



How Can We Prevent & Prepare for Health Issues in a Changing Climate?

“Climate change is potentially the biggest global health threat in the 21st century. Our response requires a new public health movement that is multidisciplinary and multisectoral, and that leads to coordinated thinking and action across governments, international agencies, NGOs, and academic institutions.”

--Lancet & University College London Institute for Global Health Commission

How Does Climate Change Affect Human Health?

Climate change is expected to affect the health of all Americans. According to the U.S. Environmental Protection Agency (EPA), as the environment changes, people will be at a higher risk for a range of threats to our health. These effects may include increased heat-related deaths and sickness; risks of respiratory infections, aggravation of asthma, increased allergens, and premature death; an increase in the number of people at risk from disease and injury related to floods, storms, droughts and wildfires; mental health impacts; water shortages and malnutrition; and increased incidence of vector-, food-, and water-borne diseases.

How Can We Prevent and Prepare for These Health Effects?

Public health and medical professionals must play a crucial role in addressing the health impacts of climate change. They must be prepared to respond to an increase in emergencies and to deal with new public health problems arising from climate change. To ensure that public health professionals are trained and equipped to address these challenges, we must bolster our investment in:

- **Research** – To guide climate change prevention and preparedness efforts, there’s a lot we still need to know about what the full range of climate-related health effects are, where they will be experienced, how we should respond, and how best to communicate these risks to the public. To get these answers, we should increase our research funding for the Centers for Disease Control and Prevention (CDC), the National Institutes of Health (NIH), the EPA, and other agencies that conduct climate and health research.
- **Planning and Communicating with the Public** – Planning for and responding to climate change will be an ongoing process. Public health professionals will be responsible for conducting a needs assessment, including the identification of vulnerable populations, and developing a strategic response plan. This plan must include: conducting surveillance and communication, assuring a prepared public health workforce, enhancing core emergency response and long-term public health capacity to respond to severe weather events and other adverse effects of climate change. They must also educate the public about climate change prevention, preparedness and response.
- **Workforce** – The public health workforce will need to draw from a variety of skill sets to effectively address climate change prevention and preparedness, including epidemiology, health information technology, environmental health, infectious disease, chronic disease, emergency preparedness, mental health, nutrition, food safety, health communication, and

injury prevention, among others. Health departments should ensure they employ a range of staff so these competencies are addressed. And when possible, staff should be cross-trained.

Climate Change & Health Research

Aren't We Already Researching the Connection Between Climate and Health?

Yes, but not to the extent necessary. The U.S. Global Change Research Program (USGCRP) coordinates and integrates federal research on changes in the global environment and their implications for society. Currently, there is no working group dedicated to the impact of climate change on human health. Instead, the Human Contributions and Responses working group lists human health as a significant research topic. Additionally, many federal partners, such as the EPA, the National Institutes of Health, the Centers for Disease Control and Prevention, and others have funded or conducted research on this topic.

Why Do We Need More Research? What Do We Still Need to Know?

To guide climate change prevention and preparedness efforts, there's a lot we still need to know about what the full range of climate-related health effects are, where they will be experienced, how we should respond, and how best to communicate these risks to the public. Specific areas of interest include: asthma, allergies, and airway diseases; stroke and cardiovascular disease; heat morbidity and mortality; mental health and stress-related disorders; waterborne disease; vector-borne and zoonotic disease; cancer; nutrition and foodborne illness; alterations in normal human development; neurological diseases; and weather related morbidity and mortality.

In 2008, the USGCRP identified some of the major climate change and health research gaps:

- The ability to identify exposure thresholds for climate-sensitive health outcomes, such as heat stress, particularly for at-risk populations;
- The development of modeling that looks at the health impacts of climate change and gives researchers estimates on the number of people affected by certain events;
- Tools to monitor and evaluate current climate change preparedness measures, including the costs and benefits of interventions. For example, the effectiveness of heat warning systems or air quality alert programs;
- The development of modeling that gives state and local planners the ability to look at their vulnerability at the micro level so they know which health effects they should be planning to respond to. This includes the ability to project when these climate change-related events might arise; and
- Research on the built environment and community design, particularly on how to strengthen infrastructure to provide protection against extreme weather events, reduce the effect of urban heat-islands, and maintain drinking and wastewater standards amid rising sea levels and changing precipitation patterns.ⁱ

A 2009 review by climate change researchers also identified other research priorities, including the mental health impact of climate change, nutritional issues related to food scarcity and population displacement, and how to most effectively communicate the health risks of climate change to the public, as well as the possible health harms and benefits of adaptation and mitigation strategies.ⁱⁱ

Planning and Preparing for the Health Effects of Climate Change: The Public Health Workforce

Health Departments and Emergency Responders Already Deal with Heat Waves, Floods, and Natural Disasters. Aren't They Already Prepared to Address the Health Effects of Climate Change?

