



## FROM BIRTH TO DEATH AND BENCH TO CLINIC

# THE HASTINGS CENTER BIOETHICS BRIEFING BOOK

for Journalists, Policymakers, and Campaigns

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### CHAPTER 13

## Environment and Health

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# environment and health

by David B. Resnik and Christopher J. Portier

## Framing the Issue

There is a growing body of evidence that the environment can affect human health and that human health care can affect the environment. Thus, the traditional divide between clinical medicine and environmental protection is disappearing. This change has created a need for bioethical reflection on all levels of interaction between human health and the environment.

The questions that span medical and environmental ethics are complex, diverse, frequently global in scope, and not able to be answered without collaboration among environmental scientists, physicians, public health professionals, ethicists, lawyers, and policymakers. Where should a county place a solid waste facility? Should emergency health care workers be vaccinated against smallpox? Should new housing developments have sidewalks and bike paths to help prevent obesity? Should any use of DDT be permitted to control malaria? Should the United States increase foreign aid to help impoverished nations improve their water supplies? Are transgenic plants an acceptable alternative to pesticides and chemical fertilizers? How much of their limited resources for environmental health should the nations of the world allocate to preventing and adapting to global climate change? Finding satisfactory answers to questions like these will become increasingly important as the environmental impacts of human activities continue to mount.

## The Science: Environmental Health and Hazards

All organisms depend on their environments for energy and the materials needed to sustain life: clean air, potable water, nutritious food, and safe places to live. For most of human history, increases in longevity were due to improved access to these necessities. Advances in agriculture, sanitation, water treatment, and hygiene have had a far greater impact on human health than medical technology.

Although the environment sustains human life, it can also cause disease. Lack of basic necessities is a significant cause of human mortality. In 2004, lack of access to safe drinking water was responsible for 1.8 million deaths (mostly small children) from diarrhea. That same year, lack of adequate sanitation caused 160 million people to become infected with schistosomiasis, which can cause malnutrition and organ damage.

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## HIGHLIGHTS

- Environmental conditions can affect human health; less widely known is that health care can also affect the environment.
- Improvements in human health, such as reduced mortality, can cause environmental harm, such as increased use of fossil fuels.
- The interactions between the environment and human health raise complex ethical questions related to environmental regulations and health policy decisions.
- These ethical questions are bound to intensify with the emergence of nanotechnology, genetically modified plants, biofuels, and other technologies that can bring benefits and risks.

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Approximately 1.1 billion people currently lack access to safe drinking water, and 2.6 billion do not have proper sanitation. Environmental hazards increase the risk of cancer, heart disease, asthma, and many other illnesses. These hazards can be physical, such as pollution and food contaminants, or they can be social, including dangerous work conditions and poverty.

By contrast, activities that promote health and extend human life can have adverse environmental effects. For example, food production causes environmental damage from pesticides and fertilizers, soil salinization, waste produced by livestock, carbon emissions from food manufacturing and transportation, and overfishing. Health care facilities also have adverse environmental impacts. Hospitals use large quantities of electricity and fossil fuels and produce medical wastes. To prevent some diseases, it may be necessary to damage the environment. For example, malaria was eradicated in the United States and other developed nations in the 1940s and 1950s as a result of draining wetlands and spraying DDT to kill mosquitoes. A reduction in mortality from starvation or disease can lead to overpopulation, which stresses the environment in many different ways—increasing use of fossil fuels, clearing land, generating pollution and waste, and so on.

## Bioethical, Social, and Legal Considerations

Relationships between human health and the environment raise many ethical, social, and legal dilemmas by forcing people to choose among competing values. These considerations can be grouped into the following categories.

**Managing benefits and risks.** Many of the issues at the intersection of health and the environment have to do with managing benefits and risks. For example, pesticides play an important role in increasing crop yields, but they can also pose hazards to human health and the environment. Alternatives to pesticide use create trade-offs in health. The extreme action of stopping all pesticide use could significantly reduce agricultural productivity, leading to food shortages and increased food prices that would, in turn, increase starvation in some parts of the world. Public health authorities have opted to regulate the use of pesticides to enhance food production while minimizing damage to the environment and human health.

