The Harvard Center for Risk Analysis (HCRA) takes a distinctive approach to the challenge of allocating resources to protect and enhance the public health. Our methods, based on the decision and management sciences, call for rigorous yet separate analysis of the facts (probabilities) and the value judgments (ethics) involved in health protection. We argue that, in the long run, ill-considered departures from this approach will “murder statistical lives,” leading to more death and human misery than is necessary.

There is a danger that analytical approaches might be poorly executed or misused, causing thoughtful decision making to be confused by a barrage of opaque mathematics. Yet there is an increasing global recognition that risk analysis will foster protection of the public’s health. For example:

- The Organization for Economic Cooperation and Development (OECD) is promoting appropriate use of risk assessment and cost-benefit analysis in the regulation of existing chemicals and is preparing a report on ways in which Europe, Asia, and North America can use analytical tools to develop environmental policies.
- Several European countries and Australia are increasing use of cost-effectiveness analysis in making health care reimbursement decisions involving pharmaceuticals and medical technologies.
- The World Bank and the World Health Organization (WHO) are using economic “burden of illness” methods in identifying health-related investment opportunities in the developing world.
- The US Department of Transportation is asking for the public’s input on the risks, benefits, and costs of advanced airbag systems in motor vehicles.
- The Clinton Administration is endorsing legislation that promotes a stronger role for risk assessment and cost-benefit analysis in health, safety, and environmental regulations.
- The World Trade Organization (WTO) uses risk assessment to ensure that food-safety policies are not a cover for anti-trade activities.

If these policy initiatives are to work, organizations such as the HCRA must provide the research, communication, and education and training necessary to protect public health and the environment.
PhD in Health Policy with Concentration in Risk/Decision Sciences
The university-wide PhD Program in Health Policy is designed for students interested in scholarly careers in environmental health, health care, mental health, and public health. HCRA faculty play a critical role in sponsoring students with interests in risk analysis and the decision sciences.
contact: Joan Curhan, 79 J.F. Kennedy Street, T460, Cambridge, MA 02138 (617) 495-1357 or joan_curhan@harvard.edu

MS/ScD in Health Policy and Management
The Harvard School of Public Health (HSPH) offers two advanced degrees, an MS degree and an ScD degree. The MS degree (1- or 2-year) is designed for professional students. HCRA faculty offer analytical coursework for students in this program. The ScD degree is reserved for physicians and lawyers interested in research.
contact: Kristine Forsgard, 677 Huntington Avenue, SPH3, 4th Floor, Boston, MA 02115 (617) 432-4511 or kforsgard@sph.harvard.edu

MS/ScD in Environmental Science and Risk Management
At the Harvard School of Public Health, the MS/ScD in ES&RM is designed for research-oriented students interested in environmental decision making. HCRA faculty collaborate with the School's Department of Environmental Health in the design and management of this program.
contact: Kristine Forsgard, 677 Huntington Avenue, SPH3, 4th Floor, Boston, MA 02115 (617) 432-4511 or kforsgard@sph.harvard.edu

Lisa Prosser, MS
Lisa Prosser is a PhD candidate in Health Policy at Harvard University, concentrating in decision sciences. Her doctoral research focuses on the impact of perspective in health care decision making. Ms. Prosser holds a BS in mathematics (with a concentration in operations research) from Cornell University and MS degrees in management and in technology and policy from the Massachusetts Institute of Technology. She also spent three years with the Wilkerson Group in New York as a management consultant to several medical products companies.

Mary Ann Chirba-Martin, JD, MPH
Mary Ann Chirba-Martin is a candidate for the ScD in health policy at the Harvard School of Public Health. She holds a BA in biology from Colgate University, a JD from Boston College Law School, and an MPH from Harvard University. The ways in which the law impedes and promotes public health in the managed care and product safety marketplace is the focus of her doctoral research. Previously, she worked as a litigator for the Boston firm of Nutter, McClennen & Fish.

