HEI HEALTH EFFECTS INSTITUTE

update

FALL 2016

HEI Welcomes Epidemiologist to Review Committee

The HEI Board of Directors has appointed environmental epidemiologist Jennifer L. Peel of Colorado State University (CSU) to the HEI Review Committee. The Committee evaluates all completed HEI studies and prepares a commentary or critique on each study and its results and interpretations that puts them in a broader scientific and policy context. This Committee has no role in selecting or overseeing HEI's research projects.

Jennifer L. Peel

JOHN EISELE, CSU PHOTOGRAPHY

Peel is a professor and section head of epidemiology in the Department of Environmental and Radiological Health Sciences at CSU. She also holds an appointment in the Colorado School of Public Health. She has more

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New Study Explores Health Benefits of Policies to Reduce Air Pollution

Over the years, HEI has played a leading role in "accountability" research, which assesses the health outcomes of air quality improvements by defining some of the major conceptual issues and sponsoring important research. HEI will soon publish a key study in this area, conducted by Frank Gilliland and his colleagues at the University of Southern California: Research Report 190, *The Effects of Policy-Driven Air Quality Improvements on Children's Respiratory Health*.

These investigators explored whether regulations implemented at the national and state level to decrease emissions of mobile-source pollutants

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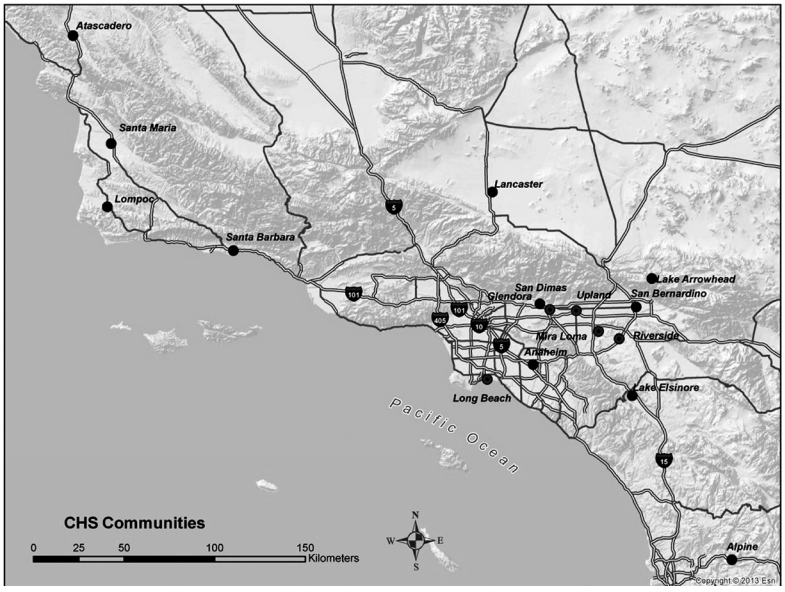


For their HEI work, Gilliland and colleagues used information that they had gathered during the 20-year Children's Health Study (CHS), which had recruited subjects from these Southern California communities.

Also in This Issue

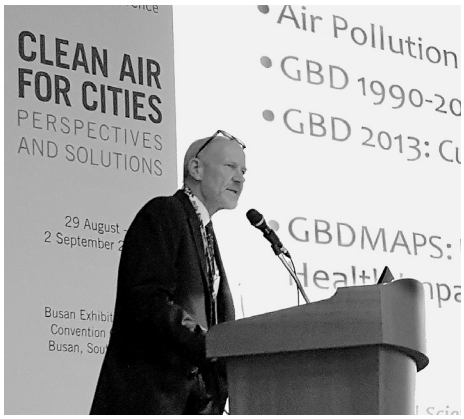
O'Keefe Cochairs Major Clean Air Meeting in South Korea

With air pollution now a major global environmental health concern, especially in developing regions, HEI Vice President Robert O'Keefe joined experts from around the world in Busan, South Korea, in a landmark meeting to address multiple challenges and identify ways toward cleaner air for countries and cities.

