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CSTE

COUNCIL OF STATE AND
TERRITORIAL EPIDEMIOLOGISTS

CSTE Summary Report

Climate and Health Surveillance Capacity Assessment

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Acknowledgements

This summary report, prepared by [Hutton Health Consulting LLC](#) for the Council of State and Territorial Epidemiologists (CSTE) and was supported by the Centers for Disease Control and Prevention of the U.S. Department of Health and Human Services (HHS) as part of a financial assistance award totaling \$50,000 with 100 percent funded by CDC/HHS. The contents are those of the author(s) and do not necessarily represent the official views of, nor an endorsement, by CDC/HHS, or the U.S. Government."

Special thanks to CSTE's Climate and Health Surveillance Workgroup; CSTE's Climate, Health, and Equity Subcommittee; and the jurisdictions who provided their valuable feedback in the CSTE Climate and Health Surveillance Capacity Assessment found in Appendix A.

Background

Climate and health surveillance at the state and local level is critical for protecting communities from the impacts of changes in weather and climate. By monitoring health hazards and health outcomes that have been associated with a changing climate, public health agencies can identify emerging health threats, tailor interventions, and improve community resilience. Having good data leads to a better understanding of specific areas of need and targeted strategies to reduce risk. A robust surveillance system reveals vulnerable populations and appropriate trigger actions, such as heat alerts, air quality advisories, and flood warnings. A strong surveillance system informs policy and planning and helps allocate resources more wisely. This is especially important now as many jurisdictions are facing additional resource limitations which have made it more difficult to collect, analyze, and interpret best actions for states and localities.

CSTE works to advance public health policy and epidemiologic capacity. CSTE provides information, education, and developmental support for epidemiologists in a wide range of areas as well as expertise for program and surveillance efforts. CSTE's Climate, Health, and Equity Subcommittee provides a forum for epidemiologists and other public health professionals who work in climate and health surveillance at state, tribal, local, and territorial levels (STLT).

[Hutton Health Consulting \(HHC\)](#) collaborated with CSTE's Climate and Health Surveillance Workgroup and subject matter experts to develop a survey to assess capacity, needs and gaps related to climate and health surveillance and epidemiology among STLTs. The goal of this project is to inform future CSTE activities to support jurisdictions working in climate and health surveillance.

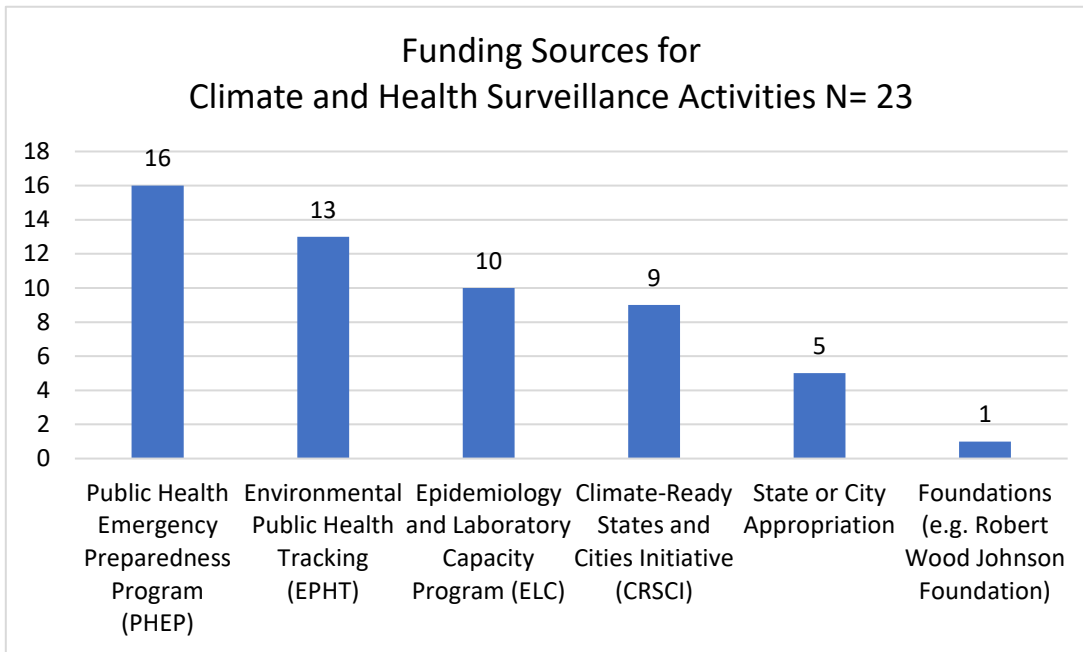
Methods

The following methods were used by HHC and CSTE during this project:

