees of the American Thoracic Society.



Homer Boushey.
PHOTO BY PAUL SCHNAITACHER

Boushey also serves on the National Asthma Expert Panel of the National Institutes of Health, which developed national guidelines for the diagnosis and treatment of asthma. In addition, he serves on numerous editorial boards, expert panels, and advisory committees. He chaired the HEI Review Committee for two terms, from 2006 to 2014. [HEI](#)

Sponsors at HEI for Annual Strategic Planning Meeting

HEI's sponsors and Research Committee gathered in Boston in March. This yearly meeting provides an opportunity for the sponsors to hear an update on HEI's activities, and for the Committee to hear directly from the sponsors about priority topics HEI should be addressing. [HEI](#)

PHOTOS BY MELISSA OSTROW



Richard Yamada, U.S. Environmental Protection Agency (EPA).



Terry Keating, at right, and Chad Bailey, both of the U.S. EPA.



Timothy French, Truck & Engine Manufacturers Association.



Sherri Hunt, U.S. EPA. Back: Anna Rosofsky, HEI.



Kevin Kuhn, U.S. EPA (foreground), and Bruce Copley, ExxonMobil.



Susan Collet, Toyota, with Alan Vette, U.S. EPA. Back left: Marusia Popovech, ExxonMobil.

Prominent Epidemiologist Takes Helm of HEI Research Committee

David A. Savitz of Brown University, a respected epidemiologist with extensive experience in environmental health, will become the new chair of HEI's Research Committee this summer.

Savitz is a professor of epidemiology in the Brown University School of Public Health, with joint appointments in obstetrics and gynecology and pediatrics in the Alpert Medical School. He currently serves as associate dean for research in the School of Public Health. His epidemiologic research has addressed a wide range of many important public health issues, including environmental hazards in the workplace and community, reproductive health outcomes, and environmental influences on cancer. He has conducted extensive work on health effects of nonionizing radiation, pesticides, drinking water treatment by-products, and perfluorinated compounds.

Savitz is a member of the National Academy of Sciences Institute of Medicine. From 2013–2017 he served as vice president for research at Brown. He is the author of nearly 350 papers in professional journals and editor or author of three books. He has served as editor at the *American Journal*

of *Epidemiology* and as a member of the Epidemiology and Disease Control-1 study section of the National Institutes of Health. Currently he is an editor at *Epidemiology*.

In addition, Savitz was president of the Society for Epidemiologic Research and the Society for Pediatric and Perinatal Epidemiologic Research, and North American Regional Councilor for the International Epidemiological Association.

Savitz came to Brown in 2010 from Mount Sinai School of Medicine, where he had served as the Charles W. Bluhdorn Professor of Community and Preventive Medicine and director of the Disease Prevention and Public Health Institute since

2006. Earlier, he taught and conducted research at the University of North Carolina School of Public Health and at the Department of Preventive Medicine and Biometrics at the University of Colorado School of Medicine. He received a PhD in epidemiology from the University of Pittsburgh Graduate School of Public Health.

"We are pleased to welcome David to HEI," said Dan Greenbaum, HEI president. "He brings extraordinary experience and expertise — and a fresh perspective about air pollution — to the task."

Savitz replaces toxicologist David Eaton of the University of Washington, who led

the Committee for two four-year terms (the established term limit). He oversaw the development and implementation of the *HEI Strategic Plan for Understanding the Health Effects of Air Pollution 2015–2020* and led the Committee in selecting many high-quality studies through rigorous competition.

"Dave Eaton has been a wonderful chairman of the Research Committee and we will miss his abiding thoughtfulness and his commitment to HEI," said Rashid Shaikh, HEI's director of science. "We will miss his leadership." 



David Savitz.

PHOTO BY PETER GOLDBERG

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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 all published HEI reports are available for downloading, free of charge, from the website.

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Communicating the Science

Particles and Policy

Results from HEI's research to understand the toxicity of particulate matter (PM) were recently presented to U.S. officials and scientists in Washington, D.C.

At a March seminar of the federal Air Quality Research Subcommittee, HEI senior staff discussed HEI's National Particle Component Toxicity (NPACT) initiative, the results of which appear in Research Reports 177 and 178. NPACT combined epidemiologic and toxicologic approaches to determine which components of the PM mixture are of greater public health concern than others so that sources emitting the more toxic components could be identified for possible control.

