Occasional Papers

Climate Change and California's Local Public Health Agencies

Louise Wells Bedsworth

with research support from Sarah Swanbeck

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Summary

This paper presents the results from a survey of local Health Officers. The intent of the survey was to learn more about perceptions of the public health threat from, and preparation for, climate change among California's local public health agencies.

The survey found that local public health officials believe that climate change poses a significant threat to public health. The most often-cited concern is the potential increase in extreme heat, followed closely by water-related concerns.

The survey also found that local Health Officers generally feel ill-prepared, both in terms of available information and resources, to respond to the public health threats posed by climate change. The majority of respondents indicated that they would like to have more detailed information on the regional risks posed by climate change, followed closely by more guidance from the California Department of Public Health. In terms of resources, most respondents would like to have greater technical resources to prepare health impact analyses, followed by dedicated funding for climate activities.

Despite this sense of being ill-prepared, most of the agencies who responded to our survey have a number of programs in place that will help mitigate the public health risks posed by climate change. These include heat emergency plans, programs to control disease vectors (e.g., mosquito abatement programs), and disease tracking and surveillance programs. These programs will likely require additional coordination and refinement to be able to better respond to climate change, but they put local public health agencies in a good position to respond to potential changes.

The results of this survey suggest that state and local public health agencies would be well-served by taking a more active role in state climate policy. This would facilitate the collection and generation of data and information that could help public health agencies respond to a changing climate. It would also make the public health community's current tools and information available to other state agencies involved in climate change policy.

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Introduction

Climate change will affect many sectors of the California economy and environment, including public health. The ill effects are likely to be more pronounced in several of the state's most vulnerable populations, including the elderly, the infirm, and those living in poverty. Yet, to date, the state's public health institutions have not played an active role in California's climate policy process.[1] California's local public health agencies, generally organized at the county level, are likely to be on the front lines in dealing with the health-related threats of climate change.

This paper presents the results from a survey of California's local Health Officers conducted between August and October 2007. Local Health Officers are physicians who are appointed to lead local health departments. There are 61 local health departments in California, one in each county and in three cities (Berkeley, Pasadena, and Long Beach). The goal of the survey was to assess how large of a threat to public health climate change is perceived to be by local health officials, how prepared they believe they are to manage the risks, and what type of information and resources are likely to be needed to help their agencies cope with the risks. This survey was conducted as part of a larger study examining how prepared the state's resource, public health, and infrastructure planning institutions are for managing the risks posed by climate change. The larger study will be available in summer 2008.

Climate Change and Public Health

Even with aggressive emission reductions, California is predicted to experience the effects of climate change over the coming century (Hayhoe et al., 2004; Cayan et al., 2006). These changes will lead to an increase in annual average temperatures across the state, contributing to changes in the state's precipitation patterns, natural habitats, and air quality, each of which can negatively affect public health. Climate change is likely not only to amplify a number of the problems currently faced by public health agencies, but also to increase the frequency of extreme events such as heat waves and flooding. Health-related implications include increases in heat-related morbidity and mortality, the incidence of vector-borne disease, and the frequency and severity of air pollution episodes. In addition, climate change could pose new challenges if it leads to dislocation or an increase in "climate refugees" displaced from other countries.

Daily maximum summertime temperatures in California are predicted to increase between 2.2°F and 7.6°F by midcentury (2035-2065) and 3.2°F and 12.8°F by the end of the century (2070-2099), with the range depending both on the trajectory that emissions take in the future and the sensitivity of the climate system to the increase in greenhouse gas concentrations (Drechsler et al., 2006). This increase in temperatures will have both direct and indirect impacts on public health (Patz, Campbell-Lendrum, Holloway, and Foley, 2005; Ebi, Kovats, and Menne, 2006). The primary direct effect will be an increase in extreme heat-related health

[1] While a number of the state's environmental agencies also have a mandate to protect public health, we are using the term "public health agencies" in a narrower sense, referring to those whose mission to protect public health includes a clinical component.

impacts. Depending on future emissions and the sensitivity of the climate system, the length of the heat wave season statewide could increase between 15 and 23 percent by the middle of the century and between 30 and 77 percent by the end of the century (relative to a 1961-1990 baseline heat wave season of 115 days).[2]

In addition to the direct effects of increased extreme heat, the increase in temperatures could lead to increases in air pollution, changes in vector- and water-borne disease occurrence, and other issues that could pose risks to public health. In general, the probability of violating air quality standards increases with temperature. Previous analysis has also shown a statistical linkage between the incidence of drinking water contamination events and extreme precipitation events (Rose et al., 2001). Thus, while the effect of climate change on amount of precipitation is uncertain, an increase of extreme storms could pose a risk to water supplies. In addition, analyses of wildfires under a changing climate generally show a change in their extent and nature, and the risk of wildfire is expected to rise (Cayan et al., 2006; Westerling and Bryant, 2006).