- HHC facilitated three calls with subject matter experts in two state jurisdictions and CSTE's Climate and Health Surveillance Workgroup to help inform the assessment tool.
- HHC drafted a survey to assess capacity, needs, and gaps related to climate and health surveillance and epidemiology among STLTS. CSTE then created an online version of the final assessment using Qualtrics.
- CSTE sent the assessment to public health professionals responsible for working on climate and health surveillance. This included CDC's Climate Ready States and Cities Initiative grantees; CSTE's Climate, Health, and Equity Subcommittee; and additional contacts working in environmental health. Those who received the survey were informed that no responses would be attributed to specific jurisdictions, and that CSTE wanted one survey response per jurisdiction. A total of 23 different jurisdictions completed the survey, including 14 state jurisdictions and 9 local jurisdictions. No tribal or territorial jurisdictions completed the assessment.
- HHC analyzed the survey results, provided by CSTE, and developed descriptive graphs and tables to illustrate the current capacity, needs, and gaps of jurisdictions.
- HHC drafted a report describing the analysis of survey results and key takeaways.
- HHC presented the findings to the CDC; CSTE's Climate, Health, and Equity Subcommittee; and partners.

Findings

FUNDING SOURCES:

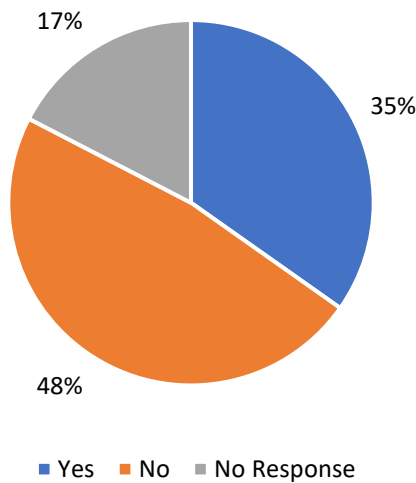


Among 23 survey respondents, 16 jurisdictions (70%) indicated that the Public Health Emergency Preparedness Program (PHEP) is a key source of funding for climate and health surveillance activities. More than half (57%) cited the Environmental Public Health Tracking Program (EPHT). Also mentioned frequently was the Epidemiology and Laboratory Capacity Program (ELC) at 43% and Climate-Ready States and Cities Initiative (CRSCI) at 39%. A state or city appropriation was indicated by five respondents (22%) and foundations, such as the Robert Wood Johnson Foundation, was listed by one respondent.

Some jurisdictions added that they received funding from other sources, including National Institute for Occupational Safety and Health (NIOSH) State-Based Surveillance Grants, and Preventive Health and Health Services Block Grants.

NOTE: In questions where respondents could provide additional information, some content has been edited to both shorten responses and protect confidentiality.

Did You Use Funding from CDC's PHIG or DMI to Support Climate and Health Surveillance? N=23



When asked specifically about funding support for climate and health surveillance from CDC's Public Health Infrastructure Grant (PHIG) or the Data Modernization Initiative (DMI), 11 respondents (48%) said no, and eight said yes (35%). For respondents who answered yes, funds were used to hire or support staff, expand information technology (IT) and surveillance capacity, or enable specific projects and reports.

The specific examples provided by respondents of how funding was used are summarized below:

- DMI funding allowed jurisdictions to expand data and IT infrastructure, including assessing data modernization needs and developing recommendations for a department plan. In addition, this funding made staff available to expand data storage and sharing platforms.
- PHIG funding supported several climate and health surveillance efforts, including:
 - publishing a climate and health report;

"FOR EXAMPLE, CLIMATE CHANGE AND HEALTH WAS ONE OF THE USE CASES EXPLORED BY A CONSULTANT HIRED TO ASSESS DATA MODERNIZATION NEEDS AND MAKE RECOMMENDATIONS ON A DATA MODERNIZATION PLAN FOR THE DEPARTMENT. IN ADDITION, OUR IT STAFF HAVE BEEN MORE AVAILABLE TO HELP US EXPAND OUR USE OF DATA STORAGE AND SHARING PLATFORMS SUCH AS DATABRICKS AND AZURE DEVOPS."