HEI presenters and discussants included President Dan Greenbaum, Vice President Robert O'Keefe, Director of Science Rashid Shaikh, and Managing Scientist Annemoon van Erp. The seminar was coordinated by the National Oceanic and Atmospheric Administration and U.S. Environmental Protection Agency.

HEI at China Costs and Benefits Conference

In mid-May, HEI Principal Scientist Katy Walker spoke at an international conference in Beijing that explored important topics related to atmospheric model development and environmental and climate issues, with a focus on Asia-Pacific countries with the most severe air pollution.

Addressing an audience of air quality scientists, model developers, and policy makers from various disciplines, Walker spoke on "Selection of Concentration-Response Functions for Health Impact Assessments in China."

The joint event combined the first Asia-Pacific conference of the *Community Modeling and Analysis System* with the 6th International Conference on *Air Benefit and Cost and Attainment Assessment* (ABaCAS). It was hosted by Tsinghua University and the State Key Joint Laboratory of Environmental Simulation and Pollution Control (China) and organized by several Chinese and U.S. universities, with support from the China Ministry of Environment, U.S. Environmental Protection Agency, and the Energy Foundation (U.S.). 

State of Global Air 2018 Now Available

Some seven billion people, more than 95 percent of the world's population, live in areas of unhealthy air, according to *State of Global Air 2018* — HEI's second annual website and report offering “one-stop shopping” for the latest international trends in air quality and its health impact.

State of Global Air 2018 cites the most recent data available from the multi-institutional [Global Burden of Disease \(GBD\)](#) project. According to the analysis, China and India together were responsible for more than half of the total early deaths attributable to ambient PM_{2.5} (particulate matter with an aerodynamic diameter of 2.5 μm or smaller) in 2016. China has made initial progress in reducing air pollution; in contrast, Pakistan, Bangladesh, and India have experienced the steepest increases in air pollution levels since 2010.

For the first time, *State of Global Air 2018* also provides worldwide estimates of exposure and health burdens from burning of solid fuels inside people's homes — a major factor in air pollution-related disease rates.

An Expanded Resource

The State of Global Air website provides both air quality and health data by country and region. Data now cover ambient particulate matter, ozone, household air pollution, and total air pollution (a combination of the three). Visitors can also find information on the major sources of outdoor air pollution, with a focus on China and India.

Here are some of the main findings cited in the 2018 report:

- Long-term exposure to the combination of outdoor and indoor air pollution contributed to 6.1 million premature deaths from stroke, heart attack, lung cancer, and chronic lung disease in 2016. That makes air pollution the 4th highest health risk factor, exceeded only by high blood pressure, diet, and smoking.
- In 2016, a total of 2.5 billion people — one in three global citizens — were exposed to household air pollution from the use of solid fuels (for example, coal, wood, dung, or other biomass) for cooking and heating.

- Most of those 2.5 billion people live in low- and middle-income countries in Asia and Africa, and face a double burden: exposure to both indoor and outdoor air pollution.
- Household air pollution from burning of solid fuels, when emitted to the outdoor air, is the largest contributor to health impacts from among all sources of air pollution in India.

“Air pollution takes a huge personal toll worldwide, making it difficult to breathe for those with respiratory disease, sending the young and old to hospitals, causing people to miss school and work, and contributing to early death,” said Bob O’Keefe, Vice President of HEI. “The trends we report show real progress in some parts of the world, but serious challenges remain to eliminate this avoidable situation.”

Launched in 2017, the State of Global Air is a collaborative effort among HEI, the [Institute for Health Metrics and Evaluation \(IHME\)](#) at the University of Washington, and the University of British Columbia. On the interactive State of Global Air website, visitors can explore and compare trends in air quality and health from 1990 to 2016 tracked by the GBD project, which IHME coordinates.

HEI provides leadership for GBD's air pollution component, and as part of this effort has published separate analyses focusing on major sources of air pollution in [China \(Special Report 20\)](#) and [India \(Special Report 21\)](#).

“The Global Burden of Disease leads a growing worldwide consensus — among the WHO, World Bank, International Energy Agency, and others — that air pollution poses a major global public health challenge,” said HEI President Dan Greenbaum. “Nowhere is that risk more evident than in the developing world, where a third of the world's population faces a double burden of indoor and outdoor air pollution.” [HEI](#)

The latest estimates of deaths and lost years of healthy life from air pollution, diet, smoking, and other risk factors for all countries can be found in the [latest GBD analysis](#), www.ncbi.nlm.nih.gov/pubmed/28919119. For more information on the *State of Global Air*, contact [Katy Walker](#), kwalker@healtheffects.org.

