

CLIMATE CHANGE HEALTH PREPAREDNESS IN OREGON

**AN ASSESSMENT OF AWARENESS, PREPARATION AND
RESOURCE NEEDS FOR POTENTIAL PUBLIC HEALTH RISKS
ASSOCIATED WITH CLIMATE CHANGE**

April 2009

Prepared by:

**Stacy Vynne, Oregon Preparation Program Coordinator
&
Bob Doppelt, Executive Director**

**Climate Leadership Initiative
Institute for a Sustainable Environment
University of Oregon**

with

The Oregon Coalition of Local Health Officials, Environmental Health Committee



Coalition of Local Health Officials



About the Authors

The Climate Leadership Initiative (CLI) is a global climate change research, educational, and technical assistance program in the Institute for a Sustainable Environment at the University of Oregon. CLI seeks to increase public understanding of the risks and opportunities posed by global warming and to enhance climate protection and preparation policy and program development.

The Oregon Coalition of Local Health Officials (CLHO) represents the interests of local public health authorities and health officers in decision-making, accountability and leadership of Oregon's public health system. They consult with the Oregon Department of Human Services, Public Health Division on annual planning, funding and program decision making, minimum standards for personnel employed in local health departments, development and implementation of public health laws, and encourage accomplishments of public health standards across Oregon counties. CLHO strives to have representation from across the state and public health sector.

Funding Provided by the Northwest Health Foundation

Contact:
svynne@uoregon.edu
5247 University of Oregon
Eugene, OR 97403
541-346-0467

Table of Contents

About the Authors.....	ii
Executive Summary	iv
Introduction.....	1
Consequences of Global Climate Change in Oregon	1
National and State-Wide Public Health Surveys on Climate Change	2
Public Health Risks Associated with Climate Change in Oregon	3
The Public Health Sector in Oregon: Roles and Responsibilities.....	5
Overview of CLI/CLHO Survey.....	6
Findings	8
Respondents	8
Roles and Responsibilities of Public Health Departments in Oregon	9
Climate Change Awareness and Mitigation in Public Health Departments	9
Impacts of Climate Change and Public Health Risks at the Local Level	12
Prioritizing Public Health Risks and Climate Change	13
Preparing for Climate Change Health Risks	14
Lack of Belief or Understanding of Climate Change	20
Conclusions.....	21
Recommendations.....	21
Next Steps.....	23
Resources	25
Appendix A. Potential Public Health Risks	27
Appendix B. Program Development.....	28
Appendix C. Additional Comments from Surveys.....	29
Appendix D. List of Survey Questions	30

Executive Summary

This report describes the findings of a survey of Oregon public health workers with the objective of determining their current knowledge of, level of preparation for, and the resources and training they believe are needed to respond to the health risks associated with climate change. The survey was distributed to public health workers across the state of Oregon in December 2008.

There is unequivocal evidence that the earth's mean surface temperature is rising due to human activities and that the consequences of that warming include increased risks to public health (IPCC, 2007). Even if rapid and drastic cutbacks in greenhouse gas emissions occur, emissions already concentrated in the atmosphere will produce significant changes in the natural environment over the coming years. At the global scale, climate change is already contributing to disease and premature deaths, reducing air quality and increasing respiratory disease, causing malnutrition by depleting crop production, and causing the spread of infectious diseases (WHO, 2008). Many of these impacts are already being felt within the United States and national health care experts expect higher rates of heat-related mortality, exacerbated cardiovascular and pulmonary illness, and food and vector-borne diseases to rise significantly over the next few decades (CCSP, 2008).

Assessments of the consequence of climate change in the Rogue and Upper Willamette river basins of Oregon by the Climate Leadership Initiative at the University of Oregon found that these regions are already experiencing higher temperatures and that climate change is likely to reduce snowpack, lead to earlier spring runoff, increase wildfire, and dramatically alter vegetation patterns (CLI & NCCSP, 2008-2009). In addition to significant consequences for the economy and built environment, these changes will impact Oregon's ecosystems, which in turn will have a significant impact on public health. Based on assessments by public health workers in Oregon and the United States, it is likely that climate change is already causing, and will continue to cause at a greater rate, increased instances of vector-borne disease from insects that have access to more breeding grounds from flooding and warming, higher rates of asthma and other respiratory diseases, higher rates of communicable disease spread, and increased heat stroke and mortality (PSR, 2002; WHO, 2008; CLI, 2008). An economic analysis in 2009 found that climate change will likely result in additional costs for Oregon's public health sector of \$900 million by 2020 and over \$1 billion by 2040 (and those costs are already beginning to accrue) (CLI and EcoNorthwest, 2009). Given this information, it is prudent for public health workers to prepare for the coming impacts on public health that result from a changing climate.

In December of 2008, the Oregon Coalition of Local Health Officials (CLHO) and the University of Oregon's Climate Leadership Initiative (CLI) distributed a survey to public health workers across the 35 county health departments in Oregon (84 individuals received the survey through a CLHO listserv). The main objectives of the survey were to: 1) assess current knowledge of respondents and their supervisors on the health risks associated with climate change; 2) assess the current level of preparation among county health departments to manage climate change associated health risks; and 3) to identify resource and training needed to assist county health departments prepare for climate change associated health risks.

Responses were received from 25 out of 35 counties¹ with public health departments.

The survey found that:

- 89% of respondents view global climate change as a serious or very serious problem, but only 38% of health departments have made efforts to reduce their greenhouse gas emissions;
- 80% of respondents are knowledgeable about climate change impacts on public health at the global and local level;
- 60% of counties with respondents believe they are already feeling the impacts of climate change;
- 88% of respondents expect climate change to cause greater impacts on public health in the next 20 years;
- 97% of respondents do not consider climate change preparation as one of their top five priorities, mainly due to other health threats seen as more urgent, lack of financial and staffing resources, and lack of support from policy and decision makers;
- 86% of respondents agree that if provided dedicated additional resources, such as funding, staff, technical resources for assessments, training, and platforms for community collaboration, county health departments across the state of Oregon would be able to adequately prepare and adapt to climate change related health risks.

Based on the survey findings and discussions with employees from public health departments, the following recommendations are offered to improve the understanding and preparedness of public health workers for climate change in Oregon:

1. Educate local decision and policy makers.
2. Scale down climate change models to the local level to provide information on public health risks for specific communities.
3. Further assess existing emergency management and health response programs that can be built upon for managing climate change health risks.
4. Provide training for public health employees on how to communicate the need for climate change health preparation to local policy and decision makers as well as to the public.
5. Provide training for public health employees on how to develop a climate change preparation plan.
6. Work with local, state and federal policy makers to secure funding for research, preparation and response mechanisms.
7. Existing networks of public health workers, administrators, departments and stakeholder groups, should adopt climate change preparedness as a strategic goal and communicate strategies with other like-minded networks.
8. Expand collaboration across the county, region, state and beyond.

It is important to note that climate preparation programs will need to be tailored to the need and conditions within specific community (e.g. rural or urban) due to variations in resources, vulnerabilities and threats and differences in readiness to move forward with climate change preparation.

¹ There are 36 counties in Oregon, but Wasco and Sherman counties share a public health department

While responding to immediate public health risks, such as obesity, are absolutely essential, health departments in Oregon face an opportunity to begin to prepare for future health risks posed by climate change that are already occurring and likely to get worse in the near future. Preparing for climate change will not require a complete revamping of the public health sector, as health departments across the state of Oregon are already working to prevent the spread of disease as well as prepare for, and respond to, disasters. By building awareness, participating in trainings, and securing the needed resources, Oregon's public health workers will be well equipped to manage the public health impacts of climate change.

The past success of public health efforts to work on multi-decade timescales (e.g. polio, tobacco, etc.) provides a framework for tackling climate change threats. However, climate change health threats must be prioritized to ensure they are addressed given the over-burdening of health departments with imminent emergencies and the need to manage substantial budget cuts. A lack of investment in climate change preparation today will likely result in much higher expenses and losses in the future.

Introduction

In 2007, the Intergovernmental Panel on Climate Change (IPCC)² declared that the evidence is now “unequivocal” that the earth’s atmosphere and oceans are warming beyond natural variability (IPCC, 2007). The IPCC concluded that human activities, including emissions of carbon dioxide, methane and other greenhouse gases, along with land clearing and development, are responsible for most of the earth’s warming. Left unchecked, rising global temperatures and the changes in climatic patterns they cause will affect ecological health and thus undermine economic and social prosperity and security locally and abroad.