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- funding a Climate and Health Adaptation Manager, who helps coordinate surveillance activities with various epidemiologists monitoring for weather events during emergency response events such as extreme heat, winter and cold events, strong storms leading to power outages, flooding, and wildfire smoke. This position also supports emergency preparedness and response activities;
- hiring a new staff person to work on climate and health surveillance;
- partially funding an epidemiologist in tracking and biomonitoring;
- partially funding a project detailing how climate change is impacting local municipal water and sewer facilities;
- supporting half of a GIS Analyst, who was instrumental in 1) developing an air quality and non-infectious disease dashboard; 2) redesigning a website with harmful algal blooms interactive maps; and 3) improving human/animal illness reporting tools; and
- supporting the Occupational Heat-Related Illness Prevention Program, with NIOSH funds, which is statewide and not exclusively focused on work-related exposures.

REDUCTIONS IN FORCE AND FUNDING:

Seventy-four percent of respondents (17/23) chose to answer the optional question, “Please describe the impact that the proposed reductions in public health funding at the federal level, the Reductions in Force (RIFs), and elimination of program areas at HHS/CDC are having on your department’s current and future ability to conduct activities related to climate and health surveillance and epidemiology?”

While one respondent said there was “no impact right now,” another jurisdiction shared they are “developing contingency plans.” All others listed one or multiple current or potential impacts. Respondents are concerned about losing staff positions, partial or entire projects and programs, capacity to conduct surveillance or analyze data, capacity to share or expand data, curtailing risk communication to public audiences, losing the opportunity to get and give technical assistance and training, limiting public health preparedness response to existing and emerging threats, and describe concerns about maintaining a sound public health infrastructure.

Here are specific quotes provided by respondents:

“The reduction in funding and elimination of program areas severely impacts our state's capacity to perform critical climate and epidemiological surveillance activities and are solely funded by federal grants. Without funding, environmental health will no longer be able to: maintain surveillance of reportable conditions to promote disease prevention and exposure control; analyze and disseminate environmental health data; or maintain rapid response capacity to novel and emergent environmental outbreaks and environmental health hazards. The climate and health program will not be able to: develop and maintain strategic partnerships with governmental and non-

governmental partners; develop, exercise and maintain preparedness and response plans; develop and maintain public health education and risk communication capabilities; or advance health equity and climate justice.”



“THERE IS VERY LIMITED FUNDING FOR ANY CLIMATE CHANGE ACTIVITIES. PHEP IS THE ONLY SOURCE OF FUNDING WE CAN USE REGULARLY FOR PREPARING CLIMATE CHANGE RESILIENCE ACTIVITIES. WITH THE SIGNIFICANT REDUCTIONS IN THIS GRANT, WE WILL ONLY BE ABLE TO PERFORM BASIC PREPAREDNESS ACTIVITIES.”

CSTE MEMBER

“I rely on the EPHT website for important information used in our surveillance.”

“Reduction in EPHT funds for data portals, means fewer updates and less data expansion.”

“We will not be able to dedicate staff to climate health initiatives, and will have to scale back future plans.”

“We will likely lose our Heat Program unless the state funds it or we can find alternative funding sources.”

“Reductions in federal funding and support for climate health will limit future growth of our climate health programs.”

“Federal funding reductions are limiting department capacity to conduct all activities including work related to climate and health surveillance and epidemiology.”

“We will no longer have to the capacity to issue heat alerts or weekly heat-related illness (HRI) surveillance.”

“Halting development of 6th National Climate Change Assessment and staff reductions at research institutions such as NOAA, USGS, EPA, etc. creates uncertainty for several research and surveillance activities. Potential reductions in federal funding will impact our environmental public health tracking program which provides publicly available data on air quality and heat-related illness.”

“If we don't receive any further funding via the EPHT or CRSCI funding streams, it is likely that climate and health surveillance/epidemiology will cease to exist at our department. As of this date, we have been unable to solidify alternative sources of funding to maintain this work.”