Timothy J. Carrothers, MS
Timothy J. Carrothers is an ScD candidate in the Joint Program in Environmental Science and Risk Management at the Harvard School of Public Health. Mr. Carrothers holds an MS and a BS in civil and environmental engineering from Stanford University. His thesis assesses the value of research regarding the health effects of particulate air pollution. He is also interested in the application of decision analysis in environmental management. He held an internship in risk assessment at ENVIRON.

Risk Quiz:
Which factor kills more people each year: firearms or motor vehicle crashes?

Faculty Profile

Milton C. Weinstein, PhD

Milton C. Weinstein is the Henry J. Kaiser Professor of Health Policy and Management and Biostatistics at the Harvard School of Public Health and Professor of Medicine at the Harvard Medical School. Best known for his research on the cost-effectiveness of medical practices, Dr. Weinstein also is director of the Program on the Economic Evaluation of Medical Technology. He is an elected member of the Institute of Medicine of the National Academy of Sciences, and a recipient of the Award for Career Achievement from the Society for Medical Decision Making. Dr. Weinstein received his AB and AM in Applied Mathematics (1970), his MPP (1972), and his PhD in Public Policy (1973) from Harvard University.

Sue J. Goldie, MD, MPH

Sue J. Goldie, MD, MPH, is an assistant professor of health decision sciences at the Harvard School of Public Health in Health Policy and Management. She completed her postdoctoral clinical training in internal medicine at Yale University and an AHCPR postdoctoral fellowship with a concentration in decision science at the HSPH. Dr. Goldie’s research interests include methods and applications of decision and cost-effectiveness analysis in the evaluation of population-based health care, particularly the screening and prevention of virally transmitted diseases and the sequelae. Her research focus includes women, individuals with HIV-infection, adolescents, and vulnerable populations (e.g. socioeconomically disadvantaged, cultural minorities).

Syllabi can be found on the WWW at www.hsph.harvard.edu/Organizations/hcra/hcra.html

COMMUNITY RISK SCALE

Risks: 10
Risk Related Short-Course Opportunities

Analyzing Risk: Science, Assessment, and Management
Dr. George Gray
This course, offered through HCRA and the HSPH Center for Continuing Professional Education, introduces students to the science and methods of risk assessment and its role in risk management and communication. Participants develop an understanding of the sources of variability and uncertainty in risk assessment, as well as the tools used for better characterizing risks. The importance of risk assessment in regulation and risk communication are also highlighted.

"Top! Amazing content for one week. Quality of instruction is superb."
Andrew V. Wittern, Economist
United States Environmental Protection Agency
Washington, DC

"One of the most stimulating, comprehensive programs I've attended in a long time. A must for decision makers. Outstanding faculty."
Stephen D. Evans, EHS Manager
MainYankee, Bath, Maine

For information on short-course opportunities contact Center for Continuing Professional Education, 677 Huntington Avenue, SPH3-LL23, Boston, MA 02115.
(617) 432-1171

Cost-Effectiveness Analysis for Medical Technologies and Pharmaceuticals
Dr. Peter Neumann
This is an advanced program on methods for performing cost-effectiveness analysis of pharmaceuticals and medical technologies. The course concentrates on costing and modeling alongside clinical trials, and the use of preference-weighted quality-of-life scales and contingent valuation methods in cost-effectiveness and cost-benefit studies. The program also provides students with an evaluation of diagnostic technologies, such as contrast media and imaging devices.

"Bravo! A first-rate and spectacular group of researchers, scholars, and educators."
Joseph C. Cappelleri, PhD, MPH
Senior Coordinator, Pfizer Central Research
Groton, Connecticut

Benefit-Cost Analysis of Health, Safety, and Environmental Regulation
Dr. James Hammitt
This course provides a rigorous introduction to the empirical methods and economic principles used in benefit-cost analysis (BCA) to quantify the costs of regulation and the benefits of improved environmental quality and reduced health and safety risks. The sessions on the theory and methods of BCA are complemented by in-depth discussion of BCAs conducted for several important applications, including automobile airbags, airborne particulates, food safety, and global climate change. Leading practitioners of BCA present real-world applications of this method, identifying both the strengths and the weaknesses of the BCAs that have been conducted in each area.

