How Low Should We Go? New Health Research on Low-level Ambient Air Pollution

Air pollution and Health: Recent Advances to Inform the European Green Deal
January 21-22, 2020, Brussels

Chairs:

Dorota Jarosinska, WHO Regional Office For Europe

Dan Greenbaum, Health Effects Institute

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Why Study the Health Effects of Low Levels of Ambient Air Pollution?

Levels of ambient air pollution have decreased over time in North America and Europe.

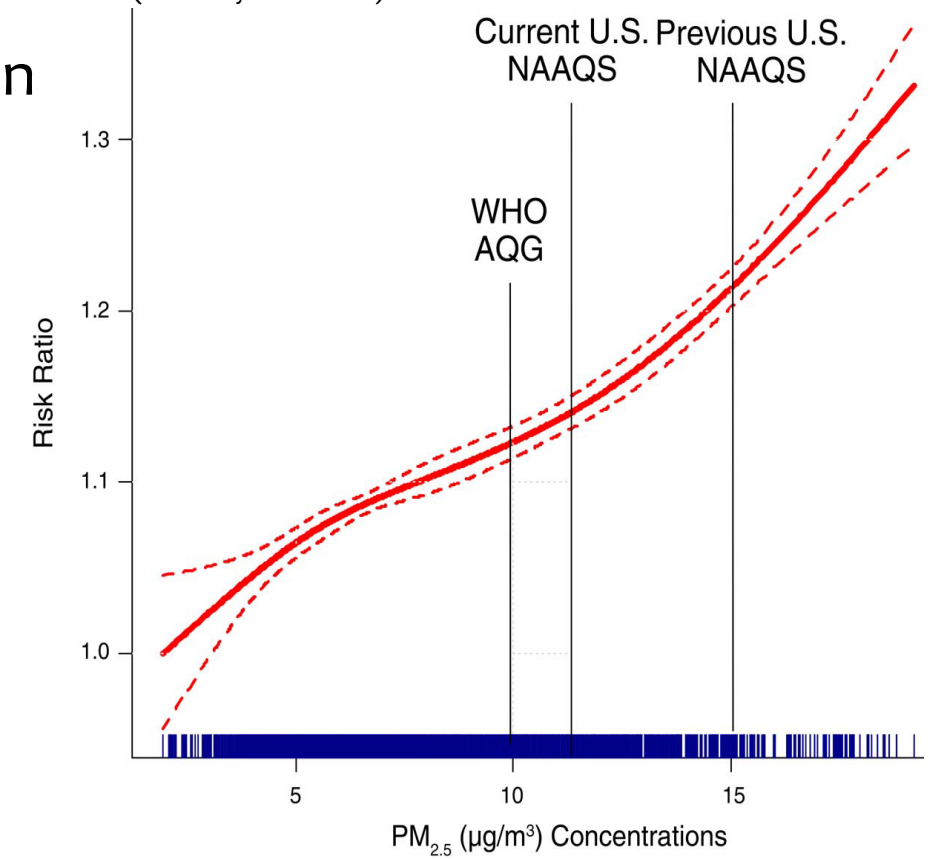
New epidemiologic studies reported associations of air pollution with health effects at levels below current air quality standards.

Yet, uncertainty within these studies and especially about the exposure response function at the low end of the exposure curve.

This information is critical for use in risk assessment and regulation.

- *How low should standards/limit values be set?*
- *Can benefits of regulation be estimated to the lowest levels?*

Shape of the concentration–response function for mortality associated with fine particulate matter in a Canadian Cohort. (Courtesy R. Burnett)



2012 Canada Results

Growing Number of Studies in Europe and North America – Need for Enhanced Analysis

Air Pollution and Mortality in Seven Million Adults: The Dutch Environmental Longitudinal Study (DUELS)

Paul H. Fischer,[1] Marten Marra,[1] Caroline B. Ameling,[1] Gerard Hoek,[2] Rob Beelen,[1,2] Kees de Hoogh,[3,4,5] Oscar Breugelmans,[1] Hanneke Kruize,[1] Nicole A.H. Janssen,[1] and Danny Houthuijs[1]