Public health departments respond to health emergencies associated with extreme weather events and infectious disease outbreaks. Yet, it is unclear how well prepared health departments are to respond to an increase in the number of emergencies. Many state and local health departments do not list climate change among their top priorities and do not believe they have the expertise to address the challenges climate change presents.

- According to a 2008 National Association of County and City Health Officials (NACCHO), Environmental Defense Fund (EDF), and George Mason University (GMU) survey of local health departments, less than one-fifth (19 percent) indicated that climate change was among their department's top 10 current priorities.ⁱⁱⁱ Only six percent indicated that climate change was one of their health department's current top five priorities.^{iv}
- A 2009 Association of State and Territorial Health Officials (ASTHO) survey of its members found that 73 percent believe their state or territory will experience one or more serious public health problems in the next 20 years because of climate change.^v Yet, 77 percent of respondents did not consider climate change to be one of their agencies' top ten priorities.
- The 2009 ASTHO survey of its members found that only 42 percent of respondents thought their health department had sufficient assessment expertise to address climate change, while only 30 percent reported having sufficient planning expertise.^{vi}
- Meanwhile, the 2008 NACCHO/EDF/GMU survey of local health directors found that 83 percent felt they lacked the expertise to craft strategic climate change response plans.^{vii} Additionally, local officials did not feel as though their federal or state counterparts could assist, with only 26 percent reporting that their state had the necessary expertise to assist with adaptation plans, and 34 percent reporting that CDC had such expertise.^{viii}

On the state level, planning relating to climate change and health impacts is very limited.

- Overall, only 33 states have developed plans in response to climate change and/or greenhouse gas emissions. Of those, only five plans detail the role of public health in preventing and preparing for climate change.
- Twenty-seven states and DC have NOT established climate change commissions. Only eight states have established climate change commissions that include a representative from the state public health department.

Clearly, health officials in many states and localities do not believe that they have the adequate expertise to address the health impacts of climate change, and the vast majority of states have not developed plans detailing the role of public health in preventing and preparing for climate change. Without this planning and expertise, we are simply NOT adequately prepared.

Planning and Preparing for the Human Health Effects of Climate Change

Why Do Health Officials Need Additional Funds to Prevent, Prepare For and Adapt to the Health Effects of Climate Change? What Specifically Would They Do with These Funds?

From food safety to chronic disease prevention to responding to outbreaks of disease like the recent H1N1 outbreak, health officials are already stretched far too thin. Without additional funds, they will not have adequate resources for climate change prevention and preparedness.

The primary responsibilities of health officials in addressing the health impacts of climate change will be to conduct a *needs assessment* and to develop a *strategic response plan*.

Needs Assessment:

Conducting a needs assessment involves using a standardized methodology to determine the critical health needs and vulnerabilities of the population. It would include an assessment of:

- The state or community's overall vulnerability to climate change, given the geographic and community characteristics;
- Workforce capacities and needs, including staff readiness to engage with partners;
- Surveillance capacities (i.e. what data are already being collected, what else needs to be collected; whether there are shifting disease vectors in the state/community, etc.)
- Identification of vulnerable populations who are most at risk for health impacts; and
- The built environment.