"Better than a semester's course in graduate school."
David E. Burmaster, President, Alceon Corporation, Cambridge, Massachusetts

Faculty Profile

James K. Hammitt is associate professor of economics and decision sciences at the Harvard School of Public Health. His teaching and research interests include the development and application of quantitative methods to health and environmental policy, including benefit-cost, decision, and risk analysis, game theory, and mathematical modeling. His current research focuses on the management of long-term environmental issues involving significant scientific uncertainties, such as global climate change and stratospheric-ozone depletion, and the characterization of social preferences over health and environmental risks using revealed preference and contingent valuation methods. Dr. Hammitt holds an AB and ScM in applied mathematics and an MPP and PhD in public policy, all from Harvard University. Before joining HCRA, he was a senior mathematician at the RAND Corporation and on the faculty of the RAND Graduate School of Policy Studies.
As managed care increases its hold on US health care, American society must gain a better understanding of the clinical and economic implications of different medical technologies to improve decision making on the part of patients, physicians, payers, and policy makers.

The Program on the Economic Evaluation of Medical Technology (PEEMT) promotes such informed decision making in the use of pharmaceuticals, medical devices, and medical procedures.

This program accomplishes its mission in several ways. PEEMT brings together decision scientists, physicians, economists, epidemiologists, biostatisticians, and health services researchers to work on scientific research projects, training programs, and public policy activities. This multidisciplinary team also collaborates with leaders in the field worldwide.

PEEMT is expanding its efforts in education and research. These include an annual executive education short-course in advanced cost-effectiveness analysis geared to practitioners in industry, government, and academia and a conference with leaders in the field on the use of cost-effectiveness analysis in managed care environments.

On the research front, new projects are examining diagnostic and therapeutic advances in AIDS, Alzheimer’s disease, asthma, cancer, coronary heart disease, and other medical conditions. In addition, PEEMT faculty and staff continue to work with public policy officials at the Food and Drug Administration (FDA), Health Care Financing Administration (HCFA), and other government agencies to explore ways to use economic evaluations in coverage and payment decisions.

Peter J. Neumann, ScD, is an assistant professor of policy and decision sciences in the Department of Health Policy and Management, and the deputy director of the Program on the Economic Evaluation of Medical Technology at the Harvard School of Public Health. His research focuses on economic evaluations of medical technologies, including ongoing evaluations of pharmacological treatments for Alzheimer’s disease, asthma, lung cancer, and schizophrenia. Several peer-review journals have published his research on the use of willingness to pay and quality-adjusted life years (QALYs) in valuing health benefits. His other research has focused on the FDA’s regulation of cost-effectiveness claims, government uses of cost-effectiveness analysis, and the impact of medical technology on health costs. He holds a doctorate in health policy and management from the Harvard School of Public Health.
When placed in context, increases in life expectancy are an important measure of medicine's effectiveness. We used target populations and diseases to categorize gains in life expectancy from a variety of medical interventions reported in 83 published sources.

We found that increases in expected life span from preventive strategies in populations at average risk range from less than one month to a little more than a year, per person receiving the intervention. In individuals at high risk, prevention resulted in gains as large as five years or more. For people being treated with established diseases, the gains in life expectancy range from several months to nine years.

