

update

SEPTEMBER 2021

Major HEI Study in Europe Finds Evidence of Health Effects at Low Levels of Air Pollution

new HEI study using data from 11 European countries reported that exposure to relatively low levels of fine particulate matter (PM_{2.5}), black carbon (BC), and nitrogen dioxide (NO₂) was significantly associated with natural-cause, cardiovascular, respiratory, and lung cancer mortality. This study contributes evidence of associations between exposures to relatively low levels of air pollution over many years and several important health outcomes.

The study was funded through HEI's program *Assessing Health Effects of Long-Term Exposure to Low Levels of Ambient Air Pollution* (RFA 14-3).

In HEI Research Report 208, Mortality and Morbidity Effects of Long-Term Exposure to Low-Level $PM_{2.5}$, BC, NO_2 , and O_3 : An Analysis of European Cohorts in the ELAPSE Project, Bert Brunekreef at Utrecht University and colleagues describe the development of new exposure models for all of Europe at a spatial resolution of $100~\mathrm{m} \times 100~\mathrm{m}$ for four pollutants, namely fine particulate matter ($PM_{2.5}$), black carbon (BC), nitrogen dioxide (PM_2), and ozone (PM_2), as well as PM_2 , particle composition. They assigned estimates of these exposures to participants in two parallel sets of epidemiologic analyses:



Brunekreef and colleagues examined data from I I countries, including seven large administrative cohorts, shown here in blue, and a pooled cohort whose subcohorts are indicated with open circles. (From HEI Research Report 208)

Report 208)
 They analyzed a pooled cohort that included 15 conventional research cohorts (i.e.,

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Richard Meserve, Distinguished Scientist, Leader, Tapped as New HEI Board Chair

ince its inception, the Health Effects
Institute has been blessed with
strong and dynamic leadership on its
Board of Directors, no more so than in the



Richard Meserve.

former Governor of Ohio, Ambassador to India, and President Emeritus of Colorado College.

In 2020 Celeste, after a productive and satisfying tenure, informed the Board of his desire to step down

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position of Chair.

nearly 40 years of

have been only two

Board: the founding

Solicitor General of the United States,

Archibald Cox; and

Richard Celeste,

Chairs of the HEI

Chair, former U.S.

operation there

Remarkably, through

Richard Celeste.

HEI Welcomes Communications Director to Staff

EI is pleased to welcome Tom Champoux to a new staff position, Director of Science Communications. Champoux joined HEI on July 26. He will expand on the roles filled by Hilary Polk, who retired in May as Managing Editor after many successful years on the staff.

those for which individuals were invited to participate and to respond to question-

HEI is rapidly growing in an era when the ways people prefer to receive news and information are undergoing dramatic change. Champoux will help the Institute develop strategies to more widely share its trusted, independent science on air pollution and health in

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Taking Steps Toward Action on Inclusiveness

n August 2020, HEI renewed and expanded its commitment to promoting diversity and inclusion in the field of environmental health with the release of its *Action Plan to Promote Inclusion*.

The Action Plan (available here) describes key steps to ensure a safe and welcoming environment for all at HEI and to include individuals from racial and ethnic groups who have been underrepresented in environmental health research.

The Plan sets goals for improving performance, monitoring progress, and reporting publicly and regularly on that progress and steps still to be taken.

Shortly after release of the *Action Plan*, many of HEI's own staff stepped forward to form a Diversity, Equity, and Inclu-

sion (DEI) Task Force that works with leadership to achieve the Plan's stated goals. HEI is pleased to report on some early steps taken to advance inclusiveness, both within the organization and through external work:

- Internally, HEI is in the process of recruiting a consultant to help ensure an inclusive and welcoming work environment. HEI also has begun to enhance efforts to diversify its staff, Board, expert committees and panels, and annual conference and webinar speakers.
- Externally, HEI continues to explore ways to reach out more effectively to scientists from underrepresented groups. This includes revising language on research and fellowship applications, expanding opportuni-

ties through a new or existing scientific fellowship program, and expanding efforts to engage individuals from underrepresented groups in HEI's review activities as well as external expert panels.

HEI leadership has been regularly communicating with staff about ongoing DEI efforts and is encouraged by the work of the Task Force in its first year. At the same time, HEI understands that bringing about meaningful and sustained institutional change requires an ongoing commitment. Therefore, it is now revisiting the August 2020 *Action Plan* to define a strategy that lays out toppriority initiatives and timelines for completing them.

HEI Launches Three New Studies on Wildfires and Effectiveness of Air Quality Policies

he HEI Board of Directors recently approved funding for three new studies: one to be conducted as part of HEI's Accountability program to test whether air quality actions achieve cleaner air and better health, and two on the air and health impacts of wildfires.