California's Climate Change Policy

California has committed to making significant reductions in greenhouse gas emissions over the next several decades. In June 2005, Governor Schwarzenegger signed an executive order to reduce greenhouse gas emissions (Executive Order S-3-05). This executive order established greenhouse gas emission reduction goals for the state both in the near- and long-term. The near-term goals have been codified into law through the Global Warming Solutions Act of 2006 (AB 32, Núñez and Pavley), which calls for a reduction of GHG emissions statewide to 1990 levels by 2020.

The Executive Order also called for the creation of the Climate Action Team, a state-level consortium of agencies led by the California Environmental Protection Agency (CalEPA) to oversee meeting the emission reduction targets. The Climate Action Team includes the secretary of the Business, Transportation, and Housing Agency; secretary of the Department of Food and Agriculture; secretary of the Resources Agency; chairperson of the Air Resources Board; chairperson of the Energy Commission, and president of the Public Utilities Commission. The Climate Action Team also includes a number of working groups that involve additional agencies and personnel. To date, the California Department of Public Health has not been represented in these groups.

The Executive Order also called for a biennial assessment of the impacts that climate change will have on the state. In addition, CalEPA is tasked with identifying the programs that will be needed to respond to these impacts. The first statewide assessment was completed in 2006, and the second is under way. A team consisting of some state agencies and academics will prepare the statewide assessment. The final reports will examine climate change impacts in a number of sectors, including public health (for a summary, see Luers et al., 2006).

[2] The heat wave season is defined as the number of days between the beginning of the year's first heat wave and the end of the year's last heat wave (Hayhoe et al., 2004).

Climate Change and California's Public Health Agencies

Changes in the climate are likely to lead to an amplification of a number of the health problems that are already being dealt with by the public health community. The challenge to public health agencies will be to respond to the general change in climate, as well as to an increase in the frequency and severity of extreme events.

California's public health agencies focus on protecting public health, but also provide direct clinical services to Californians. At the state level, the recently created California Department of Public Health (CDPH) oversees public health issues for the state.[3] In addition, the Governor's Office of Emergency Services oversees state-level emergency response to certain extreme events (e.g., extreme heat or wildfires). A number of other state agencies also operate programs that affect public health, including the California Environmental Protection Agency and the California Resources Agency.

At the local level, all California counties, as well as three cities, have their own department of public health. These local public health agencies are the institutions likely to be on the front line, managing the health risks associated with climate change on a day-to-day basis. We conducted a survey of local Health Officers in order to gain a better understanding of how the threat of climate change is perceived by local public health agencies. In particular, we sought answers to the following questions:

- How large of a threat is climate change to public health, as perceived by local officials?
- What tools are in place that could help local public health agencies respond to the threat of climate change?
- Do local public health officials believe that they have adequate information and resources to respond to the public health threats associated with climate change?
- What information and resources are needed by local public health agencies to respond to the public health risks posed by a changing climate?

[3] The California Department of Public Health was established in July 2007 as a result of a division of the Department of Health Services. One of the goals of this division was to create an agency that could provide more focused leadership on improving public health in California. The other agency that resulted from the division is the Department of Health Care Services, which focuses on the financing and delivery of individual health care services.

Survey

In August 2007, we distributed a survey to local Health Officers in California to gather information on their perception of the public health threat posed by climate change, their current programs to mitigate the threat, and the resources they yet need to respond to the threat. The survey was on-line and was sent to all 61 local Health Officers in the state (58 counties and 3 cities). We received completed surveys from 34 of the Health Officers, representing just over three-quarters of the state's population. It is important to note that the results should not be considered representative of the state as a whole given the number of nonrepondents. Figure 1 shows the counties that responded to the survey.

The survey was distributed electronically. Periodic reminders were sent via e-mail to all nonrespondents. The survey remained available through the end of October 2007. In preparation for the survey, interviews were conducted with ten public health practitioners (Health Officers and others) to inform our survey design and provide context for the survey responses.