Cohosted by two leading international air quality organizations, Clean Air Asia's 9th Better Air Quality Conference and the International Union of Air Pollution Prevention and Environmental Protection Associations' 17th World Clean Air Congress brought together nearly 1,000 participants from more than 50 countries. Among these were representatives of government ministries, nongovernmental organizations, and the private sector, as well as researchers and individuals from civil society.

At the five-day event, themed "Clean Air for Cities: Perspectives and Solutions," speakers explored advances in science, technology, policy, and practice that are needed to innovatively and collaboratively address air-quality challenges.

As Clean Air Asia's Chair of the Board, O'Keefe cochaired the conference and presented a keynote address featuring HEI's major new study presented in Special Report 20, *Burden of Disease Attributable to Coal-Burning and Other Major Sources of Air Pollution in China*, which identified coal burning as being responsible for 40 percent of the population-weighted ambient particulate matter in China and identified industrial and household combustion as being among the major sources.



HEI Vice President Robert O'Keefe presents during the "Air Pollution, Health, and the Urban Future" session of the Better Air Quality meeting.

PHOTO BY JEREY ESTRADA

HEI Makes (Ancient) History

At the International Society for Environmental Epidemiology annual conference in Rome, Italy, in early September, HEI Director of Energy Research Donna Vorhees addressed a crowd of more than 1,500 people regarding the state of the science on potential exposures and health risks associated with oil and gas development — an area of research for a new HEI program currently supported with separate foundation funding.

HEI scientist Hanna Boogaard served on the scientific program committee for the conference and also cochaired a symposium entitled "Atlanta to Asia: Measuring the Effectiveness of Air Quality Actions," with Kwaku Poku Asante from Kintampo Health Research Centre, Ghana.

In addition, HEI President Dan Greenbaum and Director of Science Rashid Shaikh led a timely session on new diesel engine technologies and public health impacts; included was a discussion of efforts in Europe and around the world to strengthen in-use compliance with emissions standards following recent findings of high nitrogen dioxide emissions from on-road diesel cars in the United States and Europe.

HEI Principal Scientist Katy Walker chaired a session to discuss systematic review methodologies that have been increasingly proposed to improve the process for evaluating epidemiological studies and their contributions to risk assessment and public policy for environmental health. HEI

New Roles for HEI Staff

HEI is pleased to announce two promotions of HEI scientists to important positions in our global health and energy research efforts.

Katy Walker.

PHOTO BY STEVEN HOLT

In August, Katy Walker was promoted to Principal Scientist. In this role, Walker is providing overall leadership and coordination of HEI's global health work. This includes continuing our work in the Global Burden of Disease initiative — particularly as HEI extends this activity by contributing to research on outdoor air pollution from various sources in China and India — and our launch of a new HEI project, State of the Global Air.

Donna Vorhees.

PHOTO BY JAY MALLIN

Also promoted was Donna Vorhees, who is now Director of Energy Research. Vorhees will continue to provide leadership on moving forward HEI's work related to unconventional oil and gas development, including steps to implement the research agenda drafted by a special committee last year. She will also seek opportunities to apply the HEI model to other areas of energy and health research. HEI

HEI Is Hiring!

HEI is seeking two strong candidates to join its scientific staff in Boston. They will play a central role in HEI's work in North America, Europe, and around the world. Review of applications has begun, but each position will be open until a suitable candidate is found.