Environmental Health Perspectives · VOLUME 123 | NUMBER 7 | July 2015

The NEW ENGLAND JOURNAL of MEDICINE

UNE 29, 2017 VOL. 376 NO. 26

Low-Concentration PM_2 Effects in a Population-E

Liuhua Shi,[1] Antonella Zanobetti,[1] Joel D. Schwartz[1]

VOLUME 124 | NUMBER 1 | Jan

lity in the Medicare Population

nobetti, Ph.D., Yun Wang, Ph.D., Petros Koutrakis, Ph.D., a Dominici, Ph.D., and Joel D. Schwartz, Ph.D.

All-cause mortality and long-t
'45 and up study' cohort, Sydn

Ivan C. Hanigan[a,b,c,*], Margaret I. Rolf
Christine T. Cowie[a,e,f], Jane Heyworth
Adrian Bauman[k], Bin Jalaludin[a,l,m], Ge

Environment Interna

www.thelancet.com Published online December 9, 2013 http://dx.doi.org/10.1016/S

Effects of long-term exposure t
natural-cause mortality: an ana
within the multicentre ESCAPE

tality in New Zealand:

ir Woodward[3]

6:468–473. doi:10.1136/jech.2010.112490

Current Environmental Health Reports
https://doi.org/10.1007/s40572-019-00235-7

AIR POLLUTION AND HEALTH (S ADAR AND B HOFFMANN, SECTION EDITORS)

Check for updates

Low Levels of Air Pollution and Health: Effect Estimates, Methodological Challenges, and Future Directions

Georgia Papadogeorgou[1] · Marianthi-Anna Kioumourtzoglou[2] · Danielle Braun[3] · Antonella Zanobetti[4]

Abstract

Purpose of Review Fine particle ($PM_{2.5}$) levels have been decreasing in the USA over the past decades. Our goal was to assess the current literature to characterize the association between $PM_{2.5}$ and adverse health at low exposure levels.

Recent Findings We reviewed 26 papers that examined the association between short- and long-term exposure to $PM_{2.5}$ and cardio-respiratory morbidity and mortality. There is evidence suggesting that these associations are stronger at lower levels. However, there are certain methodological and interpretational limitations specific to studies of low $PM_{2.5}$ levels, and further methodological development is warranted.

Summary There is strong agreement across studies that air pollution effects on adverse health are still observable at low concentrations, even well below current US standards. These findings suggest that US standards need to be reevaluated, given that further improving air quality has the potential of benefiting public health.

ssociations with Mortality
ensus Health and Environment

Aaron van Donkelaar,[6] Randall V. Martin,[6] Pope III,[11] Michael Brauer,[12] Robert D. Brook,[13] Alain Robichaud,[14] Richard Menard,[14] and Richard T. Burnett[1]

VOLUME 123 | NUMBER 11 | November 2015 · Environmental Health Perspectives

Associations between fine particulate matter and mortality in the 2001 Canadian Census Health and Environment Cohort

Lauren L. Pinault[a,*], Scott Weichenthal[b,c], Daniel L. Crouse[d], Michael Brauer[e], Anders Erickson[e], Aaron van Donkelaar[f], Randall V. Martin[f,g], Perry Hystad[h], Hong Chen[i,j], Philippe Finès[a], Jeffrey R. Brook[k], Michael Tjepkema[a], Richard T. Burnett[l]

