HEI
HEALTH EFFECTS INSTITUTE
update
SUMMER 2018

Chicago, viewed across Oak Street Beach on Lake Michigan.
PHOTO COURTESY OF CHOOSE CHICAGO

Annual Conference Features Lively Discussions on Air Pollution and Health

Some 170 experts from academia, government, industry, and nongovernmental organizations gathered in Chicago, Illinois, in late April and early May for HEI's 32nd Annual Conference. The three-day meeting featured discussion of the latest research on air pollution and health, perspectives on historical and future environmental health policies, and many informal opportunities for attendees to meet and engage with others with similar interests.

On Sunday, a pre-conference workshop on a current, widely debated topic — causal modeling in

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HEI Testifies on EPA Science Transparency Rule

HEI President Dan Greenbaum provided oral testimony on July 17 at a hearing convened by the U.S. Environmental Protection Agency (EPA) in Washington, D.C., on its proposed "Strengthening Transparency in Regulatory Science" rule.

Greenbaum testified that HEI has a longstanding commitment to the principles being addressed by the proposal: producing science of the highest integrity and quality, with special attention to issues of reproducibility and transparency. HEI's approach, he noted, includes rigorous research and statistical design; extensive efforts to test all findings against a wide range of different statistical techniques and assumptions; intensive and independent peer review, with *all* results published; and an active Data Access Policy to facilitate access to underlying data for all HEI-funded studies.

Greenbaum noted that reproducibility — that is, trying to determine whether the results of an important study can be reproduced — is a critical challenge for science. But he emphasized that in HEI's view, the most effective way to test the reproducibility and validity of scientific results in health effects studies is not necessarily to simply reproduce the same results in the same data sets. Rather, it is most important to determine whether the results are consistent when tested in other independent studies that use new and different data not affiliated with the original studies; have different investigators applying the same and/or alternative statistical techniques; and test the sensitivity of the results against numerous other possible explanations for compromised health, such as smoking behavior, socioeconomic status, access to medical care, and more.

He did comment that, in a limited number of cases — where there are no comparable studies in other data sets — it may be useful to gain access to the original study data and analytic codes to allow for independent evaluation of whether the original results can be replicated and whether they are robust to a wide range of alternative assumptions, models, and potential confounders. This is the approach that HEI applied in its independent, rigorous reanalysis of the Harvard Six Cities and American Cancer Society studies, an approach that can — and did — provide comprehensive assurance of the quality, integrity, and validity of the original results.

Greenbaum also testified that HEI agrees with the continuing need to enhance transparency and data access, but noted that these issues are not new and have been addressed for more than 15 years by both Democratic

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Also in This Issue

air pollution research and policy — generated lively discussion on the appropriate uses of causal inference methods, other ways to identify causal relationships between air pollution and health, and the challenges encountered in such research.

The main conference proceedings kicked off on Sunday afternoon with a series of wide-ranging presentations on ozone. Speakers examined international transport, climate change, and other contributors to regional ozone levels; they also provided a summary of recent epidemiological and clinical studies in the context of health assessment and the setting of the federal ozone standard. Talks by state and local air pollution control officials from Texas and Los Angeles examined how scientific knowledge and uncertainty inform state-level efforts to attain that limit.

On Sunday evening, HEI thanked Dave Eaton of the University of Washington for his eight years of excellent service as chair of the HEI Research Committee. Then keynote speaker Venkat Sumantran presented on "The Coming Urban Mobility Revolution," which he said will require new ways of thinking, including integration of a variety of urban transportation modes, to meet future challenges. Sumantran is chairman of Celeris Technologies and coauthor of the book *Faster, Smarter, Greener: The Future of the Car and Urban Mobility.* Using examples from his experiences throughout the world, he posited mobility as central to human civilization and the development of cities, and argued that urban mobility in the future would need "connected, heterogeneous, intelligent, and personalized" solutions.

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Sanjay Rajagopalan, Case Western Reserve University, is greeted by HEI Research Committee member Barbara Hoffmann, University of Düsseldorf, Germany. At left: HEI Director of Science Rashid Shaikh.

Past and current recipients of the Walter A. Rosenblith New Investigator Award include, front row, from left: Kymberly Gowdy, East Carolina University (2015); Lydia Contreras, University of Texas–Austin (2014); Marie Pedersen, University of Copenhagen, Denmark (2017); Mònica Guxens, Barcelona Institute for Global Health (2016); and back row, at right: Joshua Apte, University of Texas–Austin (2017). Back row, left: HEI Managing Scientist Annemoon van Erp; center: HEI Research Committee Chair David Eaton.

Matthew Spears, Engine Manufacturers Association, and Susan Alexander, University of Alabama–Huntsville.

Tony Cox, Cox Associates.