Wright JC, Weinstein MC.
Gains in Life Expectancy from Medical Interventions-Standardizing Data on Outcomes.
New England Journal of Medicine
AIDS
Cost-Effectiveness of Preventing AIDS Complications  Dr. Sue Goldie

Alzheimer's Disease
Cost-Effectiveness of New Treatments for Alzheimer's Disease  Dr. Peter Neumann

Asthma
Development of an Asthma Policy Model  Dr. Karen Kuntz

Cancer
Cancer Prevention Policy Model  Dr. Karen Kuntz
Cost-Effectiveness Analysis of Colorectal Cancer Screening  Dr. Karen Kuntz
Cost-Effectiveness of Chemotherapy for Advanced Non-Small-Cell Lung Cancer  Drs. Milton Weinstein and Peter Neumann

Heart Disease
Coronary Heart Disease Modeling Project  Dr. Milton Weinstein
Cost-Effectiveness of Cholesterol-Lowering Strategies  Dr. Milton Weinstein

Hormone Therapy
Cost-Effectiveness of Hormone Replacement Therapy  Dr. Milton Weinstein

Other
Database of Cost-Effectiveness Analyses which Use QALYs to Measure Health Effectiveness  Dr. Peter Neumann
FDA's Regulation of Cost-Effectiveness Claims  Dr. Peter Neumann
Uses of Cost-Effectiveness Analysis in Managed Care  Drs. Milton Weinstein and Peter Neumann

Karen M. Kuntz, ScD
Karen M. Kuntz, ScD, is an assistant professor of decision sciences at the Harvard School of Public Health and an assistant professor of medicine at the Harvard Medical School. Her research has focused on the methodology and application of decision and cost-effectiveness analysis in the evaluation of medical technologies. Dr. Kuntz's applied projects include the development of a policy model for asthma interventions, and the evaluation of cancer-prevention strategies. Her methodological projects involve the evaluation of potential biases that can occur in disease modeling. Dr. Kuntz received her masters and doctorate, both in biostatistics, from the Harvard School of Public Health.

COMMUNITY RISK SCALE

Risks: 1/10

Risks: 1/100

Risks: 1/1000

Death from all causes
8 in 100
Citizens often support stronger environmental policies on the grounds that risks to human health will be reduced or eliminated. Yet there is growing scientific evidence indicating that current environmental policies are not directed at the most significant sources of risk.

The mission of the Program on Environmental Science and Risk Management is to promote more informed decision making about environmental protection through greater use of analytic tools such as risk assessment, decision analysis, cost-effectiveness analysis and benefit-cost analysis. The program, a joint venture of the Center for Risk Analysis and the Department of Environmental Health of the Harvard School of Public Health, allows students to work collaboratively with risk analysts, economists, and environmental scientists on new approaches to protecting people from exposure to environmental pollution.

The program's creators believe a more rigorous use of risk assessment will likely enhance the public health benefits of environmental policies and reduce costs through the design of more flexible policies.

Do Scientists and the Public Agree About Hazards? Mean Confidence Scores (0-10 scale)

<table>
<thead>
<tr>
<th>Hazard</th>
<th>Lay Sample</th>
<th>Scientist Sample</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>MEN</td>
<td>WOMEN</td>
</tr>
<tr>
<td>Second-Hand Smoke</td>
<td>7.20</td>
<td>8.01</td>
</tr>
<tr>
<td>Ozone Depletion</td>
<td>6.40</td>
<td>7.69</td>
</tr>
<tr>
<td>Outdoor Particles</td>
<td>6.55</td>
<td>7.40</td>
</tr>
<tr>
<td>X-Rays</td>
<td>5.37*</td>
<td>6.00</td>
</tr>
<tr>
<td>Radon</td>
<td>5.63</td>
<td>6.85</td>
</tr>
<tr>
<td>Global Warming</td>
<td>5.74</td>
<td>7.02</td>
</tr>
<tr>
<td>Food Pesticides</td>
<td>6.42*</td>
<td>7.43*</td>
</tr>
<tr>
<td>Magnetic Fields</td>
<td>4.95*</td>
<td>6.06*</td>
</tr>
<tr>
<td>All Hazards</td>
<td>6.04</td>
<td>7.05*</td>
</tr>
</tbody>
</table>

* Indicates statistically different from gender counterpart in scientist sample. Source: Graham et al., *Technology* (6): 63-75; 1999
Dissertation Projects

