



Environmental and Energy Study Institute

122 C Street, NW
Suite 700
Washington, D.C. 20001
Phone: 202-628-1400
Fax: 202-628-1825
E-mail: eesi@eesi.org
Website: www.eesi.org

Carol Werner
Executive Director

PUBLIC HEALTH IMPACTS OF CLIMATE CHANGE

JULY 2002

According to the Intergovernmental Panel on Climate Change (IPCC), the leading scientific institution on climate change research, atmospheric concentration of carbon dioxide, the greenhouse gas most attributed to causing climate change, has increased by 31 percent since the 1750s. This increase is caused by human activities, primarily the burning of fossil fuels.

As a result of increasing carbon dioxide and other greenhouse gas emissions, changes in the earth's climate have been observed. The IPCC has stated that the 1990s was the warmest decade on record, with 1998 being the warmest year since 1861, before which adequate data is lacking. It has been recorded that the global average temperature has increased by 0.6 degrees Celsius in the past century and has been accompanied by observed sea level rise. Severe weather events, like El Nino, have also become more frequent in the past decades as a result of the changing climate.

Based on these past and current trends, scientists have forecasted likely future climate conditions. It has been predicted that, among other things, regional weather patterns will likely be altered,

The direct link between climate change and these public health risks are cause for concern. As described by the briefing panel, and supported by numerous studies, the potential impacts on society are substantial.

changes in global precipitation patterns will occur, an increase of severe weather events is probable, and a general shift of climate conditions to higher latitudes will result. These climatic changes, already being witnessed today, will have a significant impact on human existence. Even slight alterations in climate conditions have the potential to greatly alter society.

PUBLIC HEALTH AND CLIMATE CHANGE

Recently, the impacts of climate change on public health have received increasing scientific scrutiny. Various studies by Physicians for Social Responsibility (PSR), Johns Hopkins University, University of California-Davis, and Carnegie Mellon University examine the impacts of climate change on public health. A report by the Bloomberg School of Public Health at Johns Hopkins University entitled *Climate Change and Human Health* identifies five critical health issues relating to climate change.

PANELISTS

Robert K. Musil, PhD, MPH
Executive Director and CEO, Physicians for Social Responsibility

Devra Lee Davis, PhD
John Heinz III School of Public Policy and Management, Carnegie Mellon University, author of "When Smoke Ran Like Water"

William K. Reisen
Director, Arbovirus Field Station, Center for Vector Borne Disease Research, School of Veterinary Medicine, University of California Davis

These include:

1. Heat-related illness or death
2. Health issues linked to air pollution
3. Vector-borne and rodent-borne diseases
4. Extreme weather health and safety effects
5. Water-borne and food-borne diseases

The direct link between climate change and these public health risks are cause for concern. As described by the briefing panel, and supported by numerous studies, the potential impacts on society are substantial.

AT RISK POPULATIONS

Within the United States, and throughout the world, certain population sectors are more susceptible to adverse health affects relating to climate change. The most vulnerable population groups include low-income individuals, children, the elderly, and immunocompromised individuals.

Low-income populations are more vulnerable to heat-related illnesses. Poverty increases a population's risk because low-income households are less likely to live in an air conditioned environment; are more likely to live in urban areas, which are generally warmer; and have decreased access to adequate health care.

Children have a higher risk of illness or death as a result of their active behavior and small size. These factors make them more susceptible to vector borne diseases, health problems associated with air pollution, and heat stress.

Elderly persons are at risk of infectious diseases, severe weather events, and heat related illnesses caused by climate change as a result of their generally weaker physical condition and other societal factors.

Immunocompromised individuals are especially vulnerable to extreme weather and contracting infectious diseases, made more prominent by increasing temperatures and shifting climates. Persons living with AIDS or diabetes, for example, have weakened immune systems which can result in a lessened ability to fight off illnesses.

(Source: Johns Hopkins University)

estimated to have been responsible for more than 700 deaths. Musil, executive director and CEO of PSR, went on to conclude that, as climate change continues to increase the severity and frequency of such heat waves, resulting deaths are projected to double. This presents an especially serious problem for vulnerable populations such as the elderly, children, and low-income households without access to air conditioning.

AIR POLLUTION

Various forms of air pollution, including fine particulate matter and low lying ozone, which are usually associated with fossil fuel combustion, present a great risk to public health. As described by Devra Davis, of Carnegie Mellon University's John Heinz III School of Public Policy and Management, these pollutants, usually found at higher concentrations in urban areas, have been linked to elevated rates of cardiac and respiratory illnesses and deaths. In 1997, a Working Group on Public Health and Fossil-Fuel Combustion, comprised of the World Health Organization (WHO), World Resources Institute (WRI) and others, estimated that nearly 700,000 deaths annually were related to air pollution and roughly eight million excess deaths could occur by 2020.

HEAT-RELATED ILLNESS

As a result of climate change, the frequency and intensity of heat waves has increased. A Physicians for Social Responsibility (PSR) study showed that the number of heat stress days has doubled, and the number of heat waves (4+ days) has almost tripled in the United States over the past 50 years. The IPCC stated that over the next century it is very likely that this trend will continue and there will be more hot days, higher minimum temperatures and higher heat indexes.