We did not require that respondents provide an answer to each question. Therefore, we present the results showing the responses by percent for each question, including a category for "no response." Unless it is noted otherwise, all percentages are calculated based on 34 responses.

The remainder of this paper presents the results from the survey followed by some brief conclusions.

Figure 1: Counties responding to the survey

Note: In addition to the 32 counties, two cities (Berkeley and Long Beach) also responded.

Perception of Threat of Climate Change to Public Health

We found wide agreement among public health officials that climate change poses a serious risk to public health—94 percent believe that climate change is either a "very" or "somewhat" serious threat (Table 1).

When asked to name the largest risk in their region related to climate change, public health officials most often mentioned extreme heat followed by water-related issues including supply, flooding, and risks to agriculture (Table 2). Air quality (often the focus of the state's policy efforts to address climate change) was identified by only one respondent as the largest risk.

Although the above results indicate a concern about the impact of climate change, the majority of local Health Officers acknowledge that their agency has not yet undertaken programs specifically developed with climate change in mind (Table 3). Among the roughly one-quarter of agencies that have developed such programs, several officials mention heat emergency plans and working with local government on land-use planning issues. Other programs include encouraging carpooling and telecommuting, promoting hybrid electric vehicles, and raising climate change issues among the county board of supervisors.

Table 1: Perceived risk of climate change

How large of a threat to public health do you feel climate change is?	
	%
Very serious	56
Somewhat serious	38
Not too serious	3
Not at all serious	3

Table 2: Largest risk due to climate change

What do you think is the largest risk to your region related to climate change?	
	%
Heat	35
Water shortage	24
Flood	21
Risks to agriculture	26
Wildfire	18
Human health	9
Water quality	6
Air quality	6
Habitat change	3
Sea-level rise	3
Economic vitality	3
No response	6

Note: Percentages calculated based on 34 respondents. Twelve respondents provided more than one answer, for a total of 52 responses.

Table 3: Climate change-related programs

In thinking about programs your agency has undertaken, has your agency undertaken programs that were specifically developed with climate change in mind?	
	%
Yes	24
No	76

Respondents were then provided with a list of health-related risks from climate change and asked to rank their seriousness (Table 4). About 90 percent of respondents considered extreme weather to be either a "very" or "somewhat" serious threat to public health. Wildfire received the second-highest ranking, considered as either a "very" or "somewhat" serious risk by over 80 percent of respondents. This was closely followed by heat-related mortality, air pollution, and vector-borne illness, which were listed as either "very" or "somewhat" serious risks by over three-quarters of the respondents.

Water- and food-borne illness, two areas that tend to be well under control, rank among the lowest levels of concern. Officials tend to be more concerned about those areas that we have less control over (e.g., extreme heat or wildfire) and where there have been recent significant events that have received substantial media attention (e.g., the 2006 heat wave and the 2007 Southern California wildfires).

Some of these results vary by location. Twenty-five of the 34 survey respondents are located in "non-attainment" areas in terms of the federal eight-hour ozone standard. Twenty-three (92%) of the respondents in these non-attainment areas, indicated that air pollution was either a "very" or "somewhat" serious risk of climate change. Among respondents in the nine areas that are in attainment with the federal eight-hour ozone standard, only four (44%) listed air pollution as a "very" or "somewhat" serious risk from climate change. We observe similar variation about sea-level rise. Eleven of the survey respondents are located in coastal areas. All of them listed sea-level rise as a "very" or "somewhat" serious risk of climate change. Among the twenty-three respondents located in inland areas, only eleven indicated that sea-level rise is a "very" or "somewhat" serious risk of climate change.

One result that does not show this type of variation is concern about heat-related mortality. We see similar levels of concern between inland counties, which are typically warmer, and coastal counties. In both cases, about 80 percent of the officials listed heat-related mortality as a "very" or "somewhat" serious risk of climate change.