Systematic Uncertainties Confounding Animal Bioassay Based Extrapolations of Chronic Human Health Risk from Chemical Exposure
Kevin Brand

The Value of Alternative Research Strategies in Support of Decision Making for Fine Particles in Ambient Air
Timothy J. Carrothers

The Role of Subjective Judgment in Exposure Assessment: The Case of Personal Exposure to Benzene
Katherine Walker

Evaluating Conventional and Non-Convention Agricultural Systems: Risks and Perspectives
Pamela Williams

The Cost-Effectiveness of Alternative Strategies for the Control of Fine Particles in Ambient Air
Scott Wolff

Risk Quiz:

**Question:** Which federal risk-protection agency has the larger annual budget: The Environmental Protection Agency or the Food and Drug Administration?

**Answer:** The annual budget of the Environmental Protection Agency ($7 billion) is much larger than the Food and Drug Administration ($1 billion).

*Source: OMB, annual*

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**Faculty Profile**

John Evans, ScD is a senior lecturer in environmental health at the Harvard School of Public Health, where he co-directs the Program on Environmental Science and Risk Management. His research has focused on several areas, including the study of mortality from exposure to ambient particulate matter, health consequences of accidental releases at nuclear power plants, analysis of the benefits of alternative research strategies in support of environmental decision making, and characterization of uncertainty in estimates of environmental exposures and health risks.

Dr. Evans earned his BS in industrial engineering and MS in water resources management at the University of Michigan. He served as a bioenvironmental engineer in the US Air Force from 1972-76. After completing his tour of duty, Captain Evans earned his SM and ScD in environmental health sciences at Harvard University. Following his doctoral work, he was selected as a fellow with the Advisory Committee on Reactor Safeguards at the US Nuclear Regulatory Commission.

Dr. Evans is a member of the Science Advisory Board (Drinking Water Committee) of the US Environmental Protection Agency and has recently been chosen by the Society for Risk Analysis as the area editor for Human Health Risk Analysis for *Risk Analysis: An International Journal.*
The Program on Food Safety and Agriculture (PFSA) is a multidisciplinary effort to assess safety risks to the American food supply. Students in the PFSA will develop methods for risk assessment of food-borne contaminants, analyze specific food safety issues, and work alongside experts in the areas of risk assessment, food safety, and agriculture.

A main goal of the program is the education of legislators, community leaders, and journalists on the importance of risk analysis in the promotion of a safe food supply. Program leaders have testified at the state and federal level about food safety issues and worked closely with print and broadcast reporters and the editors of scholarly publications on their stories about food safety and agriculture. Program highlights include a workshop and journal publication to introduce the broader risk-analysis community to phytosanitary risk assessment, a study on the value of research on food safety, and research on risk/risk-tradeoffs in pesticide regulation.

Future projects will focus on the use of risk analysis in food safety, particularly as it relates to international trade. The North American Free Trade Agreement (NAFTA) and the General Agreement on Tariffs and Trade (GATT) both demand science-based risk assessments to support sanctions on specific commodities. Adjudication of disputes over food risks by the World Trade Organization (WTO) will stimulate interest in assessment of the potential risks of new agricultural technologies like bioengineered crops and irradiated food. It also will bring to the forefront questions of social and economic valuation of health and environment, a key HCRA interest. Implementation of the Food Quality Protection Act of 1996 will be another major area of study.

A new project will examine potential pathways for development of bovine spongiform encephalopathy (BSE) in US cattle, identify the effect of current regulations and risk-management practices for the prevention of BSE, and recommend surveillance and monitoring improvements to ensure the integrity of the US beef herd. Students also will investigate the ways in which TSE agents from cattle enter the food supply and evaluate the efficacy of current regulations concerning food processing and animal rendering in ensuring food safety.
Recent HCRA Report


This HCRA report evaluates a large-scale epidemiological study that has enrolled 90,000 farmers and farm family members in Iowa and North Carolina who may be exposed to chemicals used on the farm. Prepared in collaboration with an advisory committee chaired by Dr. Bernard Goldstein of the RWJ Medical School, the report offers scientific recommendations to both government and industry.