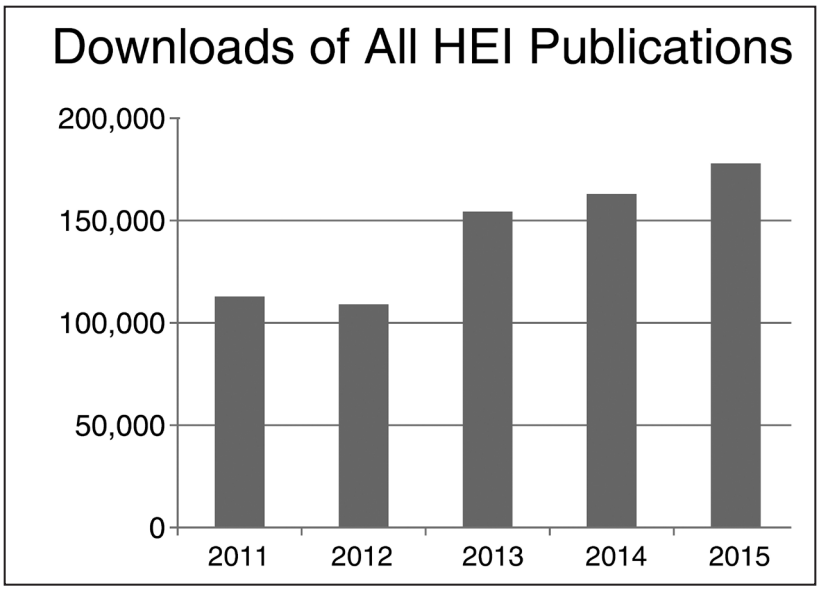
One position, for a Staff Exposure Scientist, requires expertise in exposure assessment and its applications in air pollution epidemiology. The successful candidate will bring experience and perspective on sophisticated exposure assessment methods involving satellite data, ambient monitoring data, land-use characteristics, and other information.

The other position is for a Staff Epidemiologist. The successful candidate will participate in HEI's work to assess the Global Burden of Disease and in other international projects. Other projects will include major studies to investigate health effects from exposure to low concentrations of air pollution; anticipated studies on traffic, noise, and health; and a state-of-the-science review of the literature on traffic and health.

For the complete job descriptions and requirements, visit *www.healtheffects.org/careers*. HEI

More Readers Find HEI's Quality Science a Click Away

New user statistics for HEI's Web site show that people downloaded HEI publications on air pollution and health more than 170,000 times in 2015, and that these downloads are occurring at an increasing rate. From 2011 to 2015, downloads of HEI Special Reports, Research Reports, Perspectives, and other materials published by the institute increased by nearly 58 percent (see figure).



These downloads have included a wide range of HEI reports published over the past three decades, although several have been especially popular in recent years. Special Report 17, *Traffic-Related Air Pollution: A Critical Review of the Literature on Emissions, Exposure, and Health Effects* (2010), is the clear number one, as it has been in the past four years. It is followed closely by Perspectives 3, *Understanding the Health Effects of Ambient Ultrafine Particles* (2013).

Also making the top 10 list again are Special Report 18, *Outdoor Air Pollution and Health in the Developing Countries of Asia: A Comprehensive Review* (2010), and an older Special Report, *Revised Analyses of Time-Series Studies of Air Pollution and Health* (2003). In addition, six Research Reports are on the current top 10 chart that also have been popular downloads previously (see the longer version of this article at *www.healtheffects.org/announcements*).

With the publication of additional important reports in recent years (e.g., the HEI National Particle Component Toxicity [NPACT] initiative, the Advanced Collaborative Emissions Study [ACES] testing of new-technology diesel engines, and the newest data on the Global Burden of Disease), HEI looks forward to continuing to track how many people are accessing and using our work — and to identify ways to increase their use.

All HEI publications can be downloaded free of charge at *www.healtheffects.org/publications*. The site contains a complete archive of all HEI reports, dating back to 1985.

HEI in the News

Data on Impact of Coal-Burning in China Capture Headlines

The release in August of HEI Special Report 20, *Burden of Disease Attributable to Coal-Burning and Other Major Sources of Air Pollution in China*, drew attention from prominent news media organizations. The comprehensive study found that coal combustion is the single largest source of air pollution-related health impact in China, contributing to 366,000 premature deaths there in 2013.