Consequences of Global Climate Change in Oregon

The University of Washington Climate Impacts Group (CIG) predicts that climate change impacts in the Pacific Northwest will include changes in temperature, more extreme weather events, and variance in precipitation and snowpack (IPCC & CIG, 2006; Mote, 2008). Specific predictions include:

- Warming of between 0.2 to 1.0° F per decade through 2050 with the best estimate of 0.5° F per decade. These trends already stand out above natural variability.
- Summer temperatures are expected to rise more than winter temperatures. The Rogue Basin, for example, may see up to a 15° F temperature increase in summer months by mid-century (CLI & NCCSP, 2008).
- Contraction of snow cover (low elevation snow will turn to rain), with reductions up to 90% by 2080 in some areas (CLI & NCCSP, 2008), and earlier snow melt leading to higher spring flows and lower summer flows.
- Increase in extreme weather such as heat waves, wind and rain storms.
- More heavy precipitation in winter followed by increased flooding, and more frequent and longer summer droughts.
- Rising sea level affecting low-lying coastal areas (especially from Florence, OR northward), estuaries and coastal freshwater resources (due to salt water intrusion) and changes in ocean pH leading to possible disruptions in marine food chains.

These changes will significantly impact ecosystems and biodiversity in the Northwest, which in turn will have significant implications for all aspects of society, including human health.

CIG’s prediction of regional trends have been affirmed by assessments of the consequence of climate change in the Rogue and upper Willamette Basins of Oregon by the Climate Leadership Initiative (CLI) at the University of Oregon. CLI found that these regions are already experiencing higher temperatures and that climate change is likely to reduce snowpack, cause earlier spring runoff, increase wildfire, and dramatically alter vegetation patterns. Based on predictions by experts, these changes are likely to produce increased instances of vector-borne disease from insects that have access to more breeding grounds from flooding and warming);

² The IPCC is a scientific intergovernmental body set up by the World Meteorological Organization (WMO) and the United Nations Environment Programme (UNEP), consisting of member governments and hundreds of top scientists from around the world.

higher rates of asthma and other respiratory diseases higher rates of communicable disease spread, and increased pollution and increased heat stroke and mortality (PSR, 2002; WHO, 2008; CLI & NCCSP, 2008). This information suggests that it is prudent for public health departments to prepare for the coming changes.

Climate Change and Public Health

Globally, many communities are already beginning to experience the public health impacts of climate change (WHO, 2005) and these impacts are likely to increase into the foreseeable future. St. Louis and Hess (2008) reported that:

[Changes in climate] contribute to a wide array of health effects, including the direct effects of temperature and climatologic instability, such as heat waves, drought, and increased frequency and severity of extreme precipitation events. Secondary or “systems effects” are also included, such as those from positive or negative impacts on agriculture, clean water access, shifting geographic distributions of infectious diseases, migration, increased competition for scarce resources, and the potential for armed conflict. . .the health effects of climate change are increasingly manifest and may have a devastating effect on global health in the next several decades (527).

In the United States, climate change is already having an adverse effect on public health and these affects are expected to grow over the next decades unless explicit efforts are made to prepare for and reduce the risks. In the future, extreme temperatures, droughts, floods, wildfire and severe weather events coupled with an aging population, changes in migration, and other socioeconomic factors will cause direct and indirect threats to health across the country (CCSP, 2008).

In Oregon, these impacts will be expensive. An economic analysis in 2009 found that climate change will result in additional costs for the public health sector of Oregon of \$900 million by 2020 and over \$1billion by 2040 (and those costs are already beginning to accrue) (CLI & EcoNorthwest, 2009).

National and State-Wide Public Health Surveys on Climate Change

Prior to the survey produced discussed in this report, no Oregon-specific surveys on public health and climate change had been completed. However, surveys have recently been conducted with public health workers in other parts of the nation to assess knowledge of climate change health implications and state of preparation at the national level and in other states.

In 2005, the National Association of County and City Health Officials (NACCHO) conducted a survey of 2,300 local public health departments on their preparedness for the impacts of climate change (Balbus et al., 2008). They found some level of preparation for public health emergencies and infectious diseases, but little planning for other climate related health risks. In 2007, a random sample of respondents from the 2005 survey were selected to participate in another

survey, which found strengthened emergency response for extreme weather events, but a decrease in climate training and preparation planning since the 2005 survey.

In 2006, the Association of State and Territorial Health Officials (ASTHO) surveyed 49 state environmental health directors. While climate change was not a major focus of the survey, the survey covered related issues such as program administration, food contamination, emergency preparedness, sanitation and monitoring of disease outbreaks (ASTHO, 2007). While many of these programs are found at the state level, the survey revealed that less than half of county public health departments (in many cases less than 10%) have programs on food protection, risk assessment and management, general sanitation and environmental monitoring, public water supply, and indoor and outdoor air quality.

In 2008, the Environmental Defense Fund, NACCHO, and George Mason University released the findings of a 2007 nation-wide survey of a representative sample of local health departments on their level of awareness and preparation for climate change inflicted health impacts (Balbus et al., 2008). The survey found that while most departments recognize the reality of climate change and many are experiencing changes and expecting more severe impacts in the future, most departments report that preventing or preparing for climate change is not a current priority, nor is there adequate expertise or resources to manage preparation and adaptation.

The Public Policy Institute of California (PPIC) released a report in 2008 on a survey conducted among county health departments in California (Bedsworth, 2008). The survey found that many local public health workers were concerned about the public health implications of climate change and saw it as a significant threat. However, they indicated that although they had knowledge and some programs in place that could be expanded, they did not have funding or resources to adequately prepare for the health risks associated with climate change. Most respondents felt they needed more education on risks specific to the areas that they work, as well as a variety of resources to help them prepare and adapt.

While, as mentioned above, prior to the CLI/CLHO survey no assessments had been conducted in Oregon, there are a number of groups working on climate change education of public health workers and “greening” the health care industry. Oregon-based groups include Physicians for Social Responsibility (PSR), the State’s Public Health Division (under the Department of Human Services), the CLHO Environmental Health Committee, and the Oregon Public Health Association (OPHA) are all moving forward on climate change mitigation and adaptation. At the national and international level, the Center for Disease Control, National Institute for Health, World Health Organization, American Public Health Association, ASTHO, and NACCHO are all involved in research and prevention of climate change health risks as well as climate change education and mitigation.

Public Health Risks Associated with Climate Change in Oregon

Researchers have predicted the potential health risks that result from climate change and those most likely to impact the western part of the United States. Given the predicted climatic changes based on downscaling global models, the following is a list of health risks expected to occur in Oregon:

- Increase of heat stroke, heat exhaustion and heat cramps from warming (PSR, 2002);

- Higher rates of skin cancer (already documented in a report from Kaiser Permanente [Glass & Hoover, 1989]), eye damage and disease from UV and radiation exposure (Longstreth, 1991);
- Rising outbreaks of diseases from flooding due to the combination of storm water and sewage in Oregon (McGeehin, 2008);
- Impacts on mental health and increased stress from displacement due to extreme weather events and general dealings with climate change (Longstreth, 1991);
- Reduced ability to transport medical supplies from damage to roads from flooding (Longstreth, 1991);
- Increase in vector-borne disease such as Lyme disease and West Nile Virus, from insects that have access to more breeding grounds from flooding and warming (WHO, 2005; PSR, 2002);
- Higher rates of asthma and other respiratory diseases from ground level ozone, increased allergens, degraded air quality, and increased wildfires (WHO, 2005; PSR, 2002);
- Increased rates of allergies from changes in production, distribution, dispersion and allergen content of aeroallergens and the growth and distribution of organisms that produce them (EPA, 2008);
- Disease outbreak from contamination of water by bacteria (e.g. *Salmonella*, *Shigella*), viruses (e.g. rotavirus), and protozoa (e.g. *Giardia lamblia*, amoebas, *Cryptosporidium*, and *Cyclospora*) (PSR, 2002);
- Poisonings from increased exposure to mercury in fish and water, red tides and seafood toxicity as well as higher exposure to pesticides (high use of pesticides on crops are expected to combat greater insect numbers) (PSR, 2002);
- Reduced agricultural output from droughts or contamination from flooding, leading to an increase in imported food, which could bring additional diseases and reduce nutritional value of food (CCSP, 2008); and
- Crowding, higher rates of communicable disease spread, and increased pollution in urban areas as a result of climate refugees fleeing areas affected by sea level rising and other displacement events (WHO, 2005).