Table 4: Public health risks of climate change

In thinking about the impact on public health in your region, how would you rank the following potential consequences of climate change?									
	Extreme weather (%)	Wildfire (%)	Air pollution (%)	Vector-borne illness (%)	Heat-related mortality (%)	Food-borne illness (%)	Water-borne illness (%)	Water contamination (%)	Sea-level rise (%)
Very serious	50	62	38	26	35	12	15	18	29
Somewhat serious	41	24	41	50	44	32	32	44	21
Not too serious	9	6	15	18	18	35	38	26	12
Not at all serious	0	3	6	3	3	9	6	6	35
Don't know	0	3	0	3	0	9	9	6	0
No response	0	3	0	0	0	3	0	0	3

Actions to Mitigate Public Health Impacts of Climate Change

Despite the lack of programs developed to respond specifically to climate change, public health agencies operate a number of programs that will be useful for mitigating the public health effects of climate change. Almost 90 percent of the agencies that responded to the survey have a heat emergency plan, and every agency operates a disease tracking program. In addition, most agencies answered that they worked with other local agencies to publicize air quality information and to control disease vectors. These programs will serve as important elements in local public health agencies' toolkits as they respond to the health risks posed by climate change.

Heat Emergency Plans

Following the heat wave of summer 2006, the California Office of Emergency Services (OES) issued guidance on the development of heat emergency plans (Governor's Office of Emergency Services, 2006). This guidance outlined the role of state agencies in the event of a heat emergency.

In addition, the OES plan suggests activities that can be conducted at the local level. Local heat emergency plans are important because extreme heat events tend to be localized, for example, requiring outreach and assistance to vulnerable populations at the local level. Heat emergency plans tend to be phased plans that start with monitoring of heat indicators. As conditions warrant, additional phases are implemented. For example, in San Diego County, the heat emergency plan has four phases that begin with the seasonal monitoring of heat indicators and culminate in the declaration of a heat emergency, which involves the activation of the Emergency Operation Center and can include the declaration of a public health emergency (County of San Diego Health and Human Services Agency, 2006).

Of the 34 local public health agencies that completed the survey, 30 have a heat emergency plan in place (Table 5). Almost all of these plans identify cooling centers and at-risk populations. Approximately nine out of ten of these programs monitor heat indicators, conduct public education, and include outreach to vulnerable populations (Table 6). Local health agencies work with a number of other organizations to operate cooling centers as well as to provide other services (e.g., agricultural or domestic animal care).

While it is encouraging to see that so many jurisdictions already have heat emergency plans in place, these results do identify two areas that might warrant further consideration in light of a changing climate and the increased risk of extreme heat. One of the dominant risk factors for heat-related mortality is poverty, and access to transportation has been linked with reducing risk (Basu and Samet, 2002). Yet, just over one-third of those surveyed indicate that their region's heat emergency plan provides transportation to cooling centers. And even fewer provide financial assistance to low-income residents. These are two areas that merit consideration as regions update heat emergency plans in light of a changing climate.

Table 5: Heat emergency plan

Does your agency have a heat emergency plan in place?	
	%
Yes	88
No	12

Table 6: Heat emergency plan elements

Does the plan include any of the following elements?					
	Identification of cooling centers (%)	Identification of at-risk populations (%)	Monitoring of heat indicators (%)	Outreach to at-risk populations (%)	Public education program (%)
Yes	97	97	90	90	87
No	0	0	7	7	10
No response	3	3	3	3	3
	Transport to cooling centers (%)	Financial assistance to low-income residents (%)	Operation of cooling centers (%)	Heat warning system (%)	
Yes	37	13	57	67	
No	60	80	40	27	
No response	3	7	3	7	

Note: Percentages based on the 30 respondents who indicated that they had a heat emergency plan.

Disease Tracking and Surveillance

Disease tracking and surveillance involves documenting patterns of disease among different groups of people. Such tracking can be used to detect the conditions that place populations at risk. Public health officials can then track these conditions to reduce the public health risk to the population (California Policy Research Center, 2004). Under a changing climate, a disease tracking and surveillance program can help identify emerging diseases as well as evaluate responses. Disease tracking and surveillance systems operate at all levels of government, from local to global.

Every Health Officer who participated in our survey indicated that their agency operates a disease tracking program. Most programs track vector-borne illnesses that could be of concern with a changing climate, such as West Nile Virus and encephalitis. However, less than half of the programs reported in our survey track information on heat-related morbidity and mortality, which is likely to be a growing concern under a changing climate (Table 7).