“Our Climate and Health Program has utilized several tools developed by federal agencies to enhance our ability to identify extreme weather threats and enact response plans. These tools include the EPA AirNow, CDC/NWS HeatRisk, CDC Heat Health Tracker, the HHS climate and health outlook briefing, and HHS EmPOWER. Reductions in funding and reductions in federal workforce threaten to undermine the availability and reliability of these tools which would limit our ability to prepare for and respond to events in a timely manner. In addition, cuts to CDC programs like Tracking could lead to direct funding cuts to [our jurisdiction's] Tracking program and hamper the

ability to collect and display health and exposure data and monitor long-term trends in health outcomes related to weather and climate change. With reductions in workforce, we also lose access to subject matter experts that can provide technical assistance to our programs such as understanding data and evaluating tools.”

“The reduction in public health funding has diminished our workforce, thereby limiting the capacity, time, and resources available for unfunded projects and programs, such as climate and health surveillance. Consequently, staff losses have significantly reduced our jurisdiction's bandwidth to expand or maintain these critical initiatives. In addition, we have experienced a reduction in training opportunities and lessons learned from CDC, and a general decline in communication with them.”

“If proposed cuts were to move forward again in the future, they would significantly curtail our climate hazard and health outcome surveillance, epidemiology response, reporting, risk communication, and local public health support.”

“Our department's climate and health capabilities are experiencing effects from reduced federal public health funding and RIFs at HHS/CDC. This includes a projected decrease in engagement with federal liaisons and subject matter experts, impacting our access to specialized knowledge and technical guidance. Changes in federal grant availability are expected to influence staffing decisions for key positions, which will, in turn, affect our capacity for critical data analysis, intervention development, and responding to environmental and climate-sensitive threats. These operational adjustments will likely influence our ability to effectively conduct comprehensive surveillance, analyze data, and share vital information, potentially altering the overall timeliness and capacity of public health infrastructure. Consequently, our planning for environmental and climate-related emergencies may require adjustments, impacting our preparedness efforts.”

“Right now, our Climate and Health Program is 100% funded by the BRACE award. If we lose funding, this will mean our entire team of three full-time employees, one full-time temporary employee, and one student intern would lose their positions. We maintain a Heat Health Alert System and Heat-related Illness Surveillance, as well as many other climate-related activities that may not be maintained, or at least to the same extent, if our program loses funding. Additionally, we have three grantees now who engage in climate and health-related activities in different regions and these projects may not be maintained if we cannot fund the contract. Last, we often provide educational and promotional materials for populations at high-risk of extreme heat exposures. This has included cooling towels and water bottles (with educational messaging printed on them, shirts and hats, electrolyte packets, and high velocity fans, which have been distributed to farmworkers and others.”

“Our ability to do climate work was already severely undercut by CDC's decision to eliminate funding for a number of programs with the original NOFO several years ago. Frankly, this had a bigger impact on us than the latest RIFs, although we have managed to keep a small amount of climate work alive through Environmental Public Health Tracking (which is now also gone). The combination of those two decisions has all but completely eliminated our capacity to do climate-related work in the Department of Health. In addition, the threatened cut of Public Health Emergency Preparedness may harm our existing state work on the heat and cold emergency planning activities, done by our Office of Preparedness and Response together with our Environmental Health Bureau.”

“The impacts from the RIFs at the CDC level include: inability to receive feedback from the Climate and Health Science Team on existing curriculum development work; inability to access resources on extreme heat technical tools that the Climate and Health Program created and presented to recipients previously; inability to obtain guidance from the Climate and Health Translation and Evaluation team on how to prioritize funding opportunities for additional activities related to adaptation actions; inability to meet and collaborate with the Heat Adaptation Community of Practice which allowed grant recipients to share work and prepare for the impending heat season; pausing, out of caution, given the RIFs in Climate and Health staff, the execution of four contracts with municipalities to engage in local heat and air quality planning activities; forced cancellation of the annual Climate and Health Symposium, which is the only statewide forum on the intersection of climate and health and is a critical tool for preparedness and public education; and pausing the planning of extreme heat and other adaptation activities for the 2025-2026 grant cycle due to concerns about the NOA and the absence of program staff.”

