CLIMATE CHANGE

A New Challenge for Public Health

Gregg Grunenfelder

In recent years, most of the scientific community has validated the climate changes we are experiencing across the globe. Now is the time for public health to prepare and adapt to the challenges of climate change.

Looking back, we may view 2008 as the turning point when the public health community took visible steps to join the discussions. This was the year that World Health Day's theme was "Protecting Health from Climate Change" and National Public Health Week had a theme of "Climate Change and the Nation's Health."

In the Pacific Northwest, the Climate Impacts Group (CIG) at the University of Washington formed to study the effects of climate change on our region. Climate models used by the CIG predict warmer temperatures (a rise in annual average temperatures of 1.4 to 4.6°F by 2040) and slightly wetter winters (a 2 percent increase in annual average precipitation by 2040). The result will be a reduced snow pack in the mountains, earlier peak stream flows in the spring, and reduced summer stream flows. The predictions have serious implications for public health in the Northwest.

Direct effects may first be seen in heat-related illnesses and deaths. Heat is already the leading cause of weather-related deaths in the United States, with an estimated 400 to 700 deaths each year, as estimated by Bernard and McGeehin in 2004. The cause of death from hyperthermia is usually some form of cardiovascular disease, so these figures likely underreport actual heat-related deaths.

Heat waves will become more frequent and intense in the future, particularly east of the Cascade mountains where summer temperatures often exceed 90°F. (The Centers for Disease Control and Prevention defines "extreme heat" as temperatures that hover 10°F or more above the average high temperature for the region and last for several weeks).

As is well documented in Eric Klinenberg's book *Heat Wave—A Social Autopsy of Disaster in Chicago*, the children, the elderly, the chronically ill, and the poor will be most at risk from the health effects associated with these events.

Climate change is likely to shift the patterns of infectious diseases. Changes in weather will affect the habitat and life cycles of potential disease vectors such as mosquitoes and ticks. Milder winters and hotter summers will create more conducive environments for faster breeding cycles, better survival rates over the winter, and expanded range.

Concerns with zoonotic diseases such as West Nile Virus, hantavirus, and mosquito-borne encephalitis are likely to increase along with changes in our climate. Hotter weather may influence the incidence of food-borne disease associated with pathogens such as *Vibrio parahaemolyticus* in shellfish, and of flooding, which can carry with it waterborne diseases.

Climate change is likely to increase air pollution, which has serious implications for human health. Warmer, drier summers will lengthen wildfire seasons and extend the range of lands vulnerable to fires. Washington has already experienced a fourfold increase in wildfires since 1986. The wildfire season is longer and the large fires have a burn duration of 37 days, compared with 8 days in 1986. Longer, drier seasons will increase people's exposure to fine airborne particles. Warm weather will likely lengthen pollen seasons too. New allergens may enter our area as new plant species become established.

Along with increases in ground-level ozone, which is associated with warmer temperatures,

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these pollutants will exacerbate the region's already significant cardiovascular and pulmonary problems (Washington is estimated to have 400,000 adults and 120,000 children suffering from asthma).

And finally, climate change will result in health effects and psychological/social disruption as extreme weather events dislocate residents and stress social and health care systems. Earlier spring runoff and rain-on-snow conditions are likely to increase the frequency and severity of floods. In addition to direct physical harm from high water, landslides, and falling debris, floods can cause numerous health problems through the contamination of water supplies and the spread of toxic and infectious agents.

Potential economic impacts of climate change will disproportionately affect the poor and disenfranchised populations in our communities. Whatever actions are taken to address issues associated with climate change, special consideration should be given to ensure such actions do not add further burden to those already disadvantaged segments of our population.

Our difficult economic times increase the challenge of preparing our communities to adapt to climate change. However, climate change is so important that it calls for a reinvestment in our public health system so that we can minimize its potential health implications.

The following strategies are recommended as initial steps to minimize human health impacts associated with climate change:

1. Enhanced Public Health Surveillance

The systematic collection of data is critical for monitoring changes to the magnitude of current public health threats and the early detection of new or emerging threats. Zoonotic disease surveillance should be expanded, including more robust efforts to detect the size, distribution, and makeup of disease vectors in our environment. Continued efforts are needed to improve the reporting and tracking of emerging diseases so early interventions can stop their spread in our communities. And expanded air quality monitoring is needed to give the public early warning.

2. Enhanced Emergency Planning and Preparedness

Public health involvement in emergency planning and preparedness efforts has progressed significantly in the past few years. We could do more in the area of heat emergency preparation and response by providing input into heat response elements of local plans and participating in exercises around extreme heat events. We can give further consideration to the potential psychological and social disruptions associated with extreme weather events and ensure

Climate Change: A Public Health Framework

Howard Frumkin and George Luber

As the scientific community rises to face the issues of climate change, Public Health can provide a useful framework.