Sabine Lange, Texas Commission on Environmental Quality.

Mike Brauer, University of British Columbia, Vancouver, with Ying-Ying Meng, University of California–Los Angeles.

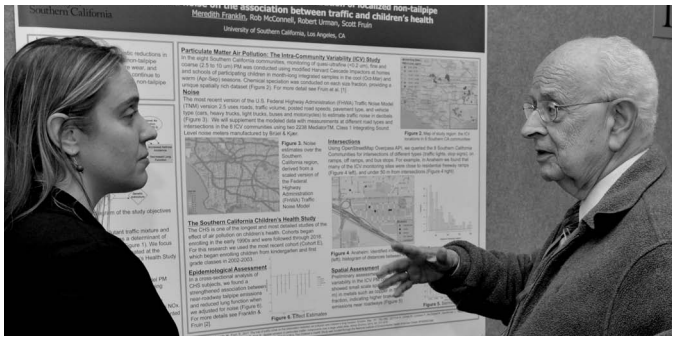
Juan Castillo (left), Clean Air Institute, and Richard Baldauf, U.S. Environmental Protection Agency.

Philip Fine, South Coast Air Quality Management District.

From left: Jaime Hart, Harvard T.H. Chan School of Public Health, and Robin Puett and Devon Payne-Sturges, both from the University of Maryland School of Public Health.

Bart Croes, California Air Resources Board.

Abby Fleisch, Maine Medical Center Research Institute.



Meredith Franklin, University of Southern California, and Philip Bromberg, University of North Carolina–Chapel Hill.

ANNUAL CONFERENCE *(Continued from page 2)*

Monday morning began with the introduction of expert panel members (see *HEI Update*, Spring 2018) for HEI's new, updated review of the traffic and health literature, and a thoughtful discussion of the changing nature of traffic-related air pollution and knowledge gaps to be addressed in the review. Investigators in HEI's new studies on traffic and health were introduced. In the next session, the mechanistic and epidemiological evidence of links between diabetes and air pollution in adults and children was discussed. A small but growing body of literature linking air pollution to Type 1 and Type 2 diabetes was presented.

After a poster session, the last session on Monday focused on issues related to reproducibility in environmental health sciences, particularly ensuring the quality of human health studies that underpin environmental regulations. This topic has received a great deal of attention in view of the U.S. Environmental Protection Agency's recently proposed policy changes (see related article, page 1). Speakers and panelists clarified reproducibility-related concepts, study design, execution and analysis issues, and reproducibility of evidence from air pollution studies.

Tuesday morning opened with an update on HEI's efforts to advance air quality, global health, and energy science. Incoming Research Committee Chair David Savitz of Brown University was welcomed; also introduced were the 2017 Walter A. Rosenblith New Investigator Award recipients. Other presentations reported on HEI's core science programs in traffic-related air pollution, health effects at low ambient levels of air pollution, accountability, and mechanisms of health effects, as well as HEI's Global Health Program. The launch and initial findings of the HEI Energy Research Program focusing on the effects of unconventional oil and gas development were announced.

The conference concluded with a discussion of the relationship between place and healthy urban living, with keynote speaker Sandro Galea of Boston University and others discussing the interrelationships among green space, air pollution, transport planning, travel choice, and health. HEI

The HEI Annual Conference 2018 program and all presentation slides are available at *www.healtheffects.org/annual-conference*. Next year's conference is scheduled for May 5–7, 2019, at the W Seattle Hotel in Seattle, Washington. Registration and program information will be available in early 2019.

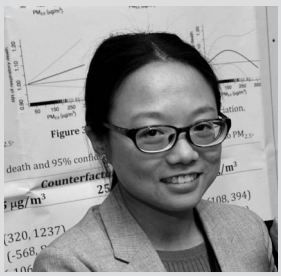
Photos by Jay Mallin
For more pictures see the Conference Photo Album, available in "Program Downloads" at *www.healtheffects.org/annual-conference*.

Three Receive Conference Travel Awards

This year HEI conferred its first three Student and Postdoc Travel Awards, identifying promising new scientists and bringing them to the HEI Annual Conference to share their work and engage with investigators and stakeholders who gather for the event. A large number of excellent applications were submitted, representing a wide range of environmental health science topics and approaches. Recipients were selected based on scientific merit and writing quality of their abstracts, relevance to or advancement of HEI's research interests, and the applicant's statement on the professional value of attending the conference.

The three 2018 HEI Student and Postdoc Travel Award recipients were Joshua Keller from Johns Hopkins University, Meilin Yan from Colorado State University, and Rishabh Shah from Carnegie Mellon University. HEI Director of Science Rashid Shaikh commented: "We were very pleased by the quality of the applications we received — and with the work of the winners — and look forward to welcoming the best new talent each year at HEI's Annual Conference." HEI

Joshua Keller.