NATIONAL DATA SOURCES:

Respondents were asked questions about climate and health data sources at the national, state, and local levels. This first question focused on which national sources they accessed and how often. Of the 20/21 jurisdictions who answered, the most cited sources used regularly were U.S. Census data (19), National Weather Service Climate Data (15), CDC’s EPHT (13), NOAA Climate Data (13), and CDC’s Health and Heat Tracker (12). CSTE Environmental Health Indicators and NASA Climate Data Indicators were listed by about half of respondents as “accessed at least once.” Few sources were identified as “not useful/used, but no longer available or complete.” Six national sources were identified as “never looked at” with Climate-Related Migrations Maps cited by 17 of 20 respondents.

National Data Source	Never Looked at Source	Looked, But Didn't Find Useful	Accessed Source At Least Once	Use Source Regularly	Used, But No Longer Available or Complete	TOTAL
CSTE Environmental Health Indicators: Climate Change	6	0	11	3	1	21
CDC Heat and Health Tracker	0	3	5	12	1	21
CDC EPHT Network	3	1	3	13	1	21
National Weather Service Local Climate Data	0	2	4	15	0	21
National Oceanic and Atmospheric Administration Climate Data	0	1	7	13	0	21
United States Geological Survey	8	3	6	4	0	21
NASA Climate Data/Indicators	7	1	10	3	0	21
Behavioral Risk Factor Surveillance System Data	8	2	6	5	0	21
United States Census Bureau data	0	0	2	19	0	21
Climate-Related Migration Maps	17	1	2	0	0	20

Jurisdictions were asked how they used national data sources. The total number of uses was greatest for “External Presentations or Reports” with the three sources most used being U.S. Census Bureau Data (17), NOAA Climate Data (15), and National Weather Service Climate data (13). Data use was frequently cited for “internal purposes,” with the top three sources being National Weather Service Climate Data (13), CDC Heat and Health Tracker (12), and NOAA Climate Data (11). A third popular use was “trend monitoring,” with the top being U.S. Census Bureau Data (14), CDC EPHT Network (12), National Weather Service Climate Data (11), and NOAA Climate Data (11). For those using data sources for real-time monitoring, National Weather Service Climate Data and CDC Heat and Health Tracker were the most identified sources. For research purposes, U.S. Census Bureau and NOAA Climate data were listed most often.

National Data Source	Internal Purposes	Research Studies	External Presentations or Reports	Real-Time Monitoring	Trend Monitoring	Other
CSTE Environmental Health Indicators: Climate Change	9	1	4	0	2	1
CDC Heat and Health Tracker	12	2	10	10	4	3
CDC EPHT Network	9	4	11	3	12	1
National Weather Service Local Climate Data	13	6	13	14	11	0
National Oceanic and Atmospheric Administration Climate Data	11	8	15	9	11	0
United States Geological Survey	4	2	4	3	3	0
NASA Climate Data/Indicators	7	4	8	1	4	0
Behavioral Risk Factor Surveillance System Data	5	6	9	0	9	0
United States Census Bureau data	10	11	17	5	14	4
Climate-Related Migration Maps	1	1	0	0	0	0

STATE DATA SOURCES:

Respondents were asked to identify which state-based based data sources they accessed and how often. Of the 21 jurisdictions who answered, the most cited sources used regularly were ED visits (20), Vital Statistics (17), Syndromic Surveillance (17), Hospital Discharge Data (12), and Infectious Disease data (10). Sources that were accessed were predominantly seen as useful, but it is noted that many state-based resources were cited as “never looked at,” including Medicare/Medicaid enrollment, physician records, Public Assistance Data (e.g. low-income energy assistance) and Workers’ Compensation. In addition, some respondents reported using other data sources that were either specific to their jurisdiction or a national source filtered for their jurisdiction (e.g., NWS

State Data Source	Never Looked at Source	Looked, But Didn't Find Useful	Accessed Source At Least Once	Use Source Regularly	Used, But No Longer Available or Complete	TOTAL
Vital Statistics	2	0	2	17	0	21
Physician Records / All-Payer Claims Databases	15	1	4	1	0	21
Hospital Discharge Data	2	0	7	12	0	21
State Climate Office Data	8	1	5	7	0	21
Emergency Department Visits	0	0	1	20	0	21
Syndromic Surveillance	1	0	3	17	0	21
EMS Data	8	0	5	8	0	21
Workers' Compensation	13	2	3	3	0	21
Medicaid / Medicare Claims or Enrollment	17	0	3	1	0	21
Low Income Home Energy Asst. Program / Other Public Ass. Data	14	0	6	1	0	21
Infectious Disease, Including Vector-Borne Disease Data	3	1	6	10	1	21
Other *	0	0	0	5	0	5