All Oregonians will be at risk from these climate change related health risks, however the type and degree of risk will be dependent on individual and community demographics. Populations that are particularly vulnerable to climate change related health risks include:

- Individuals with impaired immune systems;
- Lower income individuals and communities;
- Rural communities that may be in areas more prone to temperature change, wildfire or disease outbreak and with less access to health care; and
- Children, pregnant women, and the elderly, predicted to be 20% of Oregon's population by 2020 (Oregon Parks and Recreation, 2008), and who may be more susceptible to health risks.

The Public Health Sector in Oregon: Roles and Responsibilities

Public Health in Oregon is a shared services system between federal, state and county governments who provide resources to meet the needs and expectations of the public. The federal government provides the main source of funding along with the state through the Department of Human Services' Public Health Division. The state is responsible for public health rules and standards. As an advisory body to the state DHS the Conference of Local Health Officials (CLHO) makes recommendations to the Department of Human Services regarding the public health rules and standards established by the State. Local health jurisdictions are mandated by law to provide five public health services:

- Epidemiology and control of communicable diseases and disorders;
- Parent and child health services, including family planning clinics;
- Collection and reporting of health statistics;
- Health information and referral services; and
- Environmental health services.

Public health departments also depend on their local Board of Commissioners and Budget Committee, as well as funding from outside state and federal allocations as well as government and private foundation grants, to support their staff and programs. They also receive some financing from patient fees, insurance, Medicare and Medicaid.

Overview of CLI/CLHO Survey

Public health workers and organizations in Oregon must be equipped with sufficient understanding, resources and capacity to respond effectively to the potential health risks associated with climate change. In response to Governor Kulongoski's climate change integration group proposal to “act now, both to reduce the cause of this earth-transforming crisis ... and to begin to prepare for and adapt to the changes that mitigation cannot prevent,” (CCIG, 2008) the Oregon Coalition of Local Health Officials and the Climate Leadership Initiative at the University of Oregon conducted a survey of public health workers to understand their current state of climate change knowledge, level of preparation, and to obtain their views about the resources needed to prepare effectively for climate change.

The design of the survey was based on review of surveys discussed above, review of climate change and public health articles, and on feedback from public health administrators, researchers, and instructors across Oregon.

Draft survey questions were tested with CLHO members through online surveying, phone and in-person interviews. Individuals invited to participate in the online survey received an email alerting them of its arrival three weeks prior to its distribution. The survey was posted on SurveyMonkey (www.surveymonkey.com) and made available to respondents for two weeks, with periodic reminders sent to those that had not yet taken the survey. The survey was distributed via email by the CLHO administrator to potential participants because of their existing relationship with respondents. Eighty-four individuals received the survey through the CLHO listserv. The following is a breakdown of the number of individuals per county that received the survey in parentheses:

Baker (1)	Harney (1)	Morrow (1)
Benton (2)	Hood River (3)	Multnomah (10)
Clackamas (2)	Jackson (3)	Polk (2)
Clatsop (2)	Jefferson (1)	Tillamook (2)
Columbia (1)	Josephine (2)	Umatilla (2)
Coos (2)	Klamath (3)	Union (3)
Crook (2)	Lake (1)	Wallowa (1)
Curry (2)	Lane (4)	Wasco/Sherman (2)
Deschutes (5)	Lincoln (4)	Washington (4)
Douglas (3)	Linn (2)	Wheeler (1)
Gilliam (1)	Malheur (1)	Yamhill (2)
Grant (1)	Marion (5)	

Findings

Respondents

Which county/counties do you work in?

Responses were received from 35³ individuals (a 42% response rate), representing 25 (71%) of the 35 county public health departments (there are 36 counties in Oregon, but Wasco and Sherman counties share a health department). There was a 90% response rate from the 11 urban communities, and a 58% response rate among the rural communities. Figure One shows the counties that responded: counties in blue are “urban” counties, while those in green are considered “rural” counties.⁴

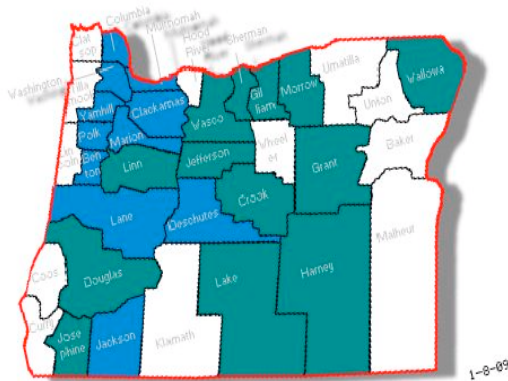


Figure 1. Map of Oregon counties with individuals that responded to the survey are highlighted. Counties in blue are urban counties and counties in green are rural counties.

The counties that responded and the number of responses per county (in parentheses) are provided below:

³ Only 34 completed the entire survey. N=34 unless otherwise indicated.

⁴ Rural and urban counties are defined by US Census Bureau by population levels. Definitions of urban and rural counties can change over time depending on migration patterns. http://www.census.gov/geo/www/ua/ua_2k.html. Identification of Oregon counties also available from the Oregon Employment Department.

Baker (0)	Harney (1)	Morrow (1)
Benton (1)	Hood River (0)	Multnomah (4)
Clackamas (2)	Jackson (2)	Polk (1)
Clatsop (1)	Jefferson (1)	Tillamook (0)
Columbia (1)	Josephine (1)	Umatilla (1)
Coos (0)	Klamath (0)	Union (1)
Crook (1)	Lake (1)	Wallowa (1)
Curry (0)	Lane (2)	Wasco/Sherman (1)
Deschutes (1)	Lincoln (0)	Washington (3)
Douglas (1)	Linn (1)	Wheeler (0)
Gilliam (1)	Malheur (0)	Yamhill (0)
Grant (1)	Marion (3)	

What is your role in public health?

Survey respondents included public health administrators/directors (38%), public health managers/supervisors (24%) or environmental health administrators/directors (18%). Also represented in the survey were two nurses, two environmental health educators, two public health coordinators or staff, one department medical officer, and one epidemiologist. Respondents said they also consulted with public health nurses, educators and environmental health specialists to complete the survey suggesting that in many cases the information provided was the results of group response, not just that of the individual.

Roles and Responsibilities of Public Health Departments in Oregon

To the best of your knowledge, please indicate the following functions for which your health department has regulatory responsibility over.

Health departments in Oregon have a variety of regulatory responsibilities.

- Water supply quality (65%)
- Indoor air quality (35%)
- Food safety and security (82%)
- Sewage and septic (29%)
- Health care (35%)
- Mental health services (41%)
- Vector-borne disease control (56%)

Health departments in Oregon also consult with, or are included in decision-making for, outdoor air quality regulation, housing codes, and county planning.

Climate Change Awareness and Mitigation in Public Health Departments

Generally speaking, and in your own view, is global climate change a very serious problem, a somewhat serious problem, a not too serious problem, or not a problem?

- 88% (n=30) of public health workers indicated that global climate change is a very serious or somewhat serious problem.
- Among urban counties, 73% believed that climate change is a “serious” problem.
- 40% of respondents from rural counties believed that climate change is a serious problem.

Has your county or local health department changed any of its procedures or policies to reduce its contribution to climate change (such as reducing greenhouse gas emissions by implementing a travel reduction policy or requiring the use of public transportation, or instituting an energy conservation or waste reduction policy)?

- 53% (n=18) indicated that their health department has not done anything to change procedures or policies to reduce their contribution to climate change.
- Among rural counties, 70% reported no changes being made.
- However, 38% (n=13) of health departments were beginning to make some changes in their operations.

Did your county make those changes more than 12 months ago or within the last 30 days?

For the health departments that have made changes in their operations, these changes took place over a year ago (100%) potentially demonstrating a long-term commitment by health departments to change their operations to become more sustainable.

What specific steps to reduce greenhouse gas emissions did your county make?

The types of changes that health departments were making to reduce their greenhouse emissions most commonly included:

- Implementing recycling programs (100% or n=13);
- Energy conservation (46% n=6); and
- Product purchasing policies (e.g. reduced toxic materials, less packaging) (46% n=6)

Some health departments had also developed policies for:

- Reducing work and commute travel (purchasing hybrid fleets, reducing diesel consumption) (39% n=5);
- Greening facilities (31% n=4);
- Reducing waste generation (31% n=4); and
- Using more organic and local foods in the cafeteria (n =1)

There are a number of actions that public health departments might take that can reduce the impacts of climate change, both to reduce emissions that cause climate change and to protect public health in the event of climatic changes. We would like to learn more about programs that your department has in place.