George M. Gray, PhD

George M. Gray, PhD, is a research associate and instructor in risk analysis in the Harvard Center for Risk Analysis at the Harvard School of Public Health. Dr. Gray is a strong proponent of the use of more and better scientific information in risk assessment and risk-based frameworks in guiding society's efforts to manage health hazards. His research interests include the role of risk assessment in food safety, the interpretation of animal bioassay data for risk assessment, characterization of risk, and the use of risk information in public and corporate decision making on health, safety, and the environment.

Dr. Gray teaches toxicology and risk assessment at the Harvard School of Public Health and directs the center's continuing education short course, "Analyzing Risk: Science, Assessment, and Management." He has worked with several companies and trade organizations.

Risk Quiz:
Query: In 1997 samples, what percentage of fresh produce contained detectable levels of at least one pesticide used in growing?
Answer: 36% or 17,714 out of 48,080 samples.
Source: 1997 USDA Pesticide Data Programs
In most developed countries, the leading killer of young people between the ages of one and 35 is motor vehicle crashes. The Program on Automotive Safety is dedicated to identifying policies that will reduce the risks of motor vehicle crashes in a cost-effective manner. For example, center investigators have estimated that a driver-side airbag costs about $20,000 for each year of life that is saved, where each year is adjusted for health-related quality to account for nonfatal injuries prevented (and caused) by airbags.

This program is a joint venture of the Center for Risk Analysis and the Injury Control Research Center at the Harvard School of Public Health. Students in the program have access to faculty expertise in epidemiology, engineering, behavioral science, and the analytic methods of risk analysis.

The primary focus of the Program on Automotive Safety is the improvement of crash protection through optimal occupant seating positions, proper use of safety belts and child restraints, and installation of advanced airbag designs. For example, Ford Motor Company has announced plans to install advanced airbag systems that modify airbag deployment based on crash speed, safety belt use, and presence of a child in the front seat. Recently, the program has begun to investigate the unique safety issues associated with sport-utility vehicles and light trucks, the fastest growing category of new vehicle sales in the US and other developed countries.

Recent Publications


Preventing Automobile Injury: New Findings from Evaluation Research
John D. Graham
1988, Auburn House Publishing Company Dover, MA

This book relates the emerging interest in injury control to the science of traffic safety. State-of-the-art evaluation research methods are employed to assess the merits of policies designed to prevent automobile-related injuries in three problem areas: drunk driving, occupant restraint use, and highway speeding.

"...contains an array of stimulating and insightful analysis about increasing highway safety. Experts from different disciplines actually engage each other on what we know, how we can make research more definitive, and how we can design better policy."
Lester B. Lave, Carnegie Mellon University Graduate School of Industrial Administration

Auto Safety: Assessing America's Performance
John D. Graham
1989, Auburn House Publishing Company Dover, MA

This book explains why the USA is the only country in the world to require driver and passenger airbags in all new cars and light trucks.

"Auto Safety explains how airbags became the Maginot Line of regulatory politics."
Chuck Hurley
National Safety Council

To order a copy of this book please contact HCRA, 718 Huntington Avenue, Boston, MA 02115 or (617) 432-4497.

Profile

Maria Segui-Gomez, MD, MPH, MSc, ScD Candidate

Maria Segui-Gomez, a physician from Spain, is a doctoral candidate in the Department of Health Policy and Management at the Harvard School of Public Health. As deputy director for the Harvard Injury Control Research Center, Dr. Segui-Gomez has been working on several projects in collaboration with the Harvard Center for Risk Analysis.

Her thesis brings state-of-the-art economic evaluation methods to the injury prevention field. Recently, she conducted a review of cost-benefit and cost-effectiveness analysis and their application to injury prevention programs. Specifically, Dr. Segui-Gomez is using cost-effectiveness methods to define the optimal deployment threshold for automotive airbags.