Environmental Research 159 (2017) 406–415

HEI

Advantages

Greater statistical power

More representative of the general population

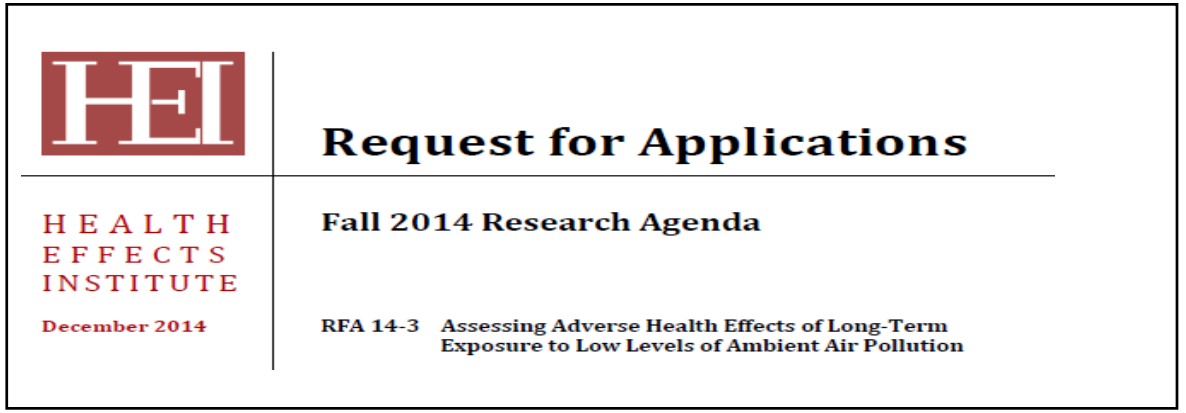
Challenges

Exposure assessment

Often individual-level information is limited

Harmonization of methods across cohorts can be difficult

RFA Objectives


HEI

HEALTH EFFECTS INSTITUTE

December 2014

Request for Applications

Fall 2014 Research Agenda

RFA 14-3 Assessing Adverse Health Effects of Long-Term Exposure to Low Levels of Ambient Air Pollution

Fund studies to assess health effects of long-term exposure to low levels of ambient air pollution, including all-cause and cause-specific mortality and morbidity endpoints. Studies should analyze and evaluate **exposure-response function(s) for $PM_{2.5}$** and other pollutants at levels currently prevalent in North America, Western Europe, and other high-income regions and may also address related questions about health effects at low levels of ambient air pollution.

Develop statistical and other methodology required for, and specifically suited to, conducting such research including, but not limited to, evaluation and correction of exposure measurement error.

