HEI HEALTH EFFECTS INSTITUTE

update

WINTER 2017

Tracking the Trends in Air Quality and World Health

HEI's New "State of Global Air" Offers Accessible Resource for Public, Policymakers, Scientists; Updated Each Year

This winter, HEI has launched the State of Global Air project — a concise, understandable annual report and interactive website providing "one-stop shopping" for key findings on the latest trends in air quality and its impact on human health globally, in regions, and in countries around the world. The report and website will be updated each year, highlighting the extent of significant health impacts from air pollution and its main sources as well as tracking progress toward cleaner air.

Home page of the interactive website.

The State of Global Air is a collaborative effort among HEI, the Institute for Health Metrics and Evaluation at the University of Washington, and the University of British Columbia. On the interactive website, *www.stateofglobalair.org*, visitors can explore and compare trends in air quality and health from 1990 to the most recent data released (currently, 2015) from the Global Burden of Disease (GBD) project (*www.healthdata.org/gbd/about*). For the first time, the website makes available to everyone the full GBD air quality data sets for downloading and use. Graphs and their underlying data are downloadable for immediate publication or for further exploration.

The report and website highlight ambient air pollution levels (focusing on fine particulate matter and ozone), the latest levels of health impact (measured in numbers of people living with unhealthy air, premature deaths, death rates, years lived with disability, years of life lost, and other metrics), and trends in these measures globally, in major geographic regions, and in individual countries. The State of Global Air provides a platform for communicating summaries of major new HEI reports, such as Special Report 20, *Burden of Disease Attributable to Coal-Burning and Other Major Sources of Air Pollution in China* (2016) and an upcoming report on India, as well as relevant studies from other institutions.

"HEI's State of Global Air project is a natural extension of HEI's role as a communicator of complex scientific studies on air pollution and health to audiences both within and beyond the scientific research community — citizens, journalists, and policymakers," said HEI President Dan Greenbaum. "Furthermore, it addresses the need for effectively informing government policymakers, along with industry and environmental stakeholders, to support their efforts to address air quality challenges."

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HEI's Annual Conference 2017 Returns to the D.C. Area: Sign Up Now!

Join HEI on April 30–May 2 for the institute's Annual Conference in historic Alexandria, Virginia — just a 20-minute Metro ride across the Potomac from Washington, D.C. Scientists, institute sponsors, and policymakers from around the globe will gather at the Westin Alexandria Hotel to learn about the latest, most critical research findings on air pollution and health. Technical sessions include the following:

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First U.S. president's estate in Mt. Vernon, Virginia.
COURTESY OF GEORGE WASHINGTON'S MOUNT VERNON

Also in This Issue

Communicating the Science

Workshop on Effects of Fuel Composition on Particles

HEI held a workshop in Chicago in early December to provide an overview of research on the effects of fuel composition on particulate matter (PM) emissions. Approximately 45 researchers and government and industry representatives attended the workshop (*www.healtheffects.org/meeting/workshop-effects-fuel-composition-pm*), which began with overviews of regulatory issues, engine and vehicle parameters, and fuel formulation, as well as the complex relationship between primary (tailpipe) emissions and secondary PM formation. Other presentations discussed the impact of gasoline composition (including ethanol level and aromatics) and engine technology (including gasoline direct injection) on PM emissions. The workshop ended with the broad recommendation of optimizing both vehicle technologies and fuels for meeting future regulatory standards.

Symposium on Approaches to Estimating Traffic Exposures

At the 2016 conference of the International Society of Exposure Science, held this past fall in Utrecht, the Netherlands, HEI scientists Hanna Boogaard and Maria Costantini cochaired a symposium entitled "Real-Time Measurements and Integrated Models to Estimate Traffic Exposures in Complex Urban Environments." The symposium brought together a multidisciplinary group of speakers to discuss research approaches aimed at distinguishing the effects of traffic-related air pollution from effects of other factors — including traffic noise, characteristics of the built environment (such as green space), and socioeconomic status — and from effects of other sources of air pollution. These topics are covered in HEI's Request for Applications 17-1, available at *www.healtheffects.org/research/funding/rfa/17-1-traffic-and-health*.

Sharing Progress on Clean Diesel

In December, HEI President Dan Greenbaum gave the keynote luncheon address at an annual meeting of the Diesel Technology Forum (DTF) and the Engine Manufacturers Association (EMA), and the next day presented the progress on implementing clean diesel technology across the United States at a meeting of the U.S. Environmental Protection Agency Clean Air Act Advisory Committee. At the DTF/EMA meeting, which each year reviews progress on efforts to advance the introduction of new clean diesel technology engines, Greenbaum highlighted the progress made on diesel as documented in HEI's Advanced Collaborative Emissions Study program and reviewed recent developments in ambient air quality and health science for particulate matter, ozone, and nitrogen oxides.