Community Risk Scale

<table>
<thead>
<tr>
<th>Risks: 7/10</th>
</tr>
</thead>
<tbody>
<tr>
<td>Death from all causes 8 in 100</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Risks: 7/100</th>
</tr>
</thead>
<tbody>
<tr>
<td>Stroke-ages 65 and older 4 in 1,000</td>
</tr>
<tr>
<td>Cancer-ages 45 to 64 2.5 in 1,000</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Risks: 7/10,000</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lung cancer 6 in 10,000</td>
</tr>
<tr>
<td>Unintentional injury 3.4 in 10,000</td>
</tr>
<tr>
<td>Homicide 1 in 10,000</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Risks: 7/100,000</th>
</tr>
</thead>
<tbody>
<tr>
<td>Leukemia 7.6 in 100,000</td>
</tr>
<tr>
<td>Accidental poisoning 3.5 in 100,000</td>
</tr>
<tr>
<td>Fires/Drowning 1.5 in 100,000</td>
</tr>
</tbody>
</table>
Special Project: Children's Health

Kimberly M. Thompson is spearheading a new project at the HCRA involving the use of risk management in the protection of children. The project seeks to promote a reasoned response to the health, safety, and environmental hazards that affect the nation's children.

Analytical techniques will be used in evaluating the performance of national activities to protect and promote the welfare of children. Currently there are no national standards involving risk reduction strategies for the protection of children. The project will take a cross-cutting approach to reducing risks to children, and will provide a common ground for the national debate on child welfare.

Top 10 Leading Causes of Death for Different Age Groups

<table>
<thead>
<tr>
<th>CAUSE</th>
<th>P. AGES</th>
<th>AGER 14</th>
<th>INFANTS</th>
</tr>
</thead>
<tbody>
<tr>
<td>Heart disease</td>
<td>1</td>
<td>5</td>
<td></td>
</tr>
<tr>
<td>Malignant neoplasms</td>
<td>2</td>
<td>2</td>
<td></td>
</tr>
<tr>
<td>Cerebrovascular</td>
<td>3</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Bronchitis/Emphysema/Asthma</td>
<td>3</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Unintentional injuries</td>
<td>5</td>
<td>1</td>
<td>7</td>
</tr>
<tr>
<td>Pneumonia and influenza</td>
<td>6</td>
<td>8</td>
<td>9</td>
</tr>
<tr>
<td>Diabetes</td>
<td>7</td>
<td></td>
<td></td>
</tr>
<tr>
<td>HIV</td>
<td>8</td>
<td>6</td>
<td></td>
</tr>
<tr>
<td>Suicide</td>
<td>9</td>
<td>7</td>
<td></td>
</tr>
<tr>
<td>Liver disease</td>
<td>10</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Congenital anomalies</td>
<td>3</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>Homicide</td>
<td>4</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Benign neoplasms</td>
<td>9</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Short gestation</td>
<td>2</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Sudden Infant Death Syndrome</td>
<td>3</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Respiratory Distress Syndrome</td>
<td>4</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Maternal complications</td>
<td>5</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Placenta cord membranes</td>
<td>6</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Perinatal infections</td>
<td>8</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Intrauterine hypoxia</td>
<td>10</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Data for 1993-1995 from the Centers for Disease Control and Prevention Available at: www.cdc.gov/nchs/aeatcausal.htm

Kimberly M. Thompson, ScD is assistant professor of risk analysis and decision sciences in the Department of Health Policy Management. She is a faculty member in the Program in Environmental Science and Risk Management and the Program on the Economic Evaluation of Medical Technology. She received her ScD in environmental health from the Harvard School of Public Health, and a BS and MS in chemical engineering from the Massachusetts Institute of Technology. Professor Thompson's research and teaching focus on issues related to developing and applying quantitative methods for risk assessment and risk management, and consideration of the public policy implications associated with including uncertainty and variability in risk characterization. Dr. Thompson's research interests include analysis of risks to children, how the public responds to different ways of presenting information, about environmental risks, and how application of value-of-information tools can improve risk management. She is currently collaborating with women's health groups in the development and testing of a tool to help consumers evaluate risk information and make wise decisions about risks.
In 1997 the National Association of Home Builders commissioned the Harvard Center for Risk Analysis and the Harvard Joint Center on Housing to examine the scientific and economic basis of building codes. The HCRA is developing and applying a risk-tradeoff model that can assist code makers responsible for building safety.