No issue demands greater care in balancing benefits and risks than global warming. A significant percentage of global climate change is due to the human production of greenhouse gases. Climate change is likely to cause tremendous harm to the environment and human health, but taking steps to drastically reduce greenhouse gases could have adverse consequences for global, national, and local economies, which would result in a general decline in human health and health care. For example, greatly increasing gasoline taxes would encourage greater fuel efficiency and lower carbon dioxide emissions, but it would also increase the price of transportation, leading to widespread inflation and reduced consumer spending power.

For many years some politicians and scholars have argued that we should wait for more evidence of global warming, since the steps needed to prevent or minimize it could have disastrous economic consequences. Others have argued that society cannot afford to wait for complete evidence because the consequences of global climate change could be catastrophic and irreversible. This difference of opinion raises a fundamental question about the ethics of benefit/risk management: What is the role of scientific evidence in decision-making?

Most regulatory agencies in the United States make benefit/risk decisions based on information from scientific studies, such as chemical analyses, cell studies, animal experiments, and controlled clinical trials. Agencies often refrain from making regulatory decisions until they have adequate sci-

### ENVIRONMENT-RELATED ILLNESSES

- Cancer
- Heart disease
- Diabetes
- Asthma
- Chronic obstructive pulmonary disease
- Obesity
- Occupational injuries
- Arthritis
- Parkinson disease
- Malaria
- Dysentery
- Depression

## ENVIRONMENTAL RISK FACTORS FOR DISEASE

- Pollution
- Microbes in air, water, or soil
- Contaminants in food
- Weather conditions (droughts, heat waves)
- Natural disasters (hurricanes, earthquakes, floods)
- Pesticides and other chemicals
- Pests and parasites
- Radiation
- Poverty
- Lack of access to health care

entific evidence. Many commentators and organizations endorse an alternative approach, the precautionary principle. The idea is that society should take reasonable steps to prevent or minimize significant, irreversible harm, even when scientific evidence is incomplete. Although the precautionary principle has many adherents, especially in Europe and California, it remains controversial.

**Social justice.** Managing benefits and risks raises social justice concerns. In general, people with lower socioeconomic status have greater exposure to detrimental environmental conditions in their homes or at work, such as lead, mercury, or smoke produced by factories. Communities and nations should minimize such injustices when making decisions, such as choosing a site for a factory, a power plant, or waste dump, or regulating safety in the workplace. The decision-making process should be fair, open, and democratic, so that people who will be affected by environmental risks have a voice in these deliberations and can make their concerns known.

When drafting and implementing environmental health regulations, it is important to consider vulnerable subpopulations. A vulnerable subpopulation is a group with an increased susceptibility to the adverse effects of an environmental risk factor due to age, genetics, health status, or some other condition. For example, children are more susceptible to the effects of lead, mercury, and some pesticides than adults. Some people have a genetic mutation that increases their susceptibility to cancer caused by passive smoking.

If an environmental regulation is designed to

protect average members of the population, it may fail to adequately protect vulnerable populations. Justice demands that we take care of people who are vulnerable. But almost everyone in the population has an above-average susceptibility to at least one environmental risk factor. Since providing extra protections to everyone would be costly and impractical, protections must be meted out carefully, and the populations who are vulnerable to a particular environmental risk factor must be defined clearly. For example, about 0.4% of the U.S. population is severely allergic to peanuts. Banning the sale of peanuts would be a costly and impractical way to protect these people, but requiring that products containing peanuts be labeled as such would be reasonable.