Other programs that health departments reported having in place or that are in the planning stage (whether or not developed with climate change in mind) included (N=33):

	In Place	Planned	Not Pursuing	Don't Know/ Other
A program to reduce fossil fuel use or conserve energy in the operation of the health department such as using hybrid fleet vehicles, implementing energy efficiency programs, or following green building practices.	20%	9%	59%	12%
A program to help residents of the county reduce their fossil fuel use or conserve energy	0	0	70%	30%
A program to encourage or help people to use active transportation such as walking, cycling	21%	24%	36%	18%
A program to encourage or help people to use public transportation such as bus and rail	30%	9%	49%	12%
Table 1. Programs planned or in place for mitigation and preparation for climate change.				

What specific changes to reduce greenhouse gas emissions does your county plan to make?

While over half of the respondents indicated that the county they work in had not yet made changes to reduce greenhouse gas emissions, some of these departments (20% n=7) reported that they had plans to make changes in the coming year. Policies to be implemented included:

- Travel related (reducing emissions from work related travel and/or commutes) (n=2)
- Purchasing (n=3)
- Waste reduction (n=2)
- Energy conservation (n=2)
- Green building (n=2)
- Use of organic or local foods (1)
- Refine existing policies (n=2)

Recycling was the most common policy that health departments have implemented (100% or n=13) among departments that had already taken steps to make changes.

Which of the following statements best describes the level at which preparation for climate change and associated health risks are being considered by your department?

Sixteen percent (n=5) of respondents indicated that plans are being made to prepare for future health risks associated with climate change:

- 6% (n=2) said that there is discussion and concern for climate change and health risks and preparation or response plans are in development.
- 9.5% (n=3) said there is considerable discussion and concern for climate change and health risks and preparation or response plans are being implemented.
- No respondents said that consideration for climate change and health risks are a part of everyday operations, nor are they educating clients and colleagues on mitigation, preparation, and response.
- Almost 1/3 of respondents (31% n= 10) indicated that there is no discussion on the issue, as climate change is not considered a threat.
- Over half of respondents (53% n=17) indicated that there is discussion on health risks associated with climate change, but no action is being taken to prepare for these risks.

There was more discussion about climate change risks and action in urban counties than rural counties:

- 60% rural counties indicated no/minimal discussion taking place compared to 16% of urban counties.
- None of the rural county representatives indicated that climate change and associated health risks were part of everyday operations.

*Please indicate if you strongly disagree, disagree, agree, or strongly agree with each of the following statements, to the best of your knowledge: a) I am knowledgeable about the potential **global** public health impacts of climate change; b) I am knowledgeable about the potential **local** public health impacts of climate change in my county; c) The other **relevant senior managers** in my department are knowledgeable about the potential local public health impacts of climate change in our county; d) At least one of my **County Commissioners** is knowledgeable about the potential local public health impacts of climate change in our county; e) **Appointed county officials** outside of the public health system are knowledgeable about the potential local public health impacts of climate change in our county; f) **Elected county officials** (other than Commissioners) are knowledgeable about the potential local public health impacts of climate change in our county; g) Leaders of the **health care delivery system** in my county are knowledgeable about the potential local public health impacts of climate change in our county*

- The majority of respondents 'agreed' or 'strongly agreed' that they were knowledgeable about the global (80% n=28) and local (75% n=25) public health impacts of climate change.
- However, respondents felt there was less awareness or knowledge regarding climate change and health impacts among senior managers (33% n=12), county commissioners (33% n=12), appointed (20% n=7) or elected (11% n=4) county officials, or the health care delivery system (20% n=7).

Impacts of Climate Change and Public Health Risks at the Local Level

Please indicate if you strongly disagree, disagree, agree, or strongly agree with the following statements: a) My county is already experiencing the effects of climate change; b) My county will experience climate change in the next 20 years; c) In the next 20 years, it is likely that my county will experience one or more serious public health problems as a result of climate change (e.g. extreme heat-related morbidity/mortality, increased frequency and/or severity of asthma or allergies, vector-borne illness.)

- Almost 60% (n=21) of the respondents agreed or strongly agreed that the county they work in was already experiencing the impacts of climate change.
- Agreement increased to 88% (n=31) when asked if their county will experience the impacts of climate change in the next twenty years.
- Half of respondents (n=17) said they expected to experience one or more serious public health problems as a result of climate change.

Based on what you've heard or experienced, how serious of a public health threat do you feel climate change is to the county where you work?

- About 2/3 of respondents (n=21) felt that climate change was a somewhat serious (47% n=16) or very serious (15% n= 5) threat to public health in the county where they work.

- 6% (n=2) felt that climate change was not at all a threat to the county where they work.
- Among rural counties, 50% felt that climate change was not too serious of a public health risk in their county compared to 16% of urban county respondents indicating low risk.

In thinking about the impact on public health in your county, how would you rank the following potential risks of climate change?

Respondents were provided a list of potential public health risks that could threaten their county and asked to indicate whether the threat was not at all serious, not too serious, somewhat serious, or a very serious issue in the county where they work. There was a wide range of responses on the seriousness and type of threats that would be experienced (See Appendix A).

- 47% (n=16) of respondents expected extreme heat mortality and drought to be a major threat, while other counties expected increased frequency and severity of water-borne illness to threaten their county (50% n=17).
- Some counties may have to deal with sea level rise (15% n=5), while others expected they would need to manage overcrowding (38% n=13) and psychological health risks (38% n=13).
- There was some agreement on risks that would impact the majority of counties across Oregon, such as:
 - Increased frequency and/or severity of asthma and other respiratory diseases (71% n=24);
 - Increased frequency and severity of allergies (62% n=21);
 - Increased flooding (59% n=20) and wildfire risks (79% n=29);
 - Increased skin cancer cases (71% n=24);
 - Higher exposure to imported diseases (54% n=18); and
 - Higher rates of injury from extreme weather events (56% n=19).

Prioritizing Public Health Risks and Climate Change

Is preventing or preparing for the public health risks associated with climate change among your department's top 5 current health priorities?

Respondents were asked whether preventing or preparing for the public health risks associated with climate change was among their department's top 5 current health priorities. One individual responded yes.

To the best of your knowledge, why is climate change not a top priority for your department?

In counties where preparing for climate change was not a priority (97%), respondents were asked to identify why climate change health risks were not a priority (n=34):

- Lack of interest by management (30%), staff (23%), clients (37%) or County Commissioners (37%)
- Lack of awareness by staff (37%), management (40%) or County Commissioners (33%)
- Counties have not yet seen the effects of climate change (40%)
- Lack of funding (87% n=26)

- Other (current) concerns are more critical (73%)

Three respondents said they are struggling just to maintain basic and mandated health services and two felt there was not enough scientific proof or support for human-caused global warming to begin preparation for associated health risks.

What are the top health priorities for your department?

When asked to identify the top five priorities for their health department, respondents indicated that the following issues took precedent over climate change (N=30) (percentages indicate the percent of respondents for which the issues is considered a top five priority in their health department):

- (1) Communicable disease/immunizations (80%)
- (2) Maternal/child/family planning health (67%) / Sexually transmitted diseases/HIV/AIDS (67%)
- (3) Environmental health (50%)
- (4) Obesity (43%) / Mental health (43%)
- (5) Diet and nutrition (37%)

Other priorities include:

- Treatment for chronic illness (30%)
- Poverty (17%)
- Food security (17%)
- Dental health (7%)
- Suicide prevention (3%)
- Asthma (3%)
- Respiratory disease (3%)

Public health priorities for rural and urban counties were fairly similar; however there was more emphasis on diabetes, diet and nutrition as current priorities in rural counties.

Preparing for Climate Change Health Risks

Has your department undertaken programs that were specifically designed to respond to the effects of climate change or help mitigate the impacts of climate change?

When asked if their department had undertaken programs specifically designed to respond to the effects of climate change or help mitigate the impacts of climate change, only one department answered in the affirmative.

Why has your department not undertaken programs that were specifically developed with climate change in mind?

The 85% of respondents that indicated their departments were not developing such programs (12% were unsure) stated that this was due to (N=28):

- Other programs taking priority (77%)
- Lack of funding (75%)

- Lack of awareness (32%)
- Lack of management support (29%)
- Lack of staff support (16%)

Does your health department use information on changes in climatic patterns in planning or implementing programmatic activities to address any of the following...?