HEI's Research Committee selected the three-year studies from among a total of 64 preliminary applications it had received in response to RFA 20-1A, *Health Effects of Air Pollution*, which solicited proposals for research on accountability, causal inference,

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Stay Tuned for Research Funding News

Opportunities for Non-Tailpipe Particulates and More Coming This Fall

EI is planning to issue a request for applications (RFA) this fall to solicit new studies on non-tailpipe vehicle emissions.

With reductions in tailpipe particulate matter (PM) emissions, there is increasing interest in non-tailpipe (i.e., non-combustion) sources of PM, specifically tire and brake wear and road dust. Because of composition changes in tires and brake parts, such emissions have been changing over time and have not been sufficiently studied or characterized. HEI is interested in new research to address the need for real-world exposure indicators unique for non-tailpipe PM

emissions from motor vehicles and to assess potential impacts of such emissions on air quality, human exposure, and human health.

HEI also intends to reissue its annual RFA for the Walter A. Rosenblith New Investigator Award. This award supports creative investigators at the assistant professor or equivalent level who are interested in conducting research on the health effects of air pollution.

To stay informed of these and future funding opportunities, check our Funding pages or follow us on Twitter.

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Richard A. Meserve, *Chair, Board of Directors* Daniel S. Greenbaum, *President*

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

HEI in Spotlight at Major Meetings

s it does each year, HEI sponsored and played important roles at two major annual scientific meetings held virtually in August and early September: the annual conferences of the International Society of Exposure Science (ISES2021) and International Society for Environmental Epidemiology (ISEE2021).

The exposure science meeting focused on "Multisector Engagement for Addressing Emerging Environmental Exposures." Several weeks in advance, on July 31, HEI's Allison Patton joined other panelists for "Career Paths in Exposure Science," a pre-conference workshop hosted by HEI.

The career event was geared toward graduate students, postdocs, and junior faculty and aimed to support participation by junior scientists and those from underrepresented groups.

At the epidemiology meeting, the theme was "Promoting Environmental Health and Equity in a Shifting Climate."

During a panel discussion, HEI staff and members of the HEI Panel on Health Effects of Traffic-Related Air Pollution discussed preliminary findings from HEI's systematic literature review.

In a separate presentation, HEI President Dan Greenbaum shared HEI's perspective on the need for additional guidance in evidence synthesis in environmental health, as the Institute is actively considering new work in this area.

HEI scientist Yi Lu presented a poster featuring work from her dissertation on how school building environment and socioeconomic status affect students' respiratory health, and in turn their academic performance and school attendance.

Sharing Initial Traffic Review Findings

The annual ISES and ISEE conferences also highlighted HEI's systematic review of traffic-related air pollution epidemiology.

HEI scientists Hanna Boogaard and Allison Patton presented methods and preliminary results from the systematic traffic review in an ISEE symposium, "Health Effects of Traffic-Related Air Pollution: Assessing the Evidence in an Evolving and Complex World."

Patton presented the review in a virtual poster session at ISES, with a focus on implications for exposure assessment. Earlier this year, Boogaard shared initial results from the review at webinars hosted by the Center for Advancing Research in Transportation Emissions, Energy, and Health; and the National Academy of Sciences, Engineering, and Medicine (NASEM).

Impact of Getting Around

The NASEM workshop, "How We Move Matters," featured sessions on three days in July exploring the science on environmental health challenges related to emerging transportation services, such as ride-hailing and delivery apps, automated vehicles, and e-scooters. Greenbaum (chair of the event's planning committee) moderated a panel identifying research gaps, and in another session Boogaard helped explore potential consequences of changes in mobility choices. The agenda and recordings of the sessions are available at bit.ly/3hS9egV.

In Case You Missed These Webinars...

Recordings of other virtual meetings where HEI recently shared research and insight are available to the public, including the following:

HEI 2021 Annual Conference Webinar Series

In lieu of our annual conference in Boston, the 2021 HEI Annual Conference was held virtually with a series of eight webinars in April and May.

Virtual Workshop on Air Pollution and Health in Southeast Europe

HEI, the International Society for Environmental Epidemiology, the European Respiratory Society, the Medical University of Plovdiv, Bulgaria, and environmental health institutions in Serbia jointly hosted this workshop in June.

Anticipatory Research for EPA's Research and Development Enterprise to Inform Future Environmental Protection: The Road Ahead

(Fifth Committee Meeting)

This videorecording of the meeting's second day includes a July 29 panel discussion led by HEI President Dan Greenbaum on "Applying Data Science for Environment and Health Assessment."