MOSES DATA (Continued from page 1)

The [MOSES database](#), <https://dataverse.harvard.edu/dataverse/MOSES>, contains all of the exposures and responses from each of the 87 participants in the study. It resides on the Harvard Dataverse public repository and may be accessed by anyone who is interested, without restrictions. Access to the database requires an initial log-in step that includes a brief questionnaire and terms and conditions for publications resulting from the research. Subsequent access to the supporting documentation (including the programming guide), to Excel files, and to the MOSES final report does not require logging in.

The MOSES specimens consist of blood and plasma samples for all 87 subjects. Any qualified researcher from a not-for-profit U.S. research center interested in conducting specific analyses can request the samples (subject to the limited quantities available).

HEI has designated the original investigators to be custodians of the material, make decisions on its distribution and use, and keep HEI informed of all requests and disposition of the material. Interested researchers should submit a short [Material Request Form](#) to the MOSES original investigators and sign a [Material Transfer Agreement](#). (Both documents are posted at

www.healtheffects.org/announcements/making-moses-data-and-specimens-available.) The Request Form should include: (1) the types of materials requested and explanation of their intended use; (2) the rationale and aim of the research project; (3) a description of what the research project will add to scientific knowledge; (4) the experimental methods; (5) the estimated duration of the research; and (6) a short curriculum vitae of the recipient (maximum 2 pages). Requests for material will be reviewed starting on July 1, 2018. [HEI](#)

For more information, contact [Maria Costantini](#) (mcostantini@healtheffects.org) or [Annemoo van Erp](#) (avanerp@healtheffects.org).

Study Tests Exposure to Traffic-Related Air Pollutants, Finds Progress

Because traffic-related emissions are an important source of urban air pollution and a public health concern, it is important to identify appropriate ways to measure where and at what level people are exposed to them. HEI [Research Report 196](#), *Developing Multipollutant Exposure Indicators of Traffic Pollution: The Dorm Room Inhalation to Vehicle Emissions (DRIVE) Study*, by Jeremy A. Sarnat at the Rollins School of Public Health of Emory University in Atlanta, Georgia, tackled this important challenge.

Sarnat and his team evaluated single- and multipollutant metrics of exposure to traffic-related air pollutants near and farther away from a busy roadway. The measurements, conducted between September 2014 and January 2015, included air pollutant data from the Georgia Institute of Technology campus between 5 m and 2.3 km from the 12-lane highway running through Atlanta, one of the busiest roads in the United States. The investigators evaluated exposure to pollutants measured outdoors, indoors, and by personal

monitors. They also evaluated biologic markers (using metabolomics) in a panel of students living in dormitories close to or away from this traffic hotspot.

Sarnat and colleagues found that there wasn't strong evidence that the two multipollutant metrics tested for exposure to traffic-related air pollution would be useful in health studies in the near-road environment. The metrics did not have as much variation over the study area as expected, and some metrics had evidence of indoor sources or reactions in the air. Biologic markers were different in the groups of students living in the two dormitories, but these differences were likely unrelated to air pollutant levels.

A noteworthy feature of this and other recent studies is the lower-than-expected air pollutant concentrations and less-steep gradients, providing evidence that the near-road environment is improving. Such changes have important implications because past near-road air pollution and health studies may become less relevant to the current and future near-road

environment given the fast-paced changes in engine and fuel technologies and electrification of the fleet.

In its independent review of the study, the HEI Review Committee noted that Sarnat and colleagues conducted a comprehensive study to evaluate single-pollutant and multipollutant metrics of exposure to traffic-related air pollution. The large number of detailed measurements and the multipollutant approach were among the strengths of the study. On the other hand, the Committee thought that the usefulness of the panel study results was limited because the personal exposures measured among residents of the two dormitories were very similar and factors other than exposure to traffic-related pollution may have played a role in the observed biologic differences. [HEI](#)

[Research Report 196](#) is available for downloading, free of charge, at www.healtheffects.org/publications. For more information, contact Allison Patton (apatton@healtheffects.org).

IMPACT OF AIR QUALITY ACTIONS (Continued from page 1)

health outcomes, using scenarios with and without regulation.