Code-making officials in the US and abroad are reviewing residential building codes aimed at protecting the buyer of a new home from health and safety hazards. In some parts of the world, concerns are natural hazards posed by earthquakes, hurricanes, tornadoes and floods. In other regions, the primary concerns are falls on stairways within the home.

Although proposals of new codes are often well-intentioned, they rarely undergo formal analysis to determine their potential benefits, risks, and costs. The economic issue is particularly salient to the buyer of a “starter home,” who may be very sensitive to small increments in price. An innovative feature of the HCRA's approach is a comparison of the risks of new homes to the risks faced by people who live in the existing housing stock.

James Hammitt, Eric Belsky, John Graham, and John Levy
Risk vs. Risk: Tradeoffs in Protecting Health and the Environment
John D. Graham and Jonathan Baert Wiener
1995, Harvard University Press Cambridge, MA (617) 495-2006

Risk vs. Risk marshals an impressive set of case studies which demonstrate that all too often our nation's campaign to reduce risks to our health and the environment is at war with itself.

"Professionals and policymakers should find this volume quite useful and thought provoking...This work might also begin a dialogue that will help develop a more holistic way of thinking about our problems and stimulate demand for a more democratic and informed policymaking process."

John S. Klemanski,
Perspectives on Political Science

Harnessing Science for Environmental Regulation
John D. Graham
1991, Praeger Publishers
Westport, CT (203) 226-3571

Harnessing Science examines the role of science in toxic chemical regulation at the US Environmental Protection Agency. The book postulates that scientific knowledge and advice from experts outside of government is critical to the competence and credibility of regulations designed to protect public health.

To obtain a copy of either book please contact the publisher at the phone numbers listed above.
<table>
<thead>
<tr>
<th>Risk Category</th>
<th>Risk Event</th>
<th>Probability</th>
</tr>
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<tbody>
<tr>
<td>Death from all causes</td>
<td></td>
<td>8 in 100</td>
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<tr>
<td>Stroke-ages 65 and older</td>
<td></td>
<td>4 in 1,000</td>
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<tr>
<td>Cancer-ages 45 to 64</td>
<td></td>
<td>2.5 in 1,000</td>
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<tr>
<td>Lung cancer</td>
<td></td>
<td>6 in 10,000</td>
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<tr>
<td>Unintentional injury</td>
<td></td>
<td>3.4 in 10,000</td>
</tr>
<tr>
<td>Homicide</td>
<td></td>
<td>1 in 10,000</td>
</tr>
<tr>
<td>Leukemia</td>
<td></td>
<td>7.6 in 100,000</td>
</tr>
<tr>
<td>Accidental poisoning</td>
<td></td>
<td>3.5 in 100,000</td>
</tr>
<tr>
<td>Fires/Drowning</td>
<td></td>
<td>1.5 in 100,000</td>
</tr>
<tr>
<td>Killed by a coworker</td>
<td></td>
<td>9 in 1 million</td>
</tr>
<tr>
<td>Tuberculosis</td>
<td></td>
<td>5 in 1 million</td>
</tr>
<tr>
<td>Train accident</td>
<td></td>
<td>2 in 1 million</td>
</tr>
<tr>
<td>Airplane accident</td>
<td></td>
<td>9 in 10 million</td>
</tr>
<tr>
<td>Floods</td>
<td></td>
<td>4 in 10 million</td>
</tr>
<tr>
<td>Lightning/Insect sting</td>
<td></td>
<td>2 in 10 million</td>
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</tbody>
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