Table 7: Disease-tracking program elements

Which, if any, of the following diseases are tracked?				
	West Nile Virus (%)	Western Equine Encephalitis (%)	St. Louis Encephalitis (%)	Heat-related mortality (%)
Yes	100	91	91	44
No	0	9	9	53
Don't know	0	0	0	0
No response	0	0	0	3
	Asthma (%)	Cardiovascular disease (%)	Cancer (%)	Other (%)
Yes	35	32	53	29
No	59	62	41	0
Don't know	0	0	0	0
No response	6	6	6	71

Note: Other diseases that are tracked include influenza, infant deaths, accidents and drownings, lead poisoning, and stroke.

Vector Control Programs

Only a few local health districts are responsible for vector control, though almost all areas of the state are included in a vector control program. These programs are operated by a number of different agencies around the state, including environmental health departments (some of which are part of the public health agency), mosquito abatement districts, and some cities.

While only one-third of the agencies that responded to the survey actually perform vector control functions (Table 8), over half work with the responsible vector control agency in a variety of tasks, such as public education about vector control (Table 9). In addition, as shown in Table 7, all track West Nile Virus and most track other vector-borne diseases.

Table 8: Vector control responsibility

Is your agency responsible for vector control?			If not, is there an agency in your region that is responsible for vector control?
	%		%
Yes	32		95
No	65		3
No response	3		-

Note: Percentages for the second question are calculated based on 22 responses from agencies that do not have responsibility for vector control.

Table 9: Vector control coordination between agencies

Does your agency either do the following or work with the local agency responsible for vector control to do the following?				
	Identify areas for spraying (%)	Publicize spraying (%)	Track vector-borne disease (%)	Provide public education about vector control (%)
Yes	56	41	100	94
No	38	47	0	6
n/a	6	9	0	0
No response	0	3	0	0

Note: An "n/a" response was intended to capture regions without a vector control program. Given the larger number of responses, it should likely be interpreted similar to a "no."

Air Pollution

Public health agencies are not responsible for air quality control programs (i.e., developing emission reduction plans), but they are able to play an important role in publicizing air quality information and in supporting programs that could reduce the public health impacts of poor air quality. Our survey results show that most regions are served by programs publicizing poor air quality and that roughly 60 percent of public health agencies work with the local air district to publicize air quality information (Table 10).

According to the respondents, 20 regions have programs in place to publicize ozone air quality information and 23 have programs to publicize particulate matter air quality information. Among the ozone programs, 16 are in regions that are not in attainment with the federal eight-hour ozone standard. Nearly three-quarters of the agencies located in ozone *attainment* areas indicated that they worked with local air pollution control officials to publicize air quality information, while just over half of agencies located in ozone *non-attainment* areas indicated that they did.

In addition, over half of public health agencies indicated that they work with local agencies to promote programs to improve air quality or reduce greenhouse gas emissions (Table 11). The share of agencies that are located in ozone non-attainment areas and that support these programs is roughly equal to the share of agencies that are located in ozone attainment areas.

Table 10: Public health agencies and air pollution

	Does your region have a program in place to publicize any of the following unhealthy air conditions?		Does your agency work with the local air district to publicize air quality information?
	Ozone (%)	Particulate matter (%)	%
Yes	59	68	62
No	21	12	38
Don't know	18	18	-
No response	3	3	-

Table 11: Promotion of air quality and climate change programs

Does your agency work with other local agencies to promote programs to reduce either smog-forming or greenhouse gas emissions?	
	%
Yes	59
No	41

Information and Resource Needs

Most local Health Officers answered that they do not have enough information to respond to climate-related public health issues. This is particularly striking when compared to whether or not they felt that they have enough information to respond to public health emergencies more generally (Table 12). About two-thirds of the respondents indicated that they have enough information to respond to public health emergencies in general, but when asked whether they felt they had enough information to respond to climate change-related public health emergencies, the results were almost the exact opposite.

The desire for more information on climate risks becomes even more pronounced when respondents are asked what type of information would be helpful. Every option listed was believed to be either very helpful or helpful by at least 80 percent of the respondents (Table 13). Detailed regional risk assessment of climate impacts received the largest share of "very helpful" rankings, at just over 40 percent.

