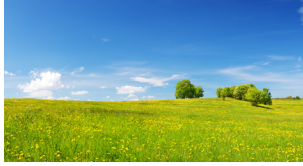




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Harvard Center for Risk Analysis Risk Assessment, Economic Evaluation, and Decisions Workshop

HONORING JOHN S. EVANS

September 26-27, 2019

Harvard University Center for the Environment

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Society for Risk Analysis Economics and Benefits Analysis Specialty Group

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Welcome Letter

Dear Colleagues,

We are delighted to welcome you to our workshop, “Risk Assessment, Economic Evaluation, and Decisions.” The workshop honors John S. Evans, who has been a core member of the Harvard Center for Risk Analysis since its founding almost 30 years ago. It features presentation and discussion of a series of papers drafted by leading experts, each of which may be downloaded from the website shown on the back cover.

The workshop aims to support improved public policy decision making. It has two overlapping themes:

- (1) Building on the contributions of John S. Evans, and
- (2) Addressing issues at the intersection of risk assessment and economics.

Dr. Evans has made important contributions to risk analysis and its use for policy decisions. His many contributions include characterizing uncertainty and its implications for decision making using structured expert judgment and the expected value of information. He has developed approaches for assessing risks in data-limited contexts, such as intake fractions and methods for low-dose extrapolation. And he has applied his tools to improve understanding of the health effects of fine-particulate air pollution, ionizing radiation, methyl mercury, and chlorine compounds, among other environmental hazards. The second theme is developing innovative approaches for better integrating risk assessment and economics. This theme is inspired by the need to address unresolved issues identified by the 2009 National Research Council report, *Science and Decisions: Advancing Risk Assessment*. Topics include improving assessment of changes in risk to support monetary valuation for benefit-cost analysis; accounting for changes in averting behavior when estimating the health effects of changes in exposures; and characterizing uncertainty and its implications for decision making.

We are grateful to our supporters, without whom this workshop would not be possible. In particular, we thank the leadership of the Society for Risk Analysis Economics and Benefits Analysis Specialty Group, who helped conceive the workshop and provided substantial financial support. We also received significant support, either financial or in-kind, from the Center for Health Decision Science, Harvard T.H. Chan School of Public Health; the Department of Environmental Health, Harvard T.H. Chan School of Public Health; the Harvard-China Project on Energy, Economy and Environment; the Harvard University Center for the Environment; Industrial Economics, Incorporated; Mohammad A. Alolayan; and Paustenbach and Associates.

We look forward to an interesting and productive discussion!

Sincerely,



A handwritten signature in black ink that reads "James K. Hammitt".

James K. Hammitt
Professor of Economics and Decision Sciences
Director, Harvard Center for Risk Analysis



A handwritten signature in black ink that reads "Lisa A. Robinson".

Lisa A. Robinson
Senior Research Scientist
Center for Health Decision Science and Center for Risk Analysis

Agenda and Papers

Thursday, September 26

The presenter is marked with an asterisk ()*

8:00-8:40: **Registration and Breakfast**

8:40-9:00: **Welcome and Introduction** (James K. Hammitt and Lisa A. Robinson)

9:00-10:30: **Clarifying Concepts** (chair, Lisa A. Robinson)

- Katherine von Stackelberg* and Pamela Williams.* **Evolving Science and Practice of Risk Assessment**
- Kevin Brand,* Zihan Lin, David Stieb, and Richard Burnett. **Converting between Measures of Health Impact: Health Gap to Health Expectancy**
- James K. Hammitt,* Peter Morfeld, Jouni Tuomisto, and Thomas C. Erren. **Premature Deaths, Statistical Lives, and Years of Life Lost: Identification, Quantification, and Valuation of Mortality Risks**

10:30-11:00: **Break**

11:00-12:30: **Integration and Modeling** (chair, Kimberly Thompson)

- Christoph Rheinberger.* **A Unified Probabilistic Framework for Cancer Risk Assessment**
- Weihsueh Chiu* and Greg Paoli. **Recent Advances in Probabilistic Dose-Response Assessment to Inform Socioeconomic Benefits Analysis**
- Jonathan Levy.* **Incorporating Inequality into Risk Assessment and Benefit-Cost Analysis**

12:30-2:00: **Lunch**

2:00-4:00: **Air Pollution Concentration-Response Functions** (chair, Katherine Walker)

- C. Arden Pope, III,* Nathan Coleman, Zachari A. Pond, and Richard T. Burnett. **Air Pollution and Human Mortality: 25+ Years of Cohort Studies**
- Patrick Kinney* and Aaron Cohen. **Particle Air Pollution and Mortality: What's New Since 1984?**
- Meng Gao,* Kirk R. Smith, Jos Lelieveld, Frank Dentener, Jason West, Jianlin Hu, Ken Kin Lam Yung, Patrick Kinney, John Evans, Zifa Wang, and Chris P. Nielsen. **Where Does Ambient PM_{2.5} Come from in China: A Comparison and Synthesis of Recent Estimates**
- Elisabeth Gilmore,* Jinhyok Heo, Nicholas Z. Muller, Christopher W. Tessum, Jason D. Hill, Julian D. Marshall, and Peter J. Adams. **Developing Estimates of the Social Costs of Air Pollutants and their Uncertainty Using Reduced Complexity Models**