Social justice must be a factor in allocating resources for health care. Governments spend billions of dollars trying to improve the health of citizens and to prevent disease. These funds go to biomedical research, overseeing the safety of foods and drugs, enforcing environmental or occupational health regulations, and running programs for disaster preparedness, public health, health education, sanitation, water treatment, and so on. In the United States, the lion's share of health resources goes to providing medical diagnosis and treatment, but one might argue that it would be wiser to shift some resources to disease prevention programs, such as environmental protection, public health, and health education, since prevention is generally more cost-effective than treatment.

**Human rights.** Various public health strategies pit the rights of individuals against the good of society. These include mandatory treatment, vaccination, or diagnostic testing; isolation and quarantine; and disease surveillance. The main argument for these public health strategies is that individual human rights may have to be limited to prevent the transmission of infectious diseases, such as tuberculosis, SARS, HIV/AIDS, and pneumonia. But restrictions on rights should be carefully considered and safeguards put in place to prevent public health authorities from overstepping their bounds. Protecting the public's health should not come at the expense of human rights.

Some health and environmental protections also limit property rights. The owner of a coal-burning power plant must deal with many laws concerning the operation of the plant, workplace safety, and carbon emissions. A developer who plans to build 150 new homes with land he has purchased may

## RESOURCES

### Web sites

- [www.who.int](http://www.who.int) – World Health Organization. Includes fact sheets, multimedia presentations, publications, and statistics on environmental health.
- [www.niehs.nih.gov](http://www.niehs.nih.gov) – National Institute of Environmental Health Sciences. Includes extensive educational information and resources on environmental health topics.

### Recent news

- Editorial, “Concerns about BPA Plastic,” *New York Times*, May 20, 2008.
- Lyndsey Layton, “Chemical in Plastic is Connected to Health Problems in Monkeys,” *Washington Post*, September 4, 2008.
- Susan Freinkel, “Trees by Design,” *Boston Globe*, December 23, 2007.

### Further reading

- John P. Holdren, “Science and Technology for Sustainable Well-Being,” *Science*, January 2008.
- David B. Resnik and Gerard Roman, “Health, Justice, and the Environment,” *Bioethics*, May 2007.
- Julia M. Gohlke and Christopher J. Portier, “The Forest for the Trees: A Systems Approach to Human Health Research,” *Environmental Health Perspectives*, June 2007.
- Anthony J. McMichael, John W. Powles, Colin D. Butler, and Ricardo Uauy, “Food, Livestock Production, Energy, Climate Change, and Health,” *The Lancet*, October 2007.
- Ronald Bayer, Lawrence O. Gostin, Bruce Jennings, and Bonnie Steinbock, eds., *Public Health Ethics: Theory, Policy, and Practice*, Oxford University Press, 2007.



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also have to deal with laws concerning storm drainage, water and sewage lines, gas lines, sidewalks, and so on. Restrictions on property rights are justified to protect human health and the environment. But opponents of these restrictions argue that they are often excessive or not adequately supported by scientific evidence.

Human rights issues also come up in research on

environmental health that involves human subjects. For such research to be ethical, human subjects must give consent, and great care must be taken to ensure that they understand that they can opt out of the research project. Since the late 1990s, some pesticide companies have tested pesticides on human subjects to gather data to submit to the government for regulatory purposes. Some commentators charge that these experiments are unethical because they place people at unacceptably high risk without clear benefit to society. Others have argued that the experiments, if properly designed and implemented, could produce important benefits to society by providing useful knowledge about the effects of pesticides, which could lead to stronger regulations.

## Emerging Issues Likely to Affect Policy

There are many new developments in science, technology, and industry that are bound to pose benefits and risks to the environment and human health. They include nanotechnology, genetic modification of plants and animals, antibiotic resistance, threats to food safety, and the growing market for biofuels. Longstanding challenges persist, including the preservation of ecosystems and endangered species and questions about animal experimentation. Many more will emerge. To deal with them in a responsible way, we must continue to research the relationship between human health and the environment and to hold fair and democratic public deliberations—community forums, academic conferences, and legislative debates—involving participants with diverse cultural, socioeconomic, philosophical, and scientific perspectives.

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