Table 12: Assessment of information and resource adequacy

	Does your agency have adequate information to respond to current public health emergencies (climate-related or otherwise)?		Do you feel that you have adequate information to respond to the potential public health risks associated with climate change?
	%		%
Yes	65		29
No	26		68
No response	9		3

Table 13: Utility of different information sources

How useful would the following types of information be to your agency to help mitigate public health impacts related to climate change?								
	Detailed regional risk assessment (%)	Scientific information on climate impacts (%)	Statewide health/disease tracking database (%)	Vulnerability assessment (%)	Guidance from CA Department of Public Health (%)	Educational programs for agency staff (%)	Clearinghouse for information on climate-related public health programs (%)	Guidance from the Office of Emergency Services (%)
Very helpful	44	26	32	26	32	26	29	32
Helpful	47	62	53	59	53	59	59	47
Neither helpful nor unhelpful	3	3	3	6	9	6	9	6
Not helpful	3	6	6	6	3	6	0	9
No response	3	3	6	3	3	3	3	6

When asked from whom Health Officers would like to receive information, almost 9 out of 10 respondents indicated scientists (Table 14), followed closely by the California Department of Public Health (just over three-quarters of respondents). These results agree with the findings on the types of information that respondents indicated that they would find most helpful (Table 13). The highest rankings were for information that is most likely to come from the scientific community. This includes more detailed regional risk assessments (91% "helpful" or "very helpful") and general scientific information on climate impacts (88% "helpful" or "very helpful"). The next highest ranked sources of information are likely to come from the California Department of Public Health. These include a statewide health/disease tracking database (85% "helpful" or "very helpful"), vulnerability assessment (85% "helpful" or "very helpful"), and guidance from CDPH (85% "helpful" or "very helpful").

Other agencies that were indicated as preferred sources of information include the World Health Organization, the Center for Disease Control and Prevention, and the National Institutes of Health.

Similar to the availability of information, Health Officers indicated that they have inadequate resources to respond to the potential public health risks of climate change (Table 15). When asked what resources they needed, roughly three-quarters of the survey respondents identified additional technical and analytical resources for health impact assessments (Table 16). This was followed closely by dedicated funding for climate-related activities.

Table 14: Information sources

If your agency would like more information on the public health impacts of climate change, who would you like your information from?		
	%	number
Scientists	86	30
CA Department of Public Health	77	27
CA Air Resources Board	57	20
California Conference of Local Health Officers	57	20
Medical community	43	15
Other	6	2
No response	3	1

Note: Based on 34 respondents. Respondents could indicate more than one choice

Table 15: Resource adequacy

Do you feel that your agency has adequate resources to respond to the potential public health risks associated with climate change?	
	%
Yes	15
No	68
Don't know	15
No response	3

Table 16: Resource needs

If not, what resources are needed?	
	%
Technical/Analytical resources to assess health impact	96
Dedicated funding for climate activities	93
Staff with expertise in climate science	79
Technical/Analytical resources to assess vulnerability	64
Better coordination with state agencies	43
Better coordination with local agencies	25
Other	21
No response	21

Note: Based on 34 respondents. Respondents could indicate more than one resource. In the "Other" category, respondents indicated agencies with which coordination would be beneficial. These included CARB, CDPH, the Department of Food and Agriculture, and the Office of Emergency Services.

Policymaking Climate

We asked two questions to get a sense of the policymaking climate in which local public health agencies are operating. Forty percent of those who responded felt that their county was doing about as much in the field of climate change as other counties (Table 17). Only five respondents indicated that they felt that their county was doing more than other counties. The same number felt that their county was doing less. Roughly one-third did not know how their county compared to others.

Table 17: Local climate change activity

In thinking about what your agency and those of other counties are doing in the field of climate change, would you say your county is doing more, less, or about the same as other counties?	
	%
More	15
Less	15
About the same	38
Don't know	32

When asked to select a description of the local policymaking environment, almost half of the respondents indicated that there is little interest in the topic of climate change and public health. Although almost as many respondents indicated that there was considerable interest, only a subset of this group (1 in 10) had a strong sense of support for local involvement in managing public health effects of climate change. In the larger number of cases (3 out of 10), there was still a lack of consensus on what the county might do.

Table 18: Policymaking climate

Which of the following statements best describes the policymaking environment in which health and climate change are linked in your county?	
	%
There is very little discussion or interest in the topic.	47
There is considerable interest, but there is much disagreement and conflict about what to do or whether to do anything.	32
There is much interest and support to have the county become involved in managing the possible health effects of climate change.	12
No Response	9

Conclusion

The results of this survey indicate that local Health Officers in California perceive climate change as a serious threat to public health. However, they feel ill-equipped to face this threat, both in terms of available information and resources.