Whether or not information on changes in climatic patterns was developed with climate change in mind, some health departments were already using this information for planning or activities related to the following:

- Heat waves and heat-related illnesses (15%)
- Storms and floods (21%)
- Droughts (24%)
- Forest fires (24%)
- Vector-borne infectious diseases (30%)
- Water- and food-borne diseases (12%)
- Anxiety/depression or other mental health conditions (6%)
- Quality or quantity of fresh water (21%)
- Quality of the air (9%)
- Health care services for people with chronic conditions during service disruptions (21%)
- Unsafe or ineffective sewage and septic system operation (3%)
- Food safety and security (12%)
- Housing for residents displaced by extreme weather events (12%)

Over the next 20 years, do you think that climate change will make the following issues more common or severe, less common or severe, or will the issues remain the same in your county?

Respondents were asked that if over the next 20 years, they think climate change will make certain issues more common or severe, less common or severe, or that the issues will remain the same in their county (N=31). Responses are provided in Figure 2.

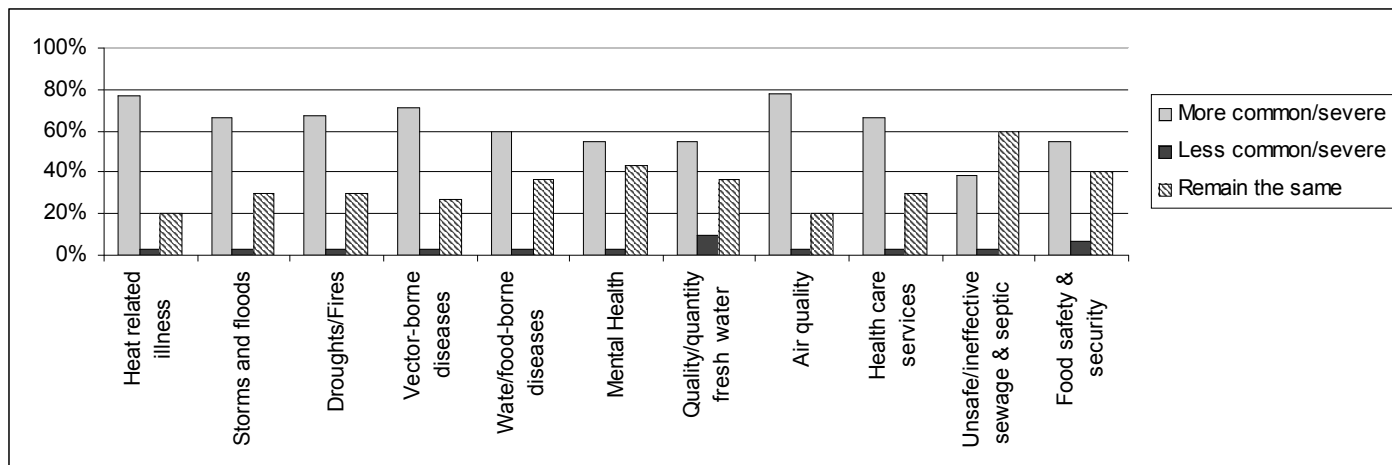


Figure 2. Expectations for health risks that will become more severe, less severe, or remain the same in Oregon counties over the next twenty years.

We would like to learn more about programs that your department has in place. Please indicate which of the following programs your department currently has in place, is planning to develop, or has no current plans to pursue.

Respondents were asked to indicate which programs their department currently had in place, is planning to develop, or had no current plans to pursue, regardless of whether the program was developed with climate change in mind (N=33). See Appendix B.

Please indicate if you strongly disagree, disagree, agree or strongly agree with the following statements based on your current knowledge.

The table below provides a breakdown of respondent level of agreement or disagreement with a number of questions asking about knowledge, expertise and capacity (N=32).

	Strongly disagree	Disagree	Agree	Strongly agree	Don't know
My health department has the knowledge and expertise needed to develop strategies for dealing with potential public health impacts of climate change in my region	13%	47%	41%	0%	0%
My health department has the capacity needed to develop strategies for dealing with potential public health impacts of climate change in my region	50%	38%	13%	0%	0%
The health care <i>delivery system</i> in my county has the knowledge and expertise ...	22%	34%	25%	0%	19%
The health care <i>delivery system</i> in my county has the capacity ...	34%	44%	6%	0%	16%
Many of the <i>leaders of environmental health</i> in my county have the knowledge and expertise ...	6%	25%	41%	6%	22%
Many of the <i>leaders of environmental health</i> in my county have the capacity ...	26%	39%	19%	0%	16%
Many of the <i>leaders in the community</i> that partner with public health in my county have the knowledge and expertise ...	9%	31%	28%	6%	25%

	Strongly disagree	Disagree	Agree	Strongly agree	Don't know
Many of the <i>leaders in the community</i> that partner with public health in my county have the capacity ...	26%	42%	10%	0%	23%
The <i>Oregon Health Department</i> has the knowledge and expertise ...	3%	9%	41%	3%	44%
The <i>Oregon Health Department</i> has the capacity ...	3%	32%	16%	3%	45%
The <i>federal government</i> has the knowledge and expertise ...	3%	13%	41%	13%	31%
The <i>federal government</i> has the capacity ...	6%	19%	22%	9%	44%

Table 2. Respondent level of agreement or disagreement regarding the knowledge, expertise and capacity of various stakeholders in terms of developing strategies for dealing with the potential public health impacts of climate change in their county.

Do you feel that your department has adequate resources to respond to the potential public health risks associated with climate change?

- Over 90% (n=28) of respondents believed their department did not have adequate resources to respond to climate change.

If your department was provided additional resources to respond to the potential public health risks associated with climate change, such as funding or hands-on training, do you think it would become a higher priority?

- Over 86% (n=25) feel that additional resources and training would make climate change health risks a higher priority in their department.

Why do you think that access to additional resources would NOT make climate change related health risks a higher priority?

- The 14% (n=4) that do not believe resources would help prioritize preparation felt that even additional resources would not prioritize climate change health risks because of other more urgent issues (n=4), lack of interest in climate change (n=2), lack of belief in climate change (n=1), and lack of financial support for climate change work (n=1).

Please identify which of the following resources: a) you think would be most effective in supporting your department in adapting to and mitigating climate change health risks; and b) that you would want from the state to respond to the potential public health risks associated with climate change.

The Table 3 provides a breakdown of respondent interest in additional resources that would be useful for their department, and resources they would want to seek from the state. (N=35).

	Would support department	Want from state
Dedicated funding for climate change activities	71%	49%
Additional general staff	66%	17%
Additional staff with expertise in climate science	46%	54%
Additional staff with expertise in health risks associated with climate change (heat exhaustion, vector-borne diseases, etc)	49%	49%
Technical/analytical resources for health impact assessments	51%	54%
Technical/analytical resources to conduct vulnerability assessments	49%	51%
Online training for mitigation/preparation for health risks associated with climate change	54%	49%
Hands-on training for mitigation/preparation for health risks associated with climate change	60%	51%
Conferences/workshops for mitigation/preparation for health risks associated with climate change	49%	57%
An online reference site or "information clearinghouse" for mitigation/preparation for health risks associated with climate change	54%	57%
Contacts with regional climate experts	46%	54%
Equipment, such as cooling fans	40%	26%
Better coordination with other state departments, such as Emergency Preparedness	31%	51%
Better coordination with local departments	34%	23%
Table 3. Resources that would support climate change preparation in public health departments.		

Please identify any resources that you would want the state of Oregon to request from the federal government or the Center for Disease Control to assist your department in preparing for the health risks associated with climate change.

Six individuals (18%) responded with suggestions for the following resources: staff to focus on climate change preparation, educational resources, financing for publicity, green vehicles, cooling fans, materials and training.

Are there existing or planned projects in your community that might be willing to collaborate with or support your program? For example sustainability initiatives, airshed or watershed groups, etc.

In addition to the support from staff and additional resources, respondents identified other groups in their community with which they could collaborate on climate change issues including watershed groups (n = 4), universities (n = 2), county Offices of Sustainability or sustainability coordinators (n = 3), Clean Air Coalitions (n = 1), Healthy Homes Coalitions (n = 1), Department of Environmental Quality (n = 1), and Housing Departments (n = 1). Respondents indicated that other groups (such as Environmental Health Service Departments and other community experts) could potentially become involved if there was financing or staff to support collaboration.