Emissions Control Forum in New Delhi

Greenbaum also presented the keynote address at the 2016 Emissions Control Forum (ECT) in New Delhi, India, in November. The influential forum is organized annually by the Emissions Control Manufacturers Association of India and attracts leading experts from government, industry, academia, and the nongovernmental sectors. The ECT covers the latest developments in emissions, fuels, and engine technologies in the expanding Indian market and provides a forum for policymakers from the National Central Pollution Board, Department of Heavy Industries, Delhi government, and elsewhere to meet with the Society of Indian Automobile Manufacturers, the fuels industry, and others at the science–policy interface.

Greenbaum's talk focused on recent HEI work in India in conjunction with the multi-institutional Global Burden of Disease project; the findings of HEI's Advanced Collaborative Emissions Study and the promise of new-technology diesel; and future HEI studies of the effects on health from exposure to traffic-related air pollution.

HEI at Indo-US Workshop

In November, Rashid Shaikh, HEI Director of Science, spoke in New Delhi at the Indo-US Workshop to Explore Bilateral Research Opportunities to Address Air Quality and Health Issues. At the meeting, organized by the National Institute of Environmental Health Sciences and the Indo-US Science and Technology Forum along with several Indian groups, participants explored pathways for an integrated program in air pollution and health in India, and identified and prioritized research needs and implementation strategies. This early-November workshop fortuitously coincided with one of the worst episodes of air pollution in Delhi, generating a high level of interest. The title of Shaikh's talk was "International Air Quality and Health Research: Observations and Reflections." HEI

Annual Report for 2016 Now Available

The 2016 Annual Report, *Trusted Science for Decisions* (*www.healtheffects.org/publication/annual-report*), describes HEI's partnership with industry, government, scientists, and the environmental community to provide high-quality, impartial, and relevant science to inform public policy decisions about air quality and public health. Included is a description of HEI's rigorous approach to science and the many ways diverse stakeholders in the United States and worldwide put the research findings to use. The report outlines HEI's latest initiatives: studies to investigate the health effects of exposure to low levels of air pollution across large populations in the United States and Europe; recent and forthcoming work of HEI's Global Burden of Disease from Major Air Pollution Sources initiative; and HEI's efforts to inform decisions on energy choices, including its Energy Research Program addressing questions surrounding unconventional oil and natural gas development.

STATE OF GLOBAL AIR *(Continued from page 1)*

Ambient air pollution ranked fifth globally in 2015 among all GBD risk factors that contribute to premature mortality, the leading environmental risk factor. Put in other terms, it factored into 8 percent of all premature deaths globally — almost 6 times as many as are accounted for by malaria and 4 times as many deaths as are attributed to HIV/AIDS.

In future years, the State of Global Air will provide a detailed look at the newest GBD data on exposures of sensitive subpopulations (for example, children and the elderly), indoor or household air pollution from the burning of solid fuels, and additional air pollutants (for example, nitrogen dioxide). HEI

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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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Where Are Vehicles and Fuels Headed in the 21st Century?

Transformations are under way in vehicles and fuels in the United States and around the world, prompted in part by current regulatory mandates to reduce greenhouse gas emissions. In the near term — through 2025–2030 — this will mean much greater use of fuel-efficient gasoline direct injection (GDI) engines, "lower carbon" fuels, and many other approaches. Over the longer term — 2025 and beyond — increasingly wider use of electric-drive vehicles has the potential for broad shifts in vehicles and mobility. This session will explore what we know about advantages and challenges of the main technology and fuel options, and potential implications for air quality and public health.

Making Sense of Sensor Data: Promises and Pitfalls

Air pollution sensors and smartphone apps are revolutionizing the way we can monitor environmental exposures and health outcomes in community studies. These novel technologies are inexpensive, easy to use, and portable, and can provide high temporal and spatial resolution; on the other hand, there are questions on data quality, analysis, interpretation, and communication. This session will discuss the current state of the art of sensor technologies, the challenges of their wider use (such as their application in "citizen science"), and how they may advance exposure assessment for health studies.

HEI Update

HEI will present progress of its research programs and publications. Highlights will include a presentation of a recently completed accountability study in the Southeastern United States and plans for new research on the effects of traffic-related air pollution and unconventional oil and natural gas development. The recipient of the 2016 Walter A. Rosenblith New Investigator Award will also be introduced.

A New Vision for Accountability Research?

There is a long-standing interest in evaluating the effectiveness of air quality interventions in reducing air pollution and improving public health. To date, "accountability" studies have had varying degrees of success in relating regulatory actions to outcomes. To encourage potential new research in this area, this session hopes to bring fresh insights for methods and approaches in accountability research, taking into account the challenges encountered.