These findings are interesting because the public health impacts of climate change are likely to be amplifications of problems that many of these agencies are already handling, including heat emergencies, vector-borne disease, and the health consequences of air pollution. Moreover, local public health agencies already have a number of programs in place that will be helpful in dealing with the potential public health impacts of climate change, including heat emergency plans, disease tracking and surveillance, and vector control programs. This suggests that rather than creating entirely new programs to address climate change concerns at the local level, California's public health system will be able to draw on its existing toolkit. However, upgrading the existing programs to address the added challenges posed by climate change will likely require additional coordination, resources, and information.

Important coordination is already occurring between local public health agencies and other institutions, notably local air quality management districts and vector control agencies. In addition, local public health agencies can learn from one another through organizations such as the California Conference of Local Health Officers. For example, agencies can share information on lessons learned from implementation of a heat emergency plan that can help other jurisdictions prepare for their own emergencies. This type of coordination will likely become even more important as the public health risks of climate change increase.

In general, local public health agencies have fairly constrained budgets. When we asked the Health Officers what share of their budget they considered "discretionary," the responses ranged between 0 and 30 percent, with an average of about 15 percent. Thus, it is not surprising that most respondents indicated they did not have sufficient resources to respond to the public health risks of climate change. Most respondents indicated a desire for additional funding and expertise to help address the health risks related to climate change. Given the number of relevant programs that local health agencies already operate, it may be most effective to target assistance through additional funding or personnel for these existing programs.

Local public health agencies also felt that they lacked information that would help them in responding to the risks posed by climate change, which was further emphasized in our interviews. Respondents felt that the California Department of Public Health could play an important role disseminating more information on the public health risks of climate change. The public health community could also play an important role by disseminating public health information and concerns to other agencies involved in climate change science and policy at the state and local level.

Appendix. PUBLIC HEALTH OFFICERS SURVEY
(August 20, 2007)

Thank you for taking the time to complete this survey. The results of this survey will help us learn more about how local public health officials are managing the topic of climate change. The information that you provide will help to inform state and local policymakers, other organizations, and the public about the issues facing local public health agencies as they address climate change issues. The survey is being conducted by the Public Policy Institute of California.

Please note: Participation is voluntary and individual responses to this survey are confidential. Identification information is collected to track the surveys. We will not identify any responses from specific individuals or specific counties.

Researcher contact information:
Louise Bedsworth
Research Fellow
Public Policy Institute of California
500 Washington Street, Suite 600
San Francisco, California 94111
Phone: (415) 291-4469
Fax: (415) 291-4401
E-mail: bedsworth@ppic.org

1. Please provide us with some information about yourself.
   Name of Individual Completing this Survey:
   Organization:
   Position:

Agency Background

2. How long have you served in your current position?

3. How large is the staff employed by your organization?

4. How large is the population in your agency's jurisdiction?

5. How large is your agency's budget?

6. Approximately, what percentage of your budget is considered discretionary?

Climate Change

7. What do you think is the largest risk to your region related to climate change?

8. How large of a threat to public health do you feel climate change is?
   - O Not at all serious
   - O Not too serious
   - O Somewhat serious
   - O Very serious
   - O Don't know

9. In thinking about the impact on *public health in your region,* how would you rank the following potential consequences of climate change?

	Not at all serious	Not too serious	Somewhat serious	Very serious	Don't know
Extreme heat-related morbidity and mortality	○	○	○	○	○
Increased frequency and/or severity of air pollution episodes	○	○	○	○	○
Food-borne illness	○	○	○	○	○
Vector-borne illness	○	○	○	○	○
Water-borne illness	○	○	○	○	○
Increased wildfire risk	○	○	○	○	○
Potential water contamination	○	○	○	○	○
Increase in frequency and severity of extreme weather events	○	○	○	○	○
Sea-level rise	○	○	○	○	○
Other (please specify)					

10. Has your agency undertaken programs that were specifically developed with climate change in mind, even if these programs have effects on other community objectives?

11. If yes, please provide up to *five* examples.

Potential Actions to Mitigate the Public Health Impacts of Climate Change

There are a number of actions that public health agencies might be taking that can reduce the impacts of climate change, both to reduce emissions that cause global warming and to protect public health in light of inevitable changes. We would like to learn more about programs that your agency has in place.

Extreme Heat

12. Does your agency have a heat emergency plan in place?

13. If yes, at what level does the plan focus?
   - ☐ Facilities (e.g., nursing homes)
   - ☐ Specific population (e.g., elderly)
   - ☐ Community-wide
   - ☐ All of the above

☐ Other (please specify)

14. Does the plan include any of the following elements? Please check the appropriate column for each of the elements that *currently apply to your jurisdiction*.