HEI

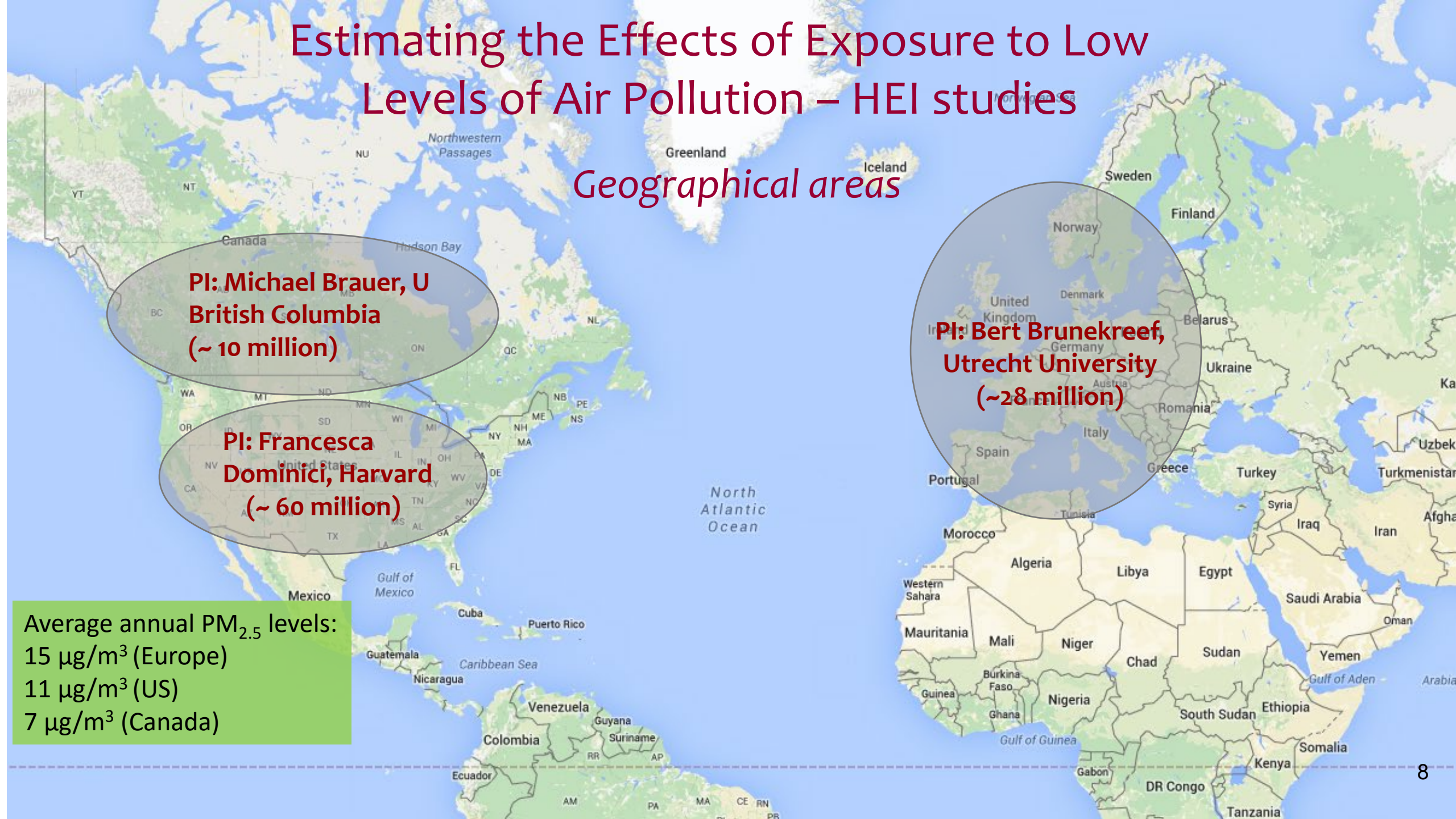
Estimating the Effects of Exposure to Low Levels of Air Pollution

Three HEI studies, with key features:

- Populations with millions in the US, Canada, and Europe; administrative and traditional cohorts
- Satellite data and ground level exposure measurements; high quality exposure assessment models at high spatial resolutions
- Development and application of novel statistical methods

Estimating the Effects of Exposure to Low Levels of Air Pollution – HEI studies

Geographical areas



Teams

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HEI

Ensuring the Highest Quality from the Studies

- Detailed and continuing HEI oversight

  -Oversight Committee:

  Progress reports every 5 months

  Annual, detailed renewal requests

  Webinars and annual meeting

  -QA/QC audits

- HEI Intensive Review of First Reports

  -Requested Phase 1 reports, summarizing results to-date

  -Formed special Review Panel, with Sverre Vedal (chair, University of Washington) plus six additional experts in epidemiology, exposure assessment and biostatistics

  -Reports and Panel commentary are published in **November 2019**, with aim to inform NAAQS, WHO, Limit Values process www.healtheffects.org

- Final reports – after review, to be published with commentaries during **2021-2022**

Aim of this session

To present results of three studies investigating the health effects of low-level exposure in very large populations in the United States, Canada, and Europe, address their strengths and weaknesses, and discuss potential implications for future risk assessment and regulation.

Speakers

- Gerard Hoek, Utrecht University

  Evidence from Europe - Effects of low-level air pollution: A study in Europe (ELAPSE)

- Michael Brauer, The University of British Columbia

  Evidence from Canada - Mortality-air pollution associations in low exposure environments (MAPLE)

- Marianthi-Anna Kioumourtzoglou, Columbia University

  Evidence from the US - Air pollution and mortality in the Medicare population

THANK YOU!

Check out our website www.healtheffects.org