The Double Life of NO_2 — Ozone Precursor and Ambient Pollutant

The oxidant gas nitrogen dioxide (NO_2), a regulated criteria pollutant, is the indicator for the larger group of oxides of nitrogen (NO_x) emitted from combustion sources. NO_x react with volatile organic compounds in sunlight to form ozone (O_3). This session will examine two separate scientific debates that have implications for future regulations of NO_x and NO_2: one related to the accuracy of NO_x emission inventories and the challenge in modeling the formation of O_3 in the troposphere, and the other related to the question of whether NO_2 has independent health effects or is more likely an indicator of the broader traffic mixture.

PM Matters — What More Do We Need to Know?

The United States and other countries have made progress in reducing levels of ambient particulate matter (PM), thanks to regulation and the technological innovation in the automotive and other industries. Further progress is expected when additional rules are fully implemented by 2030. In this session, experts from various disciplines will share perspectives on where PM science is, and identify potential key knowledge gaps where research may provide further insight and leverage for future decisions about the PM standard.

Conference program updates and hotel registration information are available at *www.healtheffects.org/annual-conference.*

HEI Announces Recipient of 2016 Walter A. Rosenblith New Investigator Award

Mònica Guxens, assistant research professor at Barcelona Institute for Global Health (ISGlobal; formerly Center for Research in Environmental Epidemiology, or CREAL) in Barcelona, Spain, has received HEI's 2016 Walter A. Rosenblith New Investigator Award for her proposal "Air Pollution, Autism Spectrum Disorders, and Brain Imaging Amongst Children in Europe — the APACHE Project."

Guxens, a physician, specializes in preventive medicine and public health. She received a Ph.D. in public health and biomedical research and has been a Río Hortega Fellow. In addition, Guxens was a postdoctoral fellow at CREAL, as well as at Erasmus Medical Center in Rotterdam and at Utrecht University's Institute for Risk Assessment Sciences, both in the Netherlands. She subsequently joined the faculty at ISGlobal and received a Miguel Servet fellowship in 2014. She is also assistant research professor in the Department of Child and Adolescent Psychiatry/Psychology of the Erasmus University Medical Center–Sophia Children's Hospital in Rotterdam.

Guxens' research focuses on the role of environmental factors, including air pollution, on children's development. In her Rosenblith Award study, she will evaluate whether prenatal air pollution exposure at different time windows is associated with development of autism spectrum disorders (ASDs) and whether prenatal and postnatal air pollution exposure is associated with changes in brain structure and function in children. She hypothesizes that exposure to air pollution during pregnancy may be related to an increased risk of ASDs, but not with an increased risk of autistic traits (subclinical deficits that do not meet formal criteria for autism spectrum disorder diagnosis). To test this hypothesis, Guxens will set up a large, population-based case-control study including children diagnosed with ASD in Catalonia, Spain. In addition, she will include longitudinal cohort data on children's brain health from the Generation R Study in Rotterdam. For both regions, she will estimate air pollution exposure at the children's home addresses using existing land-use regression models available from the European Study of Cohorts for Air Pollution Effects. Guxens will also apply innovative hybrid models — combining land-use variables and satellite-based remote sensing of aerosol optical depth — to evaluate different time windows of exposure. Finally, she will develop and apply novel methods to address measurement errors and to evaluate the possible associations of ASD and brain structural and functional changes with air pollution using multipollutant models.


Mònica Guxens.

Named for the first chair of the HEI Research Committee, the Walter A. Rosenblith New Investigator Award supports the work of a promising scientist early in his or her career. In selecting award recipients, the Committee considers each applicant's potential for a productive research career in examining air pollution and its effects on health, the support provided by the applicant's institution, and the scientific merit of the research project and its relevance to HEI's mission. Guxens is the 22nd scientist to receive the Rosenblith Award since the inception of the program in 1999.

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HEI Board of Directors Welcomes Jo Ivey Boufford

Jo Ivey Boufford.
COURTESY OF NEW YORK ACADEMY OF MEDICINE

Jo Ivey Boufford, president of the New York Academy of Medicine, recently joined HEI's Board of Directors, bringing extensive experience in medicine, international affairs, and public administration to the Board.

Boufford is Professor Emeritus of Public Service, Health Policy, and Management at New York University's Robert F. Wagner Graduate School of Public Service, where she served as dean from 1997 to 2002. She is as well a clinical professor of pediatrics at New York University School of Medicine and codirector of the national program office of the Robert Wood Johnson Foundation Health and Society Scholars Program.

She has held a number of senior positions in the U.S. Department of Health and Human Services (HHS) and in public health institutions in New York City and State government. While at HHS she served as the U.S. representative on the executive board of the World Health Organization.

Elected to the National Academy of Medicine (NAM) in 1992, Boufford was foreign secretary of NAM from 2005 to 2015 and is a member of its Board on Global Health. She also has served in leadership of a number of national education and medical organizations, and was elected a fellow of the National Academy of Public Administration in 2005. She has received several honorary doctorate of science degrees, and has been a fellow of the New York Academy of Medicine since 1988 and a trustee since 2004.

Boufford received her M.D., with distinction, from the University of Michigan Medical School and is Board Certified in pediatrics. HEI