Special Report 20, available in Chinese and English, is the first publication of the Global Burden of Disease from Major Air Pollution Sources (GBD MAPS) project, a collaborative effort among HEI and other institutions (see *HEI Update*, Summer 2016). It provides the first comprehensive assessment, at national and provincial levels, of current and future burdens of disease attributable to coal-burning and other major sources of particulate-matter air pollution in China.

Besides citing data from the China study, news media quoted HEI President Dan Greenbaum regarding air pollution in India, where the GBD MAPs effort is also turning its attention.

Here is a sampling of the news coverage:

"Coal Burning Causes the Most Air Pollution Deaths in China, Study Finds" (*New York Times*, August 17)

"Study: Air Pollution Deaths to Rise as Smog Clears" (*China Digital Times*, August 18)

"India Air Pollution Death Rate to Outpace China: Researcher" (Reuters, August 18)

"India's Air Pollution Death Rate to Outpace China Due to Power Pledge" (*South China Morning Post*, August 19)

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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 Web site.

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To sign up for e-mail delivery of *Update*, go to "Newsletter Sign-up" at the bottom of our home page, *www.healtheffects.org*.

Visiting Fellow Examines Decision-Making in Unconventional Oil, Gas Research

In September, HEI welcomed Alison Cullen of the University of Washington–Seattle as a visiting fellow. Cullen served on HEI's Special Scientific Committee on Unconventional Oil and Gas Development in the Appalachian Basin and contributed to its Research Agenda, published in October 2015. During her fellowship, she is expanding on the committee's work by exploring how best to choose among options for research in its area of focus — that is, the potential human exposure and health effects from onshore unconventional oil and gas development. She will be at HEI until December while on sabbatical from the university, where she is a professor at the Daniel J. Evans School of Public Policy and Governance and an adjunct professor in the College of the Environment and the School of Public Health.

Alison Cullen.
PHOTO BY KAREN ORDERS

Cullen's expertise is in the area of decision-making under uncertainty related to environmental health, in particular in the area of health-risk analysis. "Alison's work during her fellowship will support HEI's allocation of resources and time for research on the potential effects of unconventional oil and gas development in a way that provides the highest expected value," says Donna Vorhees, HEI's Director of Energy Research. "This approach recognizes that in controversial settings, how research directions are identified, prioritized, and funded can often be as important as their quality and utility for decision making." HEI

NEW HEI RESEARCH REPORT

Protective Role of Eosinophils after Ozone Inhalation in an Animal Model

In a study funded by HEI, Allison D. Fryer and colleagues at the Oregon Health Sciences University investigated the role of the immune system in the effects of ozone on asthma. They focused on eosinophils, white blood cells that develop in bone marrow and travel to the lungs and other organs as part of the immune response. Their findings appear in HEI Research Report 191, *Protective Role of Eosinophils and Tumor Necrosis Factor after Ozone Inhalation*, scheduled for publication this fall.

Many people are occasionally exposed to high levels of ground-level ozone, which is associated with acute asthma exacerbations and reduced lung function. It has been shown that one day after ozone exposure, eosinophils in the lung contribute to bronchoconstriction in the airways. However, in earlier work, Fryer had found the opposite effect three days after guinea pigs had been exposed to ozone. She noted that a new population of eosinophils had been recruited from bone marrow to the lungs and wondered what their role might be.

In the current study, Fryer showed that ozone exposure caused airway hyperresponsiveness and that the response was greater in "asthmatic" animals than in nonsensitized animals. She also confirmed that newly recruited eosinophils in the airways play a beneficial role three days after ozone exposure. However, this effect was not seen in animals with "asthma." Fryer found that two cytokines, tumor necrosis factor and interleukin-5, played different roles in producing the observed effects.