Please list county or state departments (e.g. Economic & Community Development Department, Emergency Management, Department of Energy) with which a) you currently work with; b) you have plans to work with; or c) you believe you should work with on the issue of health risks associated with climate change.

Collaboration between some of these groups is already occurring, specifically with Emergency Management (common = 6), Community Development Departments (n = 1), Environment Health Departments (n = 2), Hospital Preparedness Programs (n = 1), Department of Environmental Quality (DEQ) (n = 2), Public Health Preparedness (n = 1), the Governor's task force (n = 1), State Department Epidemiologist (n = 1), and the Rural Oregon Collaborative Consortium (n = 1).

Other organizations or departments that respondents feel it would be valuable to work with include: Department of Quality (n = 5), Economic and Community Development (n = 2), Watershed Council (n = 1), Emergency Management (n = 7), Seniors and Persons with Disabilities (n = 1), Mental Health (n = 1), Forest Service (n = 1), Extension Office (n = 1), Department of Energy (n = 4), Health Care Systems (n = 1), EPA (n = 1), vulnerable populations (n = 1), groups with mental disabilities (n = 1), Department of Agriculture (n = 1), Public Works (n = 1), State Drinking Water (n = 1), State Vector Control (n = 1), Hospital Association (n = 1), Sheriff's Office (n = 1), Oregon Public Health Division (n = 1), Red Flag Task Force (n = 1), and Water Resources (n = 1).

Do you see your department as having a role as a convener, bringing together different groups working on climate change and gathering the tools needed to prepare for the health risks of climate change?

Respondents were asked in an open ended question if they could see their department as having a role as a convener, bringing together different groups working on climate change and gathering the tools needed to prepare for the health risks of climate change. Over 63% (n=18) of respondents think their public health department could take on the role of convener, and support further collaboration between different groups in their community work to prepare for the health risks of climate change. Recommendations on mechanisms for collaboration from the respondents included:

- Convening a knowledgeable, politically neutral, group;
- Securing resources and technical expertise for collaboration to commit staff and ensure sustainability of the group;
- Using a collaborative approach to heighten awareness; and
- Providing training to the conveners so they can act as a resource for other departments in the community.

What prevents your department from being a collaborator?

For health departments that did not believe they were equipped to take on the role of convener to encourage collaboration (n=13), they were asked what prevented their department from doing so. Responses included that there was a lack of:

- Belief among management that climate change is occurring (31% n=4),
- Interest in climate change associated health risks (31% n=4),

- Knowledge about public health risks related to climate change (38.5% n=5),
- Resources for collaboration (61.5% n=8), and

In addition, many respondents also felt that there are more urgent health risks to manage (85% n=11).

Lack of Belief or Understanding of Climate Change

In the final section of the survey, respondents were offered an opportunity to comment on the survey or survey topic. Five individuals provided comments questioning whether climate change was human-caused or natural and indicated that the changes we are experiencing may be short-term weather patterns and not long-term warming trends. One individual commented that they had tried to work within their department to discuss the issues of climate change, but faced an uphill battle of getting people on board. Select comments are provided in Appendix C.

Conclusions

The findings lead to a number of conclusions:

- Climate change will impact the public's health across Oregon; however, counties will experience different health threats.
- Climate change associated health risks will likely only get worse in the coming decades if planning and preparation for these threats does not occur immediately, and survey respondents recognize this urgency.
- The majority of respondents do not feel their counties and departments have the knowledge or capacity to manage health impacts of climate change, yet they believe there is some expertise within the environmental health field to do so.
- There is slightly more faith in the knowledge and expertise at the state and federal level; however, respondents do not feel that any of those entities have the capacity to develop strategies for managing or mitigating the health risks.
- Due to budgetary and staffing constraints, most county public health departments are forced to focus on short term planning using the resources that are currently available.
- While there is interest in all of the resources proposed for assisting in climate change health preparation, respondents are most interested in receiving funding and staff for their departments, while technical expertise, resources, and tools or trainings are most sought from the state.
- Without support for local policy and decision makers, climate preparation will struggle to move forward in the public health sector.
- Without a financial commitment from management, the state or county, consideration for climate change health risks will continue to fall on the wayside.
- Respondents recognize that commitment at a variety of levels (local, state, regional, federal) to support preparation efforts will help move preparation efforts forward, and many are willing to take on the role of collaborator and work to bring different stakeholders together.
- Climate change preparation planning for public health departments should not be a major endeavor, as most departments indicated that they already have expertise and experiences they can draw upon, and existing or potential partnerships can be strengthened for collaboration.
- In addition, many current and planned programs (such as emergency warning systems) can be expanded to support climate change preparation.
- A significant amount of education will be needed to help certain members of the health care community understand the science of climate change.

Recommendations

Based on these conclusions and on other research on health preparedness for climate change, we recommend that the Oregon public health community take the following actions:

1. **Educate local decision and policy makers.** For climate change preparation to move forward in Oregon's public health departments, it is absolutely essential that there is buy-in from local decision and policy makers, including County Commissioners, Boards of Health and public health advisory committees. With the State of Oregon working to

secure federal funding for climate change and public health, county decision makers across Oregon should become more open to including this topic on their board agenda. Informational and educational sessions for these community leaders may need to take place across the state to guarantee that the necessary support is secured, and eventually funds can be allocated, to allow for preparation planning to move forward.

2. **Scale down the climate change models to the local level to provide information on public health risks for specific communities.** In order to understand the specific risks that communities will face with a changing climate (e.g. changes in temperature, snowpack and extreme weather events), global climate change models should be downscaled to the local level. This will enable public health workers to better predict the potential health risks that will impact the communities where they work as well as allow for identification of the most vulnerable regions and populations.
3. **Further assess existing emergency management and health response programs that can be built upon for managing climate change health risks.** Preparation planning should begin by understanding what emergency management programs already exist and those which can be expanded on or adapted for climate change preparation. While this survey was a starting point for understanding which counties have vector-control systems, cooling centers, or emergency response for flooding or wildfire, a more detailed statewide assessment (in conjunction with data gathered on the vulnerability assessments) would enable better resource allocation and identify areas where additional human and financial resources are needed.
4. **Provide training for public health employees on how to communicate the need for climate change health preparation to local policy and decision makers as well as to the public.** Framing and delivering communication in a manner to motivate local leaders and community members to take action requires an understanding and skills in communications and behavioral change. Training for public health employees can assist in assessing the values and “stage of change” of the people or groups they want to motivate as well as support awareness building within these individuals for the benefits of change and action.
5. **Provide training for public health employees on how to develop a climate change health preparation plan.** After public health departments have the support of local policy and decision makers, they will be ready to take action and move forward in developing a strategy for climate change preparation. Trainings will support departments in how to develop their plan, for instance on conducting assessments of existing programs and resources, identifying staffing and tool needs, classifying vulnerable populations, developing programs to fulfill gaps, fundraising for preparation, and establishing and/or expanding emergency response mechanisms (e.g. during heat waves, floods, etc).
6. **Work with local, state and federal policy makers to secure funding for research, preparation and response mechanisms.** Public health departments in Oregon should work with local, state and federal policy makers to secure funding for climate change related health care research, preparation and response mechanisms. Working with policy-

makers and public health administrators, the need for climate change health preparation should be acknowledged and efforts to develop programs financially supported.

7. **Existing networks of public health workers, administrators, departments and stakeholders should adopt climate change health preparedness as a strategic goal.** Oregon has a number of state-wide public health coalitions, conferences, caucuses, partnerships, organizations, councils, leadership groups, foundations, clubs, etc. If these existing and influential public health networks were to adopt climate change preparation goals, this would demonstrate the realness of these threats to the public as well as to leadership. Oregon public health networks could set an example for similar networks across the Northwest and nation, as well as for non-health networks in the state to begin climate change preparation planning.
8. **Expand collaboration across the county, region, state and beyond.** Public health departments should collaborate not only with a variety of departments in their own communities, but across counties in Oregon, as well as with other states and at the national level. In particular, a partnership should be developed between public health departments and the Oregon University System's Climate Change Research Institute (OCCRI) to advance health related climate change research. Lessons-learned can be shared on education and training programs, emergency response techniques, and detection and surveillance systems for disease outbreaks. Working across multiple departments not only reduces the strain on any one department, but also will provide a stronger foundation for reducing health risks that result from climate change.