NEW DIRECTOR OF SCIENCE COMMUNICATIONS (Continued from page 1)



Tom Champoux.

this evolving communications landscape. He will oversee and collaborate with staff maintaining HEI's websites, social media, e-mail, and press and media outreach, as well as manage promotion of events such as webinars and HEI's Annual Conference. At the same time, he will supervise publication of scientific reports and other traditional editorial projects.

Champoux has spent the past 15 years leading communications

efforts for several Boston area nonprofits. Previously he was director of communications for the American Meteorological Society (AMS), where he worked with his staff and consultants to elevate the organization's national profile as experts in weather, water, and climate science. This included promoting their monthly academic journals as well as annual reports on extreme weather events and global climate assessments.

At AMS, and at his previous job at the New England Historic Genealogical Society, Champoux developed comprehensive communications strategies. He also was responsible for gaining local and national media coverage and has led projects to redesign websites and track how effectively the organizations reached their audiences.

from his position. In June of this year, following a comprehensive search and the strong recommendation of the Board's Governance Committee, the full Board unanimously elected as its next Chair a current member, Richard Meserve, Senior of Counsel at Covington & Burling LLP, President Emeritus of the Carnegie Institution for Science, and former Chairman of the U.S. Nuclear Regulatory Commission.

"HEI has always sought Board members who are well-respected, recognized for leadership and integrity, and dedicated to bringing a balanced and impartial approach to all aspects of the Institute's operation," said HEI President Dan Greenbaum. "Dick Celeste's leadership style emphasized the importance of independence as well as being responsive to the needs of HEI's sponsors and many stakeholders reflecting their interests in the Institute's research portfolio."

During Celeste's tenure, his vision of the importance of public health in low- and middle-income countries, honed as Ambassador to India, encouraged HEI to move from a domestically focused organization to its current global perspective, with initiatives such as the State of Global Air, science to inform standards and guidelines worldwide, and helping local scientists build their skills.

Celeste's commitment and personal relationships "helped HEI open doors to international leaders and philanthropies that provided funding for HEI's work and traction for its results. HEI is grateful for the commitment, vision, and collegiality that Dick brought to the Board throughout his tenure," said HEI Vice President Robert O'Keefe.

Meserve joined the HEI Board in June of 2020 and, with the encouragement and support of the full Board, agreed to serve as Chair. He brings a remarkable range and depth of highly relevant experience and understanding to HEI at the interface of science, policy, law, and technology.

Meserve earned a PhD in applied physics from Stanford and a JD from Harvard Law School, and served as law clerk to Supreme Court Justice Harry A. Blackmun and as legal counsel to the president's science adviser. He is the former president of the Board of Overseers of Harvard University and chairman of the International Nuclear Safety Group. In addition, he is a member of the National Academy of Engineering and a former member of its Council.

Meserve has chaired or served as a member of a wide variety of studies undertaken by the National Academies of Sciences, Engineering, and Medicine.

Queta Bond, Chair of HEI's Governance Committee who led the search for a new Chair, noted: "The transition from Dick Celeste to Dick Meserve allows HEI to move seamlessly from strength to strength at its highest level."

The HEI Board expressed deep gratitude for Celeste's long service and friendship and looks ahead with excitement to the new and promising leadership of Meserve.

HEI will formally express its appreciation to Celeste and introduce Meserve to the full HEI community at the 2022 Annual Conference, to be held April 24–26 in Washington, DC.

MAJOR STUDY IN EUROPE (Continued from page 1)

naires). Most of those cohorts consist of a region that included at least one large city and a surrounding smaller town. The key strength of the pooled cohort approach is the rich amount of individual-level information available for about 325,000 participants.

 They analyzed seven large administrative cohorts individually and then conducted a metaanalysis to produce overall results. The administrative cohorts were formed by linking census data, population registries, and death registries. The key strength of the administrative cohorts is their large sample size (about 28 million total) and national representativeness.

The investigators applied standard Cox proportional hazard models to describe associations between exposures to the pollutants and the health outcomes of interest.

Almost all participants had annual average exposures below the European Union limit values for $PM_{2.5}$ (25 $\mu g/m^3$) and NO_2 (40 $\mu g/m^3$), and about 14% had exposures below the U.S. National Ambient Air Quality Standards for $PM_{2.5}$ (12 $\mu g/m^3$).