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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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NEW HEI COMMUNICATION

Assessing the Evidence on Household Air Pollution

Report Analyzes the Science on Disease Risks from Exposure to Fuels for Cooking, Heating, and Lighting

A total of 2.5 billion people — a third of the global population — were exposed to household air pollution (HAP) in 2016 from the use of solid fuels for cooking, heating, and lighting, according to HEI's recently released Communication 18, *Household Air Pollution and Noncommunicable Disease*. That population, exposed to high levels of particulate matter from domestic burning of fuels such as wood and coal, faces a significant health risk.

Over a third of the world's population burns solid fuels for household energy needs.

PHOTO: AJAY PILLARISETTI, BY PERMISSION

HEI's synthesis of the latest scientific evidence found a growing number of epidemiological studies and systematic science reviews with evidence that HAP exposures increase the risk of many noncommunicable diseases, including lung and heart disease, cataracts, and lung cancer. All told, this translates into HAP exposure contributing substantially to the global burden of disease, an estimated 2.6 million deaths in 2016. The economic consequences of the HAP-attributable health burden are also large: the best available estimate from the World Bank suggests an annual global welfare loss in 2013 of about $1.5 trillion in 2011 U.S. dollars from HAP exposures alone.

Most of those affected live in low- and middle-income countries in Asia and Africa. These populations — and especially the women and children inside the homes — face a double burden: from the air they breathe indoors as well as outdoor air pollution from the full range of industrial, transport, and other sources. (Detailed estimates of these double burdens in each country in the world are available at *www.stateofglobalair.org*.)

Clean-Energy Solutions

The report found that traditional interventions to reduce exposure — introducing improved solid-fuel cookstoves — have had mixed effects, with some reductions in exposure but relatively few health benefits. Cost of the alternatives, cultural attachment to the older stoves, and challenges in operating the new stoves all likely contribute to lower-than-expected improvements in exposure and health. These findings, the authors conclude, suggest that more extensive clean-energy solutions, such as bringing natural gas and electricity to rural homes, are needed to significantly reduce the health burden.

Introducing those new solutions has the potential for substantial public health benefits. HEI's Global Burden of Disease from Major Air Pollution Sources (GBD MAPS) project estimates that, in China and India alone, policies that shift to reliance on clean fuels could decrease the future burden of disease from ambient air pollution attributable to residential burning of solid fuels by at least 30% and possibly by more than 95%, depending on the policy. In India, for example, a policy that would virtually eliminate use of biomass cookstoves by 2050 could avoid 500,000 early deaths from outdoor air pollution annually relative to a business-as-usual scenario; eliminating these stoves would have substantial benefits indoors as well. HEI

HEI Communication 18, *Household Air Pollution and Noncommunicable Disease,* and a special *Summary for Policy Makers* were funded by the Bloomberg Philanthropies. They are available at *www.healtheffects.org/publications*. For further information, contact Katy Walker, HEI Principal Scientist (*kwalker@healtheffects.org*).

TRANSPARENCY *(Continued from page 1)*

and Republican administrations and by the scientific community. He urged the EPA to consult these many existing efforts, and to carefully consider whether additional measures would or would not further enhance transparency, before proceeding with a final rule.

Finally, Greenbaum highlighted that access to private medical information is essential to conducting high-quality and reproducible air quality and health research, and scientists must adhere to significant federal and other requirements for protecting the privacy of those data. He noted that there are several ways to make such data fully available (for instance, through Medicare and Federal Statistical Research Data Centers). He cautioned, however, that it is not possible to conduct a high-quality air pollution and health study simply by releasing a fully "depersonalized" data set, since without knowing where those being studied live and what the nearby air pollution sources are, it is difficult to accurately assess their air pollution exposure.

Greenbaum also submitted the HEI Statement for the Reanalysis of the Harvard Six Cities and American Cancer Society studies. Copies of his oral testimony and of HEI's written testimony are available at *www.healtheffects.org/accountability/data-access-transparency*. HEI

SIGN UP: HEI NEWSLETTER ONLINE

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Breakout group sessions at the July workshop brought together representatives of academia, nongovernmental organizations, industry, and federal and state governments to discuss priorities for exposure research. Each group then reported back to all the workshop participants.

PHOTO BY KATHRYN LIZIEWSKI

Progress in Energy Research Planning

Diverse Stakeholders Begin Discussion of Priorities for Exposure Studies

HEI held a public workshop in Denver, Colorado, on July 11 and 12, the second public event during Year 1 of the Institute's Energy Research Program.