It is important to note that climate health preparation programs will need to be tailored to the need and conditions within specific community (e.g. rural or urban) due to variations in resources, vulnerabilities and threats and differences in readiness to move forward with climate change preparation.

Next Steps

While many efforts are appropriately focused on reducing greenhouse gas emissions, due to the time it takes for greenhouse gases to dissipate in the atmosphere, no matter how fast society reduces emissions over the coming decades global climate change will produce significant stresses on the public health sector. Given that many of the likely climate change impacts for Oregon are known, there is an opportunity to move forward and prepare for impacts already being felt and that are likely to worsen. We currently face an option of either waiting for impacts to worsen and then taking a reactive approach, or taking proactive measures to prepare for the public health risks associated with climate change.

In many ways, the public health sector is well prepared to manage the existing and predicted health risks associated with Oregon's changing climate: expertise already exists in some counties on climate change preparation; emergency management and early warning systems are in existence or planned in some areas; and the public health sector networks or collaborates with various departments and community groups within their county and across the state. However, many counties feel that awareness and capacity for managing climate change health risks needs

to be expanded across their department and programs needs to be ramped up to handle an increase in existing public health threats as well as deal with new threats that emerge with climate change. In addition, while also managing existing threats, the public health sector will also need to shift to long-term planning and anticipate and prepare for the threats that will emerge in their county and region.

State and local public health departments have a history of combating long-term risks to public health as well as planning and implementing activities to reach future goals: for example, the forty year “tobacco wars”, the fight to eliminate small pox and polio, preparations for the aging of the baby boomers, and the establishment of activities to reach the goals of the Healthy People 2020 initiative. The past success of public health efforts to work on multi-decade timescales provides a framework for tackling climate change threats. However, climate change health threats must be prioritized to ensure that they are addressed even while health departments are over-burdened with imminent emergencies and having to manage substantial budget cuts.

Prior to any health preparation planning moving forward, respondents clearly indicated that policy and decision makers such as the Board of Commissioners, Board of Health and public health advisory committees must have buy-in and provide support for preparation programs to move forward.

Preparing for climate change health risks will provide additional benefits to the public health sector. Preparation provides the opportunity for the public health sector to address multiple issues and helps to achieve multiple benefits such as long term strategic planning for the department and county, expanded collaboration within the county and region, and improved emergency management systems.

Public health sectors are not alone in moving forward with public health preparation and planning for climate change. The State Public Health Division is working to secure funding for climate change health risk vulnerability assessments and to build awareness among state and local policy and decision makers. The CLHO Environmental Health Committee and CLI are actively seeking funding to move forward into Phase II of this project, to develop workshops for training public health practitioners on communication and preparation planning, design and disseminate an online toolbox to support preparation planning, and resource procurement to assist in preparation planning.

Resources

Association of State and Territorial Health Officials. 2007. *Ensuring Healthy Communities*. Results of the 2006 State Environmental Health Directors Survey. Available at: <http://www.astho.org/pubs/Ensuringhealthycommunitiesastho.pdf>

Balbus, et al. 2008. *Are We Ready? Preparing for the Public Health Challenges of Climate Change*. Environmental Defense Fund, George Mason University and NACCHO. Available at: http://www.edf.org/documents/7846_AreWeReady_April2008.pdf

Bedsworth, L. 2008. *Climate Change and California's Local Public Health Agencies*. Public Policy Institute of California. Available at: <http://www.ppic.org/main/publication.asp?i=799>

Climate Change Integration Group. 2008. *A Framework for addressing rapid climate change*. Final Report to the Governor. <http://www.oregon.gov/ENERGY/GBLWRM/docs/CCIGReport08Web.pdf>

Climate Change Science Program. 2008. *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. Sussman, T.J. Wilbanks, (Authors)]. U.S. Environmental Protection Agency, Washington, DC, USA.

Climate Leadership Initiative and EcoNorthwest. 2009. *An Overview of Potential Economic Costs to Oregon of a Business-As-Usual Approach to Climate Change*. <http://climlead.uoregon.edu/pdfs/FinalOReconomicreport.pdf>

Climate Leadership Initiative & National Center for Conservation Science and Policy. 2008. *Preparing for Climate Change in the Rogue River Basin of Southwest Oregon*. <http://climlead.uoregon.edu/programs/scenariosplanning.html>

Climate Leadership Initiative & National Center for Conservation Science and Policy. 2009. *Preparing for Climate Change in the Upper Willamette River Basin of Western Oregon*. <http://climlead.uoregon.edu/programs/scenariosplanning.html>

Ebi, K.L. and J.C. Semenza. (2008). *Community Based Adaptation to the Health Impacts of Climate Change*. American Journal of Preventative Medicine. 35(5):501–507.

Frumkin, H., and A.J. McMichael. 2008. *Climate Change and Public Health*. American Journal of Preventive Medicine: 35 (5):403-410.

Glass, A.G., and R.N. Hoover. 1989. *The emerging epidemic of melanoma and squamous cell skin cancer*. JAMA. 262:15. Available at: <http://jama.ama-assn.org/cgi/content/abstract/262/15/2097>

Intergovernmental Panel on Climate Change. 2007. *Summary for Policymakers. In: Climate Change 2007: The Physical Science Basis*. Contribution of Working Group I to the Fourth Assessment Report of the Intergovernmental Panel on Climate Change [Solomon, S., D. Qin, M. Manning, Z. Chen, M. Marquis, K.B. Averyt, M. Tignor, and H.L. Miller (eds.)]. Cambridge University Press, Cambridge and New York.

IPCC & Climate Impacts Group. 2006. *Climate Change Scenarios*. Joint Institute for the Study of the Atmosphere and Ocean. Seattle, Wash.: University of Washington. Available at <http://www.cses.washington.edu/cig/fpt/ccscenarios.shtml>

Mote, P., et al. 2008. *Scenarios of Future Climate for the Pacific Northwest*. Climate Impacts Group, University of Washington.

Physicians for Social Responsibility (PSR). 2002. *Degrees of Danger: Health Effects of Climate Change and Energy in Oregon*. Available at: <http://www.psr.org/site/DocServer/DegreesDangerOrgeon.pdf?docID=4242>

Longstreth, J. 1991. *Anticipated Public Health Consequences of Global Climate Change*. Environmental Health Perspectives. Vol 96. pgs 139-144.

McGeehin, M. 2008. *Climate Change and Human Health: The Public Health Response*. PowerPoint Presentation. National Center for Environmental Health, Centers for Disease Control and Prevention. Available at: <http://www.astho.org/pubs/McGeehinClimateChange.pdf>

Oregon Parks and Recreation Department. 2008. *Outdoor Recreation in Oregon: The Changing Face of the Future*. Chapt 2: A Rapidly Aging Oregon Population. Available at: http://egov.oregon.gov/OPRD/PLANS/scrop08_12.shtml

St. Louis, M.E., and J.J. Hess. 2008. *Climate Change Impacts on and Implications for Global Health*. American Journal of Preventative Medicine. 35(5): 527-538.