In its independent review, the HEI Review Committee said Fryer's observations may provide insights into the mechanism of ozone-induced injury and could potentially have implications for treatment of patients with the allergic type of asthma. Future work, the Committee said, should pursue in more detail how newly formed and preformed eosinophils differ in function and phenotype. HEI

Research Report 191 will soon be available for downloading, free of charge, at *www.healtheffects.org/publications*.

PEEL *(Continued from page 1)*

than 16 years of experience evaluating the health effects of air pollution — both ambient air pollution in the United States and household air pollution from biomass-burning cookstoves in Central America. Her active collaborative research projects include examining the short-term exposures and health impacts of commuting in Fort Collins, Colorado; evaluating cardiovascular, respiratory, and adverse birth outcomes in relation to air pollution in Colorado; investigating cardiovascular and metabolic-related endpoints in relation to biomass exposures in Honduras; and investigating acute cardiorespiratory effects from controlled exposures to cookstove emissions.

Peel holds a Ph.D. in epidemiology from the Rollins School of Public Health at Emory University in Atlanta, Georgia. She has worked with the U.S. Environmental Protection Agency on criteria ambient air pollutants and is a reviewer for multiple agencies, including the National Institutes of Health. She is also an associate editor of *Environmental Health Perspectives*. Previously she was funded by HEI for an accountability (health outcomes) study, HEI Research Report 148, *Impact of Improved Air Quality During the 1996 Summer Olympic Games in Atlanta on Multiple Cardiovascular and Respiratory Outcomes*, published in 2010. HEI

SAVE THE DATE!

HEI Annual Conference

April 30–May 2, 2017

Alexandria, Virginia

Stay Tuned for New RFAs

This upcoming fall and winter, HEI will issue three requests for applications (RFAs) soliciting new research. Watch for updates at *www.healtheffects.org/research/funding*.

RFA 16-1: Walter A. Rosenblith New Investigator Award

This award supports creative junior investigators, at assistant professor or equivalent level, with outstanding promise who are interested in studying the health effects of air pollution. RFA 16-1, which will be released in November, will provide funding for a project relevant to HEI's research interests, as outlined in the HEI Strategic Plan for 2015–2020. Interested applicants will be asked to submit a four-page preliminary application (PA) in February 2017, which the HEI Research Committee will review. Investigators with the most promising PAs will be asked to submit a full application in May, which the Research Committee will subsequently evaluate. Prospective applicants should contact HEI to verify their eligibility before applying. For more information about the award program and its history, visit *www.healtheffects.org/research/funding/rosenblith-award* or contact Annemoon van Erp (*avanerp@healtheffects.org*).

RFA 17-1: Assessing Adverse Health Effects of Exposure to Traffic: Air Pollution, Noise, and Interactions with Socioeconomic Status

Deliberations from an early-May workshop to discuss research questions for new studies on the health effects of exposure to traffic-related pollution are being used to inform the development of this RFA.

More than 40 leading researchers and sponsors with expertise in various fields attended the workshop, which was held in Denver after the HEI Annual Conference. Given the large and growing literature on the effects of traffic-related air pollution, participants were asked to identify key research questions, the research designs that might best address them, and the major methodological challenges. Emphasis was placed on how to disentangle the role of other factors, in addition to air pollution, that are associated with traffic exposure. Within this context, workshop participants discussed issues related to study design and health outcomes that may be included, such as assessment of traffic noise, the role of socioeconomic status, and the possible impact of green space.

HEI staff and the Research Committee are currently preparing the RFA, which will be sent to HEI sponsors for their feedback, according to HEI's procedures, during the fall. HEI plans to issue the RFA in January 2017. Interested applicants will be asked to submit a four-page preliminary application (PA) in March, which the Research Committee will review. Investigators with the most promising PAs will be asked to submit a full application, due in July.

For further information about RFA 17-1, contact Hanna Boogaard (*jboogaard@healtheffects.org*) or Maria Costantini (*mcostantini@healtheffects.org*).