Hosted by the new HEI Energy Research Committee, the meeting brought together a wide range of stakeholders to contribute their perspectives to the Committee's impartial, interdisciplinary review and interpretation of exposure, toxicity, and risk assessment literature — a review that HEI expects to publish this winter in a Special Report — and to lend insight to the Committee's planning for scientific investigations.

The Energy Research Program, officially launched at a public meeting in January, was established to fill important knowledge gaps about potential human exposures associated with oil and natural gas development from unconventional resources. The Energy Research Committee defines and oversees the multidisciplinary program in collaboration with HEI staff.

At the July workshop, 16 speakers and other representatives of federal and state government, nongovernmental organizations, community groups, industry, and academia engaged in a productive exchange with the Committee and other meeting participants about HEI's review of the exposure literature, ideas for population-level exposure research, and criteria for prioritizing areas of scientific inquiry for funding.

Research is anticipated to begin during Year 2 of the program. Experts at the workshop presented information and data useful for planning the studies, including overviews of literature on community and worker exposure assessment, trends in oil and gas operational practices and regulation, air and water quality impacts, and quantitative assessments of human health risk.

The Committee is continuing its review of the literature in advance of a second workshop, to be held this September, where research planning will proceed in greater depth. HEI plans to release a Request for Qualifications in late 2018 or early 2019. HEI

Presentations from the workshop are available at *www.healtheffects.org/meeting/hei-energy-Jul-2018-workshop*. For more information, contact Donna Vorhees (*dvorhees@healtheffects.org*).

HEI Grateful to Sheppard for Service on Review Committee

After nine years of distinguished service, Elizabeth (Lianne) Sheppard stepped down from the Review Committee in June.

Lianne Sheppard.

Sheppard is a professor of environmental and occupational health sciences, and of biostatistics, at the School of Public Health, University of Washington–Seattle. Her research interests include air pollution epidemiology, estimation of health effects from environmental exposures, exposure modeling, and measurement error. She is a member of the U.S. Environmental Protection Agency's (EPA) Clean Air Scientific Advisory Committee and has served on other EPA panels.

As a biostatistician on the Review Committee, Sheppard scrutinized the design, data analysis, results analysis, interpretation, and conclusions of HEI studies. She provided insightful comments and suggestions to authors of HEI reports.

"Lianne considers accurate and honest reporting to be an ethical responsibility of scientists," said HEI Director of Science Rashid Shaikh. "Her efforts improved the reporting for many, many HEI studies. We will miss her advice and counsel." HEI

Mark Your Calendar!

HEI 2019 Annual Conference

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

Health Effects Institute

75 Federal Street, Suite 1400
Boston, MA 02110-1817

Costantini Retires After Notable Career with Institute

After a long and productive career, Maria Costantini retired from HEI this past June. She joined HEI in 1987 as a staff scientist at a time when Massachusetts Institute of Technology (MIT) Professor Walter Rosenblith was the chair of the Research Committee and Jane Warren the Director of Science.

With a PhD in biological sciences from the University of Milan, Italy, and subsequent research experience at the University of Milan and MIT, Costantini contributed to HEI's strong research portfolio on toxicology of motor vehicle exhaust, fuels, and fuel additives. Over the years, she was instrumental in developing and implementing a wide variety of research projects as well as reviews of the literature on topics ranging from methanol, cerium, and methyl tertiary-butyl ether to diesel exhaust, particulate matter, ozone, and traffic-related air pollution.

Maria Costantini at an HEI Annual Conference. PHOTO BY JAY MALLIN

Costantini oversaw several high-profile studies, such as the Advanced Collaborative Emissions Study (ACES) on toxicity of new-technology heavy-duty diesel engines, and most recently the Multicenter Ozone Study in oldEr Subjects (MOSES) on respiratory and cardiovascular effects at low ozone concentrations in older volunteers. She was also involved in the early stages of developing HEI's Public Health and Air Pollution in Asia program. She was a major contributor to the frequently cited 2010 Special Report 17, *Traffic-Related Air Pollution: A Critical Review of the Literature on Emissions, Exposure, and Health Effects*.

Behind the scenes, Costantini helped organize many excellent HEI Annual Conferences and scientific workshops, and managed HEI's Quality Control/Quality Assurance process, which ensures the signature high quality of data analysis and reporting that HEI is known for. She also played an active role in the International Society for Exposure Science. After retiring, Costantini hopes to enjoy travel and outdoor adventures with her husband and extended family.

"Maria has been a terrific colleague and friend over the years," said HEI Director of Science Rashid Shaikh. "An excellent scientist, Maria has led many successful and multidisciplinary scientific collaborations during her tenure at HEI. She has served HEI and the air pollution research community with unfailing energy, good ideas, and hard work. We will all miss her greatly and wish her the very best for future endeavors." HEI