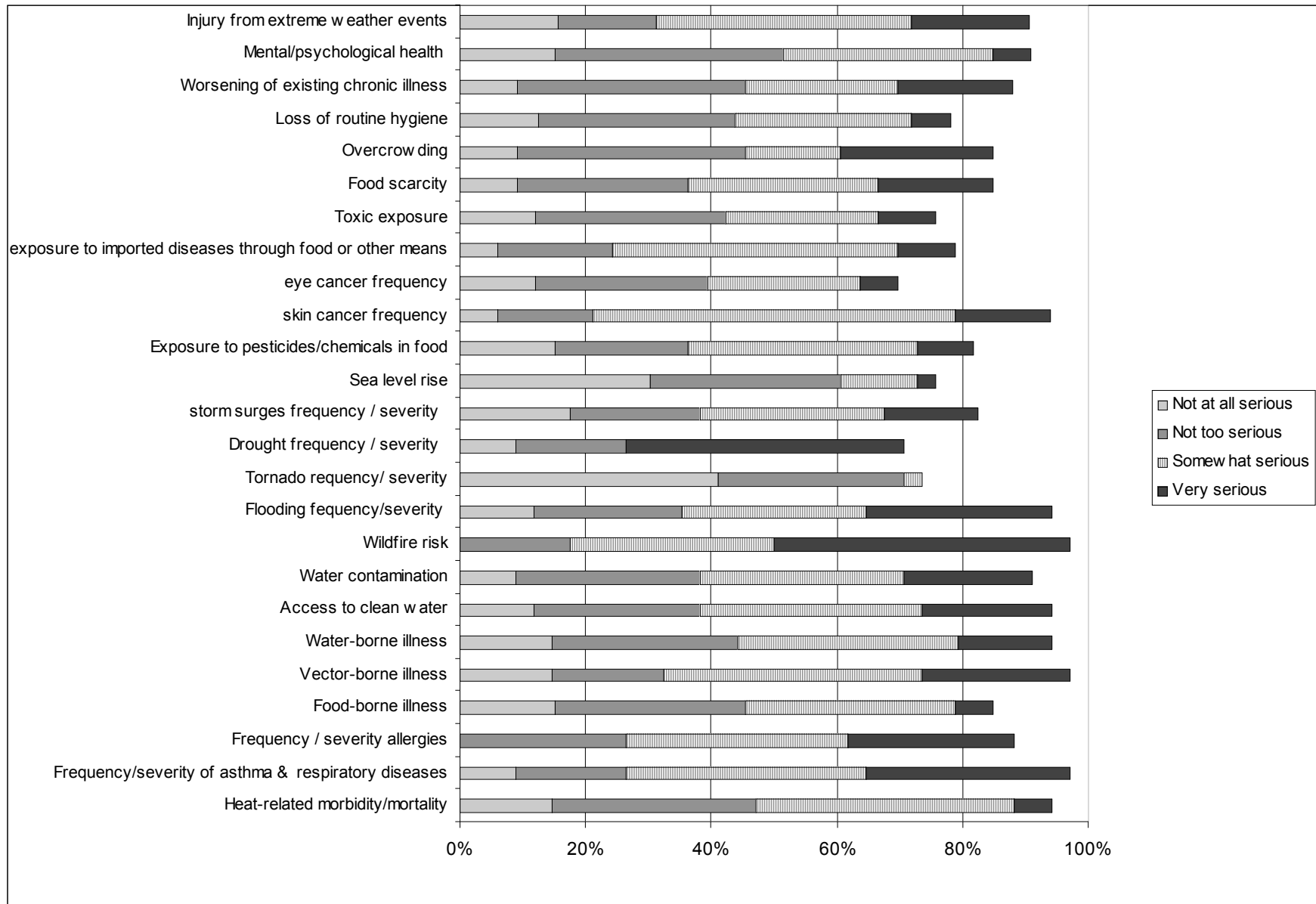
United States Environmental Protection Agency. 2008. *A Review of the Impacts of Climate Variability and Change on Aeroallergens and Their Associated Effects*. Global Change Research Program. National Center for Environmental Assessment. Office of Research and Development

The World Health Organization. *Climate and health*. <http://www.who.int/mediacentre/factsheets/fs266/en/index.html> (accessed November 2008)

World Health Organization. 2005. *Climate and Health: Fact Sheet*. Available at: <http://www.who.int/globalchange/news/fsclimandhealth/en/index.html>

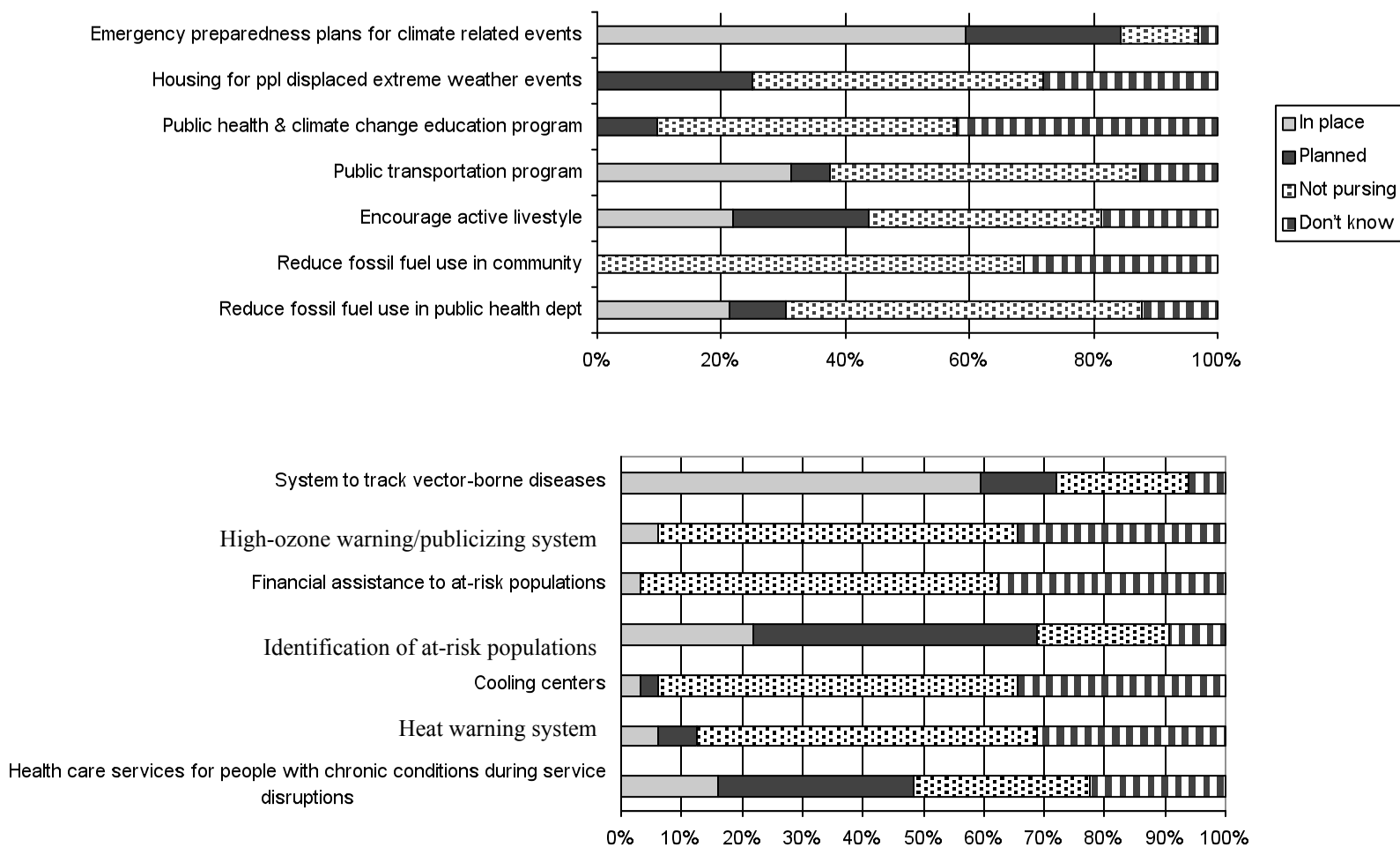
Appendix A. Potential Public Health Risks

In thinking about the impact on public health in your county, how would you rank the following potential risks of climate change?



Appendix B. Program Development.

Please indicate which of the following programs your department currently has in place, is planning to develop, or has no current plans to pursue.



Appendix C. Additional Comments from Surveys

- “There should have been a question about whether (sic) or not we believe that climate change is caused by greenhouse gas emissions. Any one who is truly knowledgeable about that question knows that the causes of warming are related to sunspots etc. There is some question statistically that we are experiencing warming more that very short term. Yes, we are in a 10 year drought. Yes, these periods have happened before. Yes, there is current political fear being generated to make certain factions of our society very rich at the expense of the rest us over nothing that we can really control. “
- “There are over 30,000 scientists across the nation who have serious doubts about the human impacts associated with climate change. I would like to hear a more balanced presentation of the issue and would like to see both sides represented at conferences.”
- H:\Climate Change Info\Global Warming Petition Project.htm “There is no convincing scientific evidence that human release of carbon dioxide, methane, or other greenhouse gasses is causing or will, in the foreseeable future, cause catastrophic heating of the Earth's atmosphere and disruption of the Earth's climate. Moreover, there is substantial scientific evidence that increases in atmospheric carbon dioxide produce many beneficial effects upon the natural plant and animal environments of the Earth.”

(CLI in collaboration with other research organizations has developed a document that provides responses to common challenges to climate change science, available at:

http://climlead.uoregon.edu/pdfs/Setting_record_Straight.pdf)

Appendix D. List of Survey Questions

Full survey will be available at: <http://climlead.uoregon.edu/programs/scenariosplanning.html>