4:00-4:30: **Break**

4:30-5:30: **Decision-Making** (chair, Dennis Paustenbach)

- Roger Cooke,* Deniz Marti, and Thomas Mazzuchi. **Expert Judgment and the Inevitability of Validation**
- John Graham,* Jonathan Wiener,* and Lisa A. Robinson. **Co-Benefits, Countervailing Risks, and Cost-Benefit Analysis**

5:30: **Wrap-up** (Lisa A. Robinson)

Agenda and Papers

Friday, September 27

The presenter is marked with an asterisk ()*

8:00-8:25: **Registration and Breakfast**

8:25-8:30: **Welcome** (Lisa A. Robinson)

8:30-10:00: **Health Applications** (chair, TJ Carrothers)

- Aylin Sertkaya, Amber Jessup,* and Rebecca DeVries. **Cost of Developing a Therapeutic Complex Medical Device for the U.S. Market**
- Olivier Jolliet.* **High Throughput Risks of Chemicals in Consumer Products: From Product Intake Fraction to DALYs**
- Ying Zhou* and Scott Grosse. **Valuing the Benefits of Reducing Childhood Lead Exposure—Human Capital, Parental Preferences, or Both?**

10:00-10:30: **Break**

10:30-12:30: **Air Pollution Warnings and Other Applications** (chair, Adrián Fernández Bremauntz)

- Joseph Aldy,* Jing Cao, and Nan Zhong. **Learning to Avoid Pollution: Public Health Benefits from Beijing's Air Quality Index Forecast**
- Jonathan J. Buonocore,* Lisa A. Robinson, James K. Hammitt, and Lucy O'Keeffe. **Potential Health Benefits of Air Quality Warnings**
- Henry Roman, James E. Neumann,* Stefani Penn, Alisa White, and Neal Fann. **Dynamic Versus Static Modeling of Mortality-related Benefits of PM Reductions in the US and Chile: 1990 – 2050**
- John S. Evans, Leonora Rojas-Bracho,* James K. Hammitt, and Douglas W. Dockery. **Health Benefits of Air Quality Improvements in Mexico City: Emission Controls for Heavy Duty Vehicles**

12:30-1:30: **Lunch**

1:30-2:30: **Economics** (chair, Sandra Baird)

- Sandra Hoffmann,* Lydia Ashton, Jessica Todd, and Peter Berck. **What Food Purchase Data Can Tell Us about Campylobacteriosis in the U.S.**
- Daniel Herrera-Araujo* and James K. Hammitt. **Using Non-Marginal Risk Reductions to Elicit Value Per Statistical Life (VSL)**

2:30-3:00: **Break**

3:00-5:00: **Successes and Failures of Risk Analysis: Lessons for the Future** (chair, James K. Hammitt)

- Adam Finkel* and George Gray.* **The Pebble Remains in the Master's Hand: Two Careers Spent Learning (Still) from John Evans**
- **Discussion** with opening remarks from Roger Cooke, Olivier Jolliet, and Kimberly Thompson

5:00: **Final Words** (James K. Hammitt)



John S. Evans

Adjunct Professor of Environmental Health Department of Environmental Health

John Evans has served on the Harvard faculty since 1983. His teaching and research have focused on assessing human health risks from exposure to pollutants such as fine particulate matter, methyl mercury, chloroform, perchloroethylene, ethylene oxide and radon. His primary interests are in the use of risk assessment to inform environmental decisions and in the characterization of scientific uncertainty in support of decision making.

Dr. Evans is a founding member of the Harvard Center for Risk Analysis, the primary developer of graduate degree programs in risk analysis and decision making, and the lead instructor of an evolving set of courses in risk analysis. He was Academic Director and Director of Harvard's Cyprus International Institute for Environment and Public Health, a research and educational institute. He has supervised more than 30 doctoral candidates at Harvard and other universities.

Much of Dr. Evans' work has been international. At the Technical University of Denmark, he worked with leaders in life cycle impact assessment on improving approaches for estimating the public health consequences of air pollution exposure. He directed Harvard's Kuwait Public Health Project, which attempted to quantify the public health impacts of Iraq's 1990 invasion and occupation of Kuwait. He has worked with researchers and government officials in Mexico City, with the MIT-led project on air pollution in global megacities and a Harvard project to quantify the public health benefits of the dramatic improvement in air quality achieved in Mexico City since 1990. He has frequently taught at the Mexican National Institute of Public Health and at other institutions worldwide.

Dr. Evans serves as a member of the board of the Agency for Public Health Education Accreditation; is a charter member and fellow of the Society for Risk Analysis and was the first recipient of their Outstanding Educator award; served on the US EPA's Science Advisory Board; and was a member of the NAS Committee on Estimating the Health Benefits of Air Pollution Regulation.

Dr. Evans studied engineering and water resources management at the University of Michigan (BSE 1969, MS 1971) and environmental health sciences at Harvard (SM 1977, ScD 1980). He served as a bioenvironmental engineer in the US Air Force from 1972 until 1976.



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Workshop Website:

<https://www.hsph.harvard.edu/hcra/risk-assessment-economic-evaluation-and-decisions-workshop>