RFA 17-2: Health Effects of Air Pollution

This RFA provides an application mechanism for investigators whose area of interest falls outside of the topics targeted in other requests for applications from HEI. Of greatest interest is research that is relevant to HEI's current priorities, as outlined in the HEI Strategic Plan for 2015–2020. HEI plans to issue the RFA in January 2017. Interested applicants will be asked to submit a four-page preliminary application (PA) in May, which the Research Committee will review. Investigators with the most promising PAs will be asked to submit a full application in the fall of 2017. For more information about RFA 17-2, contact Katy Walker (*kwalker@healtheffects.org*). HEI

GILLILAND *(Continued from page 1)*

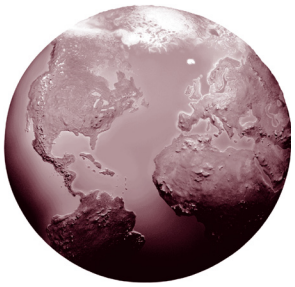
result in long-term reductions in the levels of those pollutants, and whether they also lead to improvements in the health of the exposed population. Gilliland and colleagues brought together extensive pollutant monitoring and health effects information — lung function and respiratory symptoms — as well as multiple covariates that they had collected over more than 20 years from participants in several cohorts recruited into the Children's Health Study (CHS) in Southern California. The children lived in communities that differed in sources and levels of the outdoor pollutants particulate matter, nitrogen dioxide, and ozone.

Gilliland and his team found that 18 major policy actions had been implemented in Southern California during 1985–2012 to reduce pollution from transportation sources. During the two decades of the study period, they found that emissions of pollutants and their precursors, as well as ambient levels of most air pollutants, decreased, in some cases quite significantly. The study's major health findings were that decreases in long-term community-level averages of pollutants across cohorts — particularly NO_2 and $PM_{2.5}$ — were associated with improved growth of children's lung function. Decreases in levels of NO_2, $PM_{2.5}$, PM_{10}, and O_3 were also associated with decreased prevalence of respiratory symptoms, particularly in children with asthma.

The Review Committee praised Gilliland and his colleagues for analyzing valuable data on air pollution and health status that they had collected over two decades in Southern California; their focus on lung health among teenagers was well justified because the teen years are a period of rapid lung growth. Given the large number of policy control measures taken, sometimes with overlapping time frames, it was difficult to attribute the emission and pollutant reductions to specific policies. The Review Committee concurred with the overall findings of health improvement in the teenagers, but it also noted that changes in lung function and respiratory symptoms were not uniform across the communities in relation to decreases in pollutants, suggesting that some unexplored between- and within-community factors also were likely to be important. Given the extensive data that the CHS has collected, future research can explore in more depth the nature of these associations, in particular the question of whether they are likely to be causal.

Taken together, these findings are important in suggesting that national and California agency regulations directed at reducing emissions of mobile-source pollutants were likely contributors to improvements in air quality that were in turn associated with improvements in children's respiratory health — all of which suggests the potential for important public health benefits from decreasing levels of major outdoor pollutants. HEI

HEI Research Report 190 will soon be available for downloading, free of charge, at *www.healtheffects.org/publications*.



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New and Improved HEI Web Site

HEI's newly redesigned Web site went live in mid-August. In addition to a fresh new look, you will find these helpful features:

- Easier navigation and cross-linking of information
- Enhanced search function to locate our publications, newsletters, studies under way, and other information
- Buttons for sharing HEI news and studies via social media (e.g., Twitter, Reddit, Facebook, etc.)
- Dedicated pages for our top-priority work on Air Pollution, Accountability, Emerging Fuels and Technologies, Global Health, Unconventional Oil and Natural Gas, and Innovative Strategies
- And much more!

We appreciate the feedback we received on our beta site in May. We hope you will find *www.healtheffects.org* helpful and easy to use, and we welcome your feedback and suggestions for making it even better. Send your comments on the site to *webmaster@healtheffects.org*.