In analyses with both sets of cohorts, Brunekreef and colleagues reported significant positive associations between PM_{2.5}, BC, and



 ${
m NO}_2$ and natural-cause, cardiovascular, respiratory, and lung cancer mortality. They also reported that they did not find positive associations between ${
m O}_3$ and all causes of death examined. The hazard ratios for natural-cause mortality remained elevated and significant for ${
m PM}_{2.5}$ even when the analyses were restricted to observations below 12 ${
m \mu g/m}^3$. For ${
m NO}_2$, hazard ratios remained elevated and significant when analyses were restricted to observations below 20 ${
m \mu g/m}^3$.

In its independent evaluation, the Low-Exposure Epidemiology Studies Review Panel felt that this study provided important evidence of associations between long-term exposures to low concentrations of $\rm PM_{2.5}$, BC, and $\rm NO_2$ and various health outcomes, including mortality. Evidence for as-

sociations at the lowest concentrations remains limited because those analyses were based primarily on data from Norway and Stockholm. Continuing research on the effects of low concentrations of air pollutants in North America and Europe is expected to further inform the process of setting air quality standards in those and other global regions.

For more information on this study, contact Dan Crouse, dcrouse@healtheffects.org.

wildland fires, and other topics. Fifteen teams were then invited to submit full applications.

Policy Impacts in Three Cities

The Accountability study will explore "Environmental and Health Benefits of Mobile Source and Electricity Generating Unit Policies to Reduce Particulate Pollution." **Stefanie Ebelt** (Emory University), **David Rich** (University of Rochester Medical Center), and their colleagues will evaluate the effect of selected policies that targeted emissions from motor vehicles and electricity generating units on PM_{2.5}, gaseous pollutants, PM_{2.5} components, and source-specific PM_{2.5} concentrations at six locations in Atlanta, New York City, and Los Angeles.

The investigators will compare changes in estimated $PM_{2.5}$ composition resulting from the selected air quality policies during 2005–2019 and estimate the health benefits of the air quality policies over that period on cardiorespiratory emergency department visits and hospitalizations at each of the six locations.



Effects from Fires

For a study of "Australian Fires and Perinatal Health Risks," **Michelle Bell** (Yale University) and colleagues in the United States and Australia will estimate daily exposure to $PM_{2.5}$ from Australian wildfires using advanced fire modeling methods and emissions inventory. The investigators will then use a retrospective cohort study to estimate associations between adverse birth outcomes and those exposures.

In addition, this study will assess disparities in exposures and in health responses for potentially sensitive populations, such as those with low socioeconomic status and Aboriginal and Torres Strait Islander populations. Bell and colleagues will make their advanced modeling methods and emissions inventory publicly available.

Meanwhile, for a study on "Contributions of Prescribed Fire and Agricultural Burning to Air Quality and Health," **Mehmet Talat Odman** (Georgia Institute of Technology) and colleagues will quantify the effects of prescribed and agricultural burning on daily PM_{2.5} and ozone levels in 4 km by 4 km grids in the southeastern United States.

Odman and colleagues will use a case-crossover design to examine associations between emergency department visits in a

national administrative dataset with $PM_{2.5}$ and ozone associated with these burns using a source-apportionment approach. They will then estimate the excess emergency department visits that can be attributed to smoke exposure in the southeastern United States. \blacksquare

Study Examines Role of Social Stressors in Air Pollution–Disease Links

ir pollution exposures, social stressors, and health outcomes can all interact in studies of air pollution and health. Given that, disentangling the role of social stressors as modifiers or confounders of health effects is imperative to identify potentially vulnerable populations and to provide additional scientific evidence needed to inform mitigation measures.

Research Report 206, Social Susceptibility to Multiple Air Pollutants in Cardiovascular Disease, presents a study led by Jane Clougherty at Dornsife School of Public Health, Drexel University. This study examined whether the associations between community- and individual-level cardiovascular disease (CVD) events and ambient air pollutants vary with social stress.

Unique datasets included data on CVD events in all New York City hospitals, city wide fine particulate matter, nitrogen dioxide, sulfur dioxide, ozone, community-level social stressors, and noise disturbance.

The study demonstrated that variations in the social stressors in New York City were associated with CVD events, reinforcing the importance of considering such stressors in air pollution health analyses. At the same time, the study found that associations between pollutants and CVD were attenuated when adjusting for social stressors.

The HEI Review Committee complimented much of the investigators' work, but the Committee disagreed with the investigators' interpretation of some of their results that associations between air pollution and CVD were stronger in communities with higher stressor levels. The Committee recommended that future studies attempting to disentangle social stressors from air pollution effects on CVD events should build on steps Clougherty and colleagues have taken by further investigating important social stressor confounders and modifiers.

For more information on this study, contact Anna Rosofsky, arosofsky@healtheffects.org.

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