Strategic Response Plan:

After conducting a needs assessment, a state or community would need to develop a strategic climate change response plan that addresses the core public health capabilities needed to prepare for and respond to climate change related health threats. This plan should address:

- Surveillance – Public health needs improved human health surveillance that is integrated with environmental quality and protection monitoring. In some areas, practitioners may need access to early warning systems that can forecast extreme weather to help reduce casualties and the spread of disease. Health departments also need the ability to access modeling and forecasting data for planning, though such data are now only available at the regional level.
- Communication – State and local health departments have an infrastructure, culture, and environment that support the development and delivery of effective and scientifically rigorous public education initiatives. They have partnerships with other trusted messengers, like community- and faith-based organizations, who may be the most credible messengers for certain populations. Health officials need funds to communicate the risks of climate change to the public, vulnerable populations, health care professionals, and businesses.
- Workforce - The public health workforce will need to draw from a variety of skill sets to effectively address climate change prevention and preparedness, including epidemiology, health information technology, environmental health, infectious disease, chronic disease, emergency preparedness, mental health, nutrition, food safety, health communication, and injury prevention, among others. Health departments should ensure they employ a range of staff so these competencies are addressed. And when possible, staff should be cross-trained.
- Emergency Response – Health departments must develop the capacity to respond to more frequent and severe weather events and other adverse effects of climate change. This capacity must

include planning, table-top exercises, drills, and simulations. Responses will vary regionally, depending upon the expected health effects of climate change.

Plans to Address the Health Effects of Climate Change

Are There Examples of How Preparing for Climate-Related Events Can Help Save Lives or Reduce Injury?

Philadelphia -- Hot Weather-Health Watch/Warning System (PWWS)

After a severe heat wave in July 1993 resulted in at least 118 heat-related deaths, Philadelphia developed the Philadelphia Hot Weather-Health Watch/Warning System (PWWS) in 1995 to alert the city's population when weather conditions pose health risks. There are two types of air mass that are associated with increased risk of death in Philadelphia: maritime tropical and dry tropical. The PWWS forecasts air mass type for the current day and the coming two days during the summer season, which runs from May 15 through September 30. The PWWS factors in several variables to its forecasts including: the number of consecutive days that the air mass was present, the maximum temperature, and the time of season. The local branch of the National Weather Service determines whether or not to issue its own warning based on the PWWS forecasts, the heat index, and other information. More often than not, the NWS will issue a heat warning on days recommended by the PWWS.

When the National Weather Service issues a warning, the local health department and other agencies roll out a series of interventions.

1. Local media are asked to publicize the warning and include information on steps that residents can take to avoid heat-related illnesses.
2. Media announcements encourage friends, relatives, neighbors, and other volunteers to make daily visits to elderly persons during the heat wave to make sure these at-risk individuals have sufficient fluids, proper ventilation, and other tools to cope with the weather.
3. A "heatline" is operated together with the Philadelphia Corporation for the Aging to provide information and counseling to the general public on how to avoid heat stress.
4. The Philadelphia Department of Public Health contacts nursing homes and other elder care and child care facilities to inform them of the high-risk heat situation and offer advice on how best to protect their clients from the heat.
5. Local utilities halt service suspension during warning periods.
6. Local fire and rescue units call up more personnel during warnings in anticipation of increased demand.
7. Local homeless service agency activates increased daytime outreach activities to help those people living on the streets.
8. Senior centers extend their hours of operation of air-conditioned facilities during warning periods.

An analysis of the PWWS found that issuing a heat warning lowered daily mortality by about 2.6 lives on average, and that the costs of running such a system were negligible while the net benefits were around \$468 million over the three-year period of 1995-1998.^{ix}

Chicago, Illinois -- Extreme Weather Notification Systems

In mid-July 1995, Chicago experienced a heat wave with temperatures ranging from 93°F to 104°F. On July 13, the heat index peaked at 119, a record high for the city. After two days of extreme heat, there was a spike in heat-related illness and death, leaving emergency departments overwhelmed. A total of 465 deaths -- mostly among low-income African Americans and the elderly -- were attributed to the extreme heat. In response to the deadly heat wave, Chicago developed a heat wave response program. One component of the program is the Extreme Weather Notification System that places automatic telephone calls to warn at-risk individuals of an impending heat or cold wave.^x The calls consist of a recorded message of weather forecasts, safety tips, and information on City services. Residents must register themselves or their friends and relatives online, over the phone, or by completing a form available at various city offices, library branches, and police stations.

The Extreme Weather Notification System is activated when the National Weather Service declares a Heat Warning or Wind Chill Warning. A Heat Warning occurs when forecasts indicate three consecutive days with a heat index of 100 to 105 F; or two consecutive days with a maximum heat index of 105 to 110 F; or one day with a maximum heat index of 110 F or greater. A Wind Chill Warning takes place when extreme low temperatures occur or if wind chills reach -30 F or colder, with wind speed greater than or equal to 10 mph.