These weather patterns pose a risk to public health in the form of fainting, heat exhaustion, and stroke, according to the *Climate Change and Human Health* report by Bloomberg School of Public Health. In Robert Musil's paper entitled, *The Politics and Public Health Implications of Global Warming*, it is cited that a five-day heat wave in Chicago during the summer of 1995, was

Restricting pollution from 'dirty' power plants, increasing energy efficiency, and decreasing tailpipe emissions from automobiles would result in cleaner air, fewer climate altering gases, and improved public health.

- Devra Lee Davis, PhD, author of "When Smoke Ran Like Water"

According to Davis, efforts to decrease the release of greenhouse gases, resulting from the burning of fossil fuels, also effectively decreases harmful forms of air pollution resulting from the same source. Restricting pollution from 'dirty' power plants, increasing energy efficiency and decreasing tailpipe emissions from automobiles would result in cleaner air, fewer climate altering gas emissions, and improved public health.

VECTOR-BORNE DISEASES

The predicted 3-5 degree Celsius temperature rise will extend the length of mosquito and virus transmission seasons, increase the rate of mosquito population growth, and extend its geographic range in which these insects thrive.

- William K. Reisen, Director, Arbovirus Field Station, Center for Vector Borne Disease Research, School of Veterinary Medicine, University of California-Davis

Around the globe, it is likely that climate change will increase the occurrence of vector-borne diseases. Vector-borne diseases are those that are carried by blood feeding insects, such as mosquitoes or ticks. Examples of such diseases include malaria, West-Nile Virus, Lyme's disease and encephalitis. Climate conditions play a large role in the spread of these and other vector-borne diseases because the carriers are so sensitive to their climatic surroundings. Very slight changes in temperature and/or climate can greatly expand the areas in which vector-borne disease carriers exist. The IPCC predicts that by the second part of this century roughly 45-65 percent of the world's population may live in areas where malaria is prevalent as a result of climate change, a substantial increase.

William Reisen, from the Center for Vector Borne Disease Research, examined the impacts of climate change on North American mosquito-borne encephalitis viruses. Although the findings are specific to one disease, Reisen points out that the climate change effects are generally applicable to other vector-borne diseases, such as malaria in Africa or Lyme's disease on the East Coast. The results of the study found that the long term effects of climate change will likely increase the spread of encephalitis. The predicted 3-5 degree Celsius temperature rise will extend the length of mosquito and virus transmission seasons, increase the rate of mosquito population growth, and extend the geographic range in which these insects thrive. These changes will all result in the increased presence of vector-borne diseases.

Reisen also linked shorter-term changes associated with climate change to the spread of encephalitis in North America. He pointed out that the years in which El Nino and La Nina events have occurred, which have become more frequent as the climate changes, have also been associated with an increase in mosquito and virus activity. The increasing risk of vector-borne diseases can potentially put an increased strain on health care systems and affect even larger sectors of the population.



EXTREME WEATHER AND FOOD-BORNE AND WATER-BORNE DISEASES

While the briefing panel discussed heat-related stress, air pollution illnesses, and vector-borne diseases relating to climate change in detail, extreme weather events, as well as food-borne and water-borne diseases, were only touched upon.

The IPCC has concluded that it is very likely that more intense precipitation will occur over many regions of the world, and that in some areas, it is likely that wind speeds, along with peak precipitation intensities of tropical storms will increase over the next century. These intensifications can lead to increased flooding, more downed tree limbs, added power outages, and a host of other problems. These occurrences result in direct risk to human health and safety.

In addition to these direct effects, extreme weather can result in decreased water quality for human needs and increase the occurrence of water-borne diseases. During the briefing, Musil described a 1999 event in which large volumes of raw sewage were released into a Maryland watershed after a heavy rain. Similar incidents are likely to occur globally at an increasing rate as climate change continues. Examples predicted within the United States are described in the series of state reports released by PSR, entitled *Death by Degrees*.

Water and food-borne diseases are also likely to increase as a result of slight temperature increases. In the report issued by the Bloomberg School of Public Health at Johns Hopkins University, bacterial agents, toxic algae blooms, and even viral poisoning of shell fish are all affected by temperature changes. As a result, even slight temperature changes have the potential to harm fresh water and food supplies.

FUTURE

The health impacts of climate change pose a significant risk to the future of humankind. Unless something is done to control the release of greenhouse gas emissions, public health impacts will continue to expand. In addition, as Reisen suggested, more research is needed to be able to predict and prevent these risks associated with climate change. Health issues considered alone, not to mention in combination with ecological and economic impacts, are compelling reasons enough for political action to be taken to halt or at least slow the changing of the climate.

For More Information

- Physicians for Social Responsibility: www.psr.org
- Johns Hopkins University, School of Public Health: www.jhsph.edu/globalchange/
- Intergovernmental Panel on Climate Change: www.ipcc.ch

Writer: Lisa Damon
Editor: Beth Bleil

For more information,
please contact
Carol Werner at
(202) 662-1881 or
cwerner@eesi.org.

Please visit us at:
www.eesi.org

Special thanks to the
National Institutes of
Health/National Institute
of Environmental Health
Sciences for their support
of this briefing