	Yes	No	n/a
Monitoring of heat indicators	○	○	○
Heat-warning system	○	○	○
Identification of cooling centers	○	○	○
Operation of cooling centers	○	○	○
Transport to cooling centers	○	○	○
Public education program	○	○	○
Identification of at-risk populations	○	○	○
Outreach to at-risk populations	○	○	○
Financial assistance to low-income residents	○	○	○

Air pollution

15. Does your region have a program in place to publicize any of the following unhealthy air quality conditions?

	Yes	No	Don't Know
High ozone days	○	○	○
High particulate matter days or nights	○	○	○
Other (please specify)			

16. Does your agency work with the local air district to publicize air quality information?

17. Does your agency work with other local agencies to promote programs to reduce either smog-forming or greenhouse gas emissions (e.g., encouraging biking or walking, supporting proposed regulations)?

Vector-borne disease

18. Is your agency responsible for vector control?

19. If not, is there an agency in your region that is responsible for vector control?

20. If yes, who?

21. Does your agency either do the following or work with the local agency responsible for vector control to do the following?

	Yes	No	n/a
Identify areas for spraying	○	○	○
Publicize spraying	○	○	○
Track vector-borne disease	○	○	○
Provide public education about vector control	○	○	○

Disease tracking and surveillance

22. Is there a disease tracking system in place in your region?

23. If yes, is it operated by your agency?

24. If not, who operates it?

25. Which, if any, of the following diseases and conditions are tracked?

	Tracked	Not tracked	Don't know
Heat-related morbidity and mortality	○	○	○
West Nile Virus	○	○	○
Western Equine Encephalitis	○	○	○
St. Louis Encephalitis	○	○	○
Asthma	○	○	○
Cardiovascular disease	○	○	○
Cancer	○	○	○
Other (please specify)			

Information Needs and Resources

26. Does your agency have adequate information to respond to current public health emergencies (climate-related or otherwise)?

27. Do you feel that you have adequate **information** to respond to the potential public health risks associated with climate change?

28. How useful would the following types of information be to your agency to help mitigate public health impacts related to climate change?

	Not helpful	Neither helpful nor unhelpful	Helpful	Very helpful
Scientific information on general climate impacts	○	○	○	○
Educational programs for agency staff	○	○	○	○
Guidance from California Department of Public Health	○	○	○	○
Guidance from the Office of Emergency Services	○	○	○	○
Statewide health tracking database	○	○	○	○
Detailed regional risk assessment of climate impacts	○	○	○	○
Vulnerability assessment to identify at-risk populations	○	○	○	○
Clearinghouse for information on climate-related public health programs	○	○	○	○
Other (please specify)				

29. If your agency would like more information on the public health impacts of climate change, who would you like the information from? Check all that apply.

☐ Scientists

☐ The medical community

- ☐ California Department of Public Health
- ☐ California Air Resources Board
- ☐ California Conference of Local Health Officers
- ☐ Other (please specify)

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

31. If not, what resources are needed?
    - ☐ Dedicated funding for climate activities
    - ☐ Staff with expertise in climate science
    - ☐ Additional technical/analytical resources for health impact assessments
    - ☐ Additional technical/analytical resources to conduct vulnerability assessments
    - ☐ Better coordination with state agencies (specify which below)
    - ☐ Better coordination with local agencies (specify which below)
    - ☐ Other (please specify)

Policymaking climate

32. In thinking about what your agency and those of other counties are doing in the field of climate change, would you say your county is doing more, less, or about the same as other counties?

33. Which of the following statements best describes the policymaking environment in which health and climate change are linked in your county?
    - O There is very little discussion or interest in the topic.
    - O There is considerable interest, but there is much disagreement and conflict about what to do or whether to do anything.
    - O There is much interest and support to have the county become involved in managing the possible health effects of climate change.

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PUBLIC POLICY INSTITUTE OF CALIFORNIA
500 Washington Street, Suite 600
San Francisco, California 94111
phone: 415.291.4400
fax: 415.291.4401

PPIC SACRAMENTO CENTER
Senator Office Building
1121 L Street, Suite 801
Sacramento, California 95814
phone: 916.440.1120
fax: 916.440.1121

www.ppic.org