St. Louis, Missouri -- Operation Weather Survival

Operation Weather Survival (OWS) was created in 1981 to address the needs of the community during extreme weather conditions. It is comprised of public and private organizations working together to prevent illness or death from extreme heat, cold conditions, or ground level ozone. The program targets those most at-risk, including the homeless, the poor, the elderly, and chronically ill persons living alone. The St. Louis health department provides preventive education and also monitors temperatures in order to generate OWS alerts and warnings. OWS provides air conditioners to individuals who are medically at risk and helps to identify cooling sites that are open year-round. During severe heat, cooling center hours and services are extended.

Arizona -- Heat Emergency Response Plan

Arizona is one of the hottest places on earth from June to September. Heat-related illnesses are common during the summer in Arizona. Year after year nearly 800 people are admitted to hospitals because of heat related illnesses.^{xi} As a result, the Arizona Department of Health Services, the Maricopa County Department of Emergency Management, and the City of Phoenix Emergency Management Office developed a Heat Emergency Response Plan.

The goals of the plan are to limit the adverse human health effects from extreme heat and to provide a framework for state and local health departments to provide services to at-risk populations, especially senior citizens and people with existing medical conditions.^{xiii} Depending on the type of heat-related warning the Phoenix office of the National Weather Service issues -- heat advisory, excessive heat watch, or excessive heat warning -- the plan details the specific roles and responsibilities of various government agencies. The plan includes a detailed public health education campaign to raise awareness among residents of the dangers of excessive heat and steps they can take to avoid harm. The communication campaign materials are available in both English and Spanish.

Rhode Island -- Air Quality Alert Program

Ground level ozone, or smog, is a major air pollution problem in Rhode Island and other northeast states. The Rhode Island Department of Health warns that unhealthy levels of ozone can cause throat irritation, coughing, chest pain, shortness of breath, increased susceptibility to respiratory infection, and aggravation of asthma and other respiratory ailments.^{xiii} These symptoms are worsened by exercise and heavy activity. The elderly, children, and people who have underlying lung diseases, such as asthma, are at particular risk of suffering from these effects. As ozone levels increase, the number of people affected and the severity of the health effects also increase. High levels of fine-particle matter are also a major health threat.

The Rhode Island Public Transit Authority implemented the Air Quality Alert Days Program, which is designed to help protect the public's health by issuing an alert on days when air quality is unhealthy due to a high level ozone or particle matter. The program is in effect year round. When an Air Quality Alert is issued, residents are able to ride all public bus and trolley routes in the state for free. By encouraging people to leave their cars at home and take public transit, the state program aims to reduce air pollutant emissions. The program also encourages residents to limit their use of small engines, lawn mowers and charcoal lighter fluids.

- ⁱ Gamble, J.L., K.L. Ebi, F.G. Sussman, T.J. Wilbanks, C. Reid, J.V. Thomas, and C.P. Weaver. "Common Themes and Research Recommendations." Chapter 5 in: *Analyses of the Effects of Global Change on Human Health and Welfare and Human Systems. A Report by the U.S. Climate Change Science Program and The Subcommittee On Global Change Research*. [Gamble, J.L. (ed.), K.L. Ebi, F.G.
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- ^v Association of State and Territorial Health Officials. *Climate Change: A Serious Threat to Public Health. Key Findings from ASTHO's 2009 Climate Change Needs Assessment*. Arlington, VA: ASTHO, 2009.
- ^{vi} Association of State and Territorial Health Officials. *Climate Change: A Serious Threat to Public Health. Key Findings from ASTHO's 2009 Climate Change Needs Assessment*. Arlington, VA: ASTHO, 2009.
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- ^x Chicago Department of Family and Support Services. "Extreme Weather Notification System." Press Release, May 25, 2004.
- ^{xi} Arizona Department of Health Services. "Protecting Yourself from Arizona's Heat." http://www.azdhs.gov/phs/oeht/protect_from_heat.htm (accessed July 10, 2009).
- ^{xii} Arizona Department of Health Services. *Heat Emergency Response Plan*. Phoenix, AZ: Arizona Department of Health Services, May 2006.
- ^{xiii} Rhode Island Public Transit Authority. "Air Quality Alert Days." <http://www.ripta.com/content259.html> (accessed July 10, 2009).