In 1994, the American Public Health Association and its partners developed a standard framework for action known as the 10 Essential Services of Public Health. An adaptation of these essential services provides a lens through which to view climate change from a public health standpoint. We offer a brief overview here; more detailed discussion is available in the March 2008 issue of the *American Journal of Public Health.*

1. **Monitor health status to identify and solve community health problems:** Climate change will require public health professionals to develop a new level of risk data, including meteorological data, ecological data, and indicators of vulnerability. Expanded surveillance programs can incorporate such climate change indicators and help health authorities to understand the associations among long-term climate changes, weather events, ecological changes, and direct and indirect health outcomes.
2. **Diagnose and investigate health problems and hazards in the community:** Classic public health responsibilities include identifying, investigating, and explaining health problems at the population level. In a changing climate, public health laboratories will need the capacity to make rapid diagnoses and reports of altered distribution and frequency dynamics of diseases.
3. **Inform, educate, and empower people about health issues:** Although most Americans believe climate change exists, only 1 in 5 reports understanding the issue very well. Health communicators can inform the public and policymakers about climate change, its potential health effects, and actions that may reduce risk. To build effective health communication strategies, we must target specific groups, accounting for varying levels of understanding, cultural and ethnic differences, and vulnerability.
4. **Mobilize community partnerships to identify and solve health problems:** We will need to strengthen relationships among traditional partners, such as government agencies and academia, and develop new partners, such as faith institutions and city planning departments. Many of these relationships will evolve at the local and state levels, where services are delivered. As we identify vulnerable populations, respond to emergencies, and implement adaptive policies, we must integrate community expectations, beliefs, and values.
5. **Develop policies and plans that support individual and community health efforts:** Although the responsibility for climate change mitigation lies outside the scope of Public Health, health professionals can provide compelling arguments about strategies to reduce morbidity and mortality. Public health tools such as health impact assessments can provide evidence for positive and negative effects of various approaches to climate change mitigation. These tools will allow local and state health departments to collaborate across policy sectors to exemplify public health engagement.

6. **Enforce laws and regulations that protect health and ensure safety:** Few public health laws and regulations have a direct bearing on climate change. However, Public Health can provide science-based evidence for laws and regulations in the environmental, transportation, and energy arenas. There may be roles for state and local public health agencies in enforcing policies such as building codes, water quality regulations, and air quality laws.
7. **Link people to needed health services and ensure provision of care:** A strong infrastructure for delivering health care services must be part of the response to climate change. This premise is outlined in the National Response Plan, under Emergency Support Function No. 8, called Public Health and Medical Services. Although disaster medical planning often focuses on trauma care, disasters may interrupt care for chronic diseases, routine laboratory testing such as newborn screening, access to mental health care, and other services.
8. **Ensure a competent public and personal health care workforce:** Health systems must develop a wider range of expertise at every level to adequately respond to the challenges of climate change. Partnerships could be developed between health science schools and other academic institutions to train health professionals in non-traditional subjects such as economics, health impact assessments, ecology, urban health, and vulnerability modeling.
9. **Evaluate effectiveness, accessibility, and quality of health services:** Evaluation requires robust surveillance capacity, a well-trained public health workforce, and reliable systems for sharing information among different levels of government and parts of the health sector. Evaluation also requires a periodic inventory of available services and assesses the degree to which those services are accessible to the most vulnerable intended populations.
10. **Search for new insights and innovative solutions to health problems:** Several lines of health research will be needed to provide data-based support for public health action on climate change. These include empirical research on the association between climate change and health, scenario development to forecast health impacts and vulnerabilities, and development and testing of strategies to reduce risk. For each intervention and service, cost-benefit research is needed. ■

Authors

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Resources

Public Health Functions Steering Committee. *Public Health in America*. www.health.gov/phfunctions/public.htm

Frumkin H, Hess J, Luber G, Maililay J, McGeehin M. Climate change: The public health response. *American Journal of Public Health.* 2008; 98(3):435–445.

appropriate response actions are identified and planned for.

3. Enhanced Land Use Mitigations

One of the broader, more comprehensive, and unfortunately more difficult issues involves changes in land use policies to mitigate key causes of climate change, while at the same time addressing the key health issues of obesity and physical fitness. By planning our communities to be more conducive to walking, biking, and mass transit, we not only reduce the amount of green house gases and air pollutants we put into the atmosphere, but can enhance exercise and wellness.

As Albert Einstein once said: "We can't solve problems by using the same kind of thinking we used when we created them." Addressing the broad and complex implications of climate change will necessitate enhanced partnerships between health, environmental, and agricultural agencies at the federal, state, and local levels. It will also require building effective new partnerships between the public and private sectors.

Because the science of climate change is neither exact nor certain, it will take courage to step forward with actions now in the light of an uncertain future. However, action is needed now, because effective adaptation to climate change will only come about through a continuous series of discussions and actions undertaken by a broad range of partnerships. How soon we peruse those discussions and actions will have a significant influence in determining how successful we will be in protecting the health and well-being of those living and working in our communities. ■

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Resources

Global perspective: World Health Organization, Climate Change and Human Health
www.who.int/globalchange/climate/en

National perspective: Centers for Disease Control and Prevention, Climate Change and Public Health
www.cdc.gov/ClimateChange

State perspective: Department of Ecology, Climate Change in Washington State
www.ecy.wa.gov/climatechange