Russell and colleagues found that air quality improved substantially and fewer people visited hospital emergency departments after implementation of regulations targeting power plant and mobile source emissions. The investigators found that air pollutant emissions and ambient concentrations decreased over the

This is one of few accountability studies to follow changes of individual regulations on emissions all the way to health outcomes, using scenarios with and without regulation.

study period for most pollutants and estimated that the pollutant levels were lower than what would have been expected without regulatory actions (a “counterfactual” scenario). Their analysis also showed that the observed improvements in air quality were associated with fewer emergency department visits for asthma and other respiratory disease compared with what would have been expected without the regulations. And their data appear to suggest that the benefits increased over time as the air pollution control measures went into effect and emissions went down.

In its independent review of the report, the HEI Review Committee noted that the study was an ambitious application of HEI's accountability framework as it encompassed a broad suite of regulatory programs designed to reduce multipollutant emissions from power plants and mobile sources in Georgia and nearby states. Regulations targeting power plants appeared

more effective in improving air quality than those targeting mobile sources, presumably because of the longer time frame for fleet turnover; however, the Committee had more confidence in the results attributed to all regulations combined than to individual regulatory programs.

The accountability study by Russell and colleagues was featured in the first-ever HEI public webinar on April 19. More than 200 participants from government, industry, and academia from around the world tuned in to learn about the study and join in a question-and-answer discussion with the investigators and HEI. [Slides from the webinar](#) are available at www.healtheffects.org/announcements/webinar-accountability-russell-study-atlanta. [HEI](#)

[Research Report 195](#) is available for downloading, free of charge, at www.healtheffects.org/publications. For more information on the study, contact [Dan Greenbaum](mailto:DanGreenbaum@healtheffects.org) (dgreenbaum@healtheffects.org) and/or [Ted Russell](mailto:TedRussell@ce.gatech.edu) (trussell@ce.gatech.edu).

Mark Your Calendar!
HEI 2019 Annual Conference

May 5–7, 2019
W Seattle Hotel, Seattle, WA



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Traffic Panel Launched for Updated Literature Review

The HEI Board of Directors has appointed an expert HEI panel to review the current literature on potential adverse health effects from exposure to traffic-related air pollution. HEI last published a similar review in 2010: [Special Report 17, Traffic-Related Air Pollution: A Critical Review of the Literature on Emissions, Exposure, and Health Effects](#), and much new science has been published since that time. Results of the review will be presented in an HEI Special Report, anticipated for release in late 2020.

In late April the panelists held their first face-to-face meeting in Chicago, just before the 2018 HEI Annual Conference. They discussed the protocol for the systematic review, including the health outcomes to be included and exposure inclusion criteria, as well as the search strategy and data extraction plan. Here are the panelists:

Francesco Forastiere, PhD (panel cochair) *Emeritus Director of the Etiological and Occupational Epidemiology Division, Department of Epidemiology, Lazio Regional Health Service, Rome, Italy*

Frederick Lurmann, MS (panel cochair) *Manager of Exposure Assessment Studies, Sonoma Technology, Inc., Petaluma, California*

Richard Atkinson, PhD *Reader in Epidemiology, Population Health Research Institute and MRC-PHE Centre for Environment and Health, St. George's, University of London, UK*

Jeffrey Brook, PhD *Assistant Professor, Occupational and Environmental Health Division, Dalla Lana School of Public Health, University of Toronto, Canada; Member, HEI Research Committee*

Howard Chang, PhD *Associate Professor, Department of Biostatistics and Bioinformatics, Rollins School of Public Health, Emory University, Atlanta, Georgia*

Gerard Hoek, PhD *Associate Professor, Institute for Risk Assessment Sciences, Environmental Epidemiology, Utrecht University, Netherlands*

Barbara Hoffmann, MD, MPH *Professor of Environmental Epidemiology, Institute of Occupational, Social, and Environmental Medicine, Heinrich Heine University of Düsseldorf, Germany; Member, HEI Research Committee*

Audrey Smargiassi, PhD *Associate Professor, Department of Environmental and Occupational Health, School of Public Health, University of Montreal, Quebec, Canada*

Adam Szpiro, PhD *Associate Professor of Biostatistics, Department of Biostatistics, University of Washington, Seattle*

Danielle Vienneau, PhD *Senior Scientific Collaborator, Physical Hazards and Health, Swiss Tropical and Public Health Institute, University of Basel, Switzerland*

Gregory Wellenius, ScD *Associate Professor, Department of Epidemiology, Brown University, Providence, Rhode Island*

Jennifer Weuve, MPH, ScD *Associate Professor, Department of Epidemiology, Boston University School of Public Health, Boston, Massachusetts* 