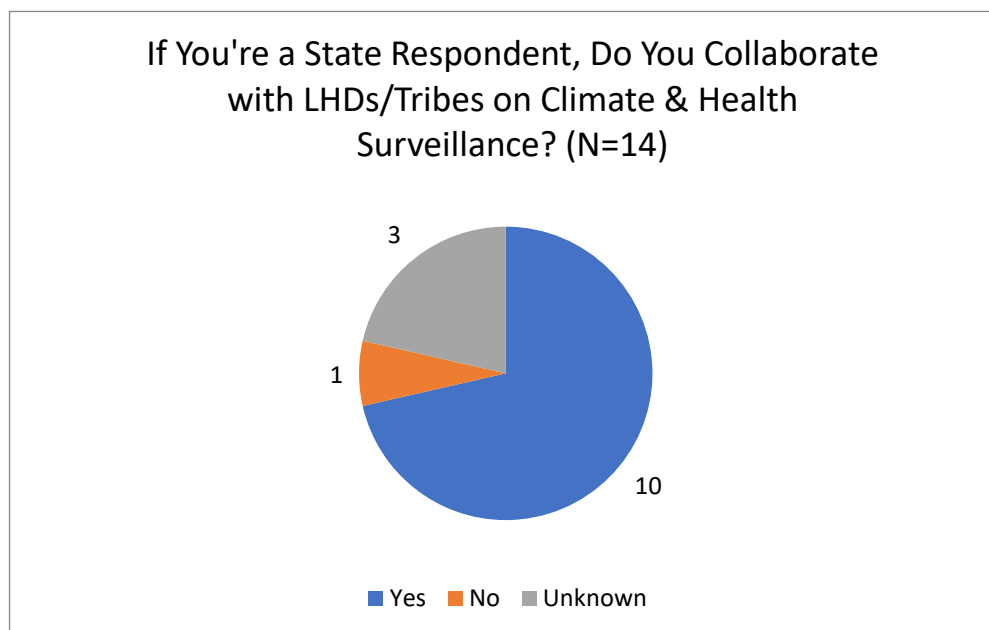
HeatRisk, EPA AirNow, or state OSHA data). Other state or local sources listed included population-based data and state opioid and overdose dashboards.

Jurisdictions were asked how they used state-based data sources. Trend monitoring was the most cited use, with the five sources used most frequently being ED visits (17), Vital Statistics (15), Syndromic Surveillance (15), Hospital Discharge Data (13) and Infectious Disease data (13). The next highest use was for “external presentations and reports,” with the same data sources listed for trend monitoring. When state sources were used for internal purposes, ED visits and syndromic surveillance were most cited. For research studies, respondents listed the top two sources as ED visits and syndromic surveillance. For real-time monitoring, syndromic surveillance was easily identified as the most useful state-based source.

State Data Source	Internal Purposes	Research Studies	External Presentations or Reports	Real-Time Monitoring	Trend Monitoring	Other	N/A
Vital Statistics	9	7	13	7	15	1	0
Physician Records / All-Payer Claims Databases	1	1	0	0	1	0	0
Hospital Discharge Data	7	8	11	4	13	0	0
State Climate Office Data	2	5	6	3	5	0	0
Emergency Department Visits	11	10	15	8	17	0	0
Syndromic Surveillance	10	6	13	15	15	1	0
EMS Data	6	1	4	5	5	0	0
Workers' Compensation	0	3	4	0	0	1	0
Medicaid / Medicare Claims or Enrollment	2	4	1	1	1	0	0
Low Income Home Energy Asst. Program / Other Public Ass. Data	4	3	2	1	2	0	0
Infectious Disease, Including Vector-Borne Disease Data	9	7	10	7	13	1	0
Other	2	3	2	4	3	0	0

COLLABORATION:

One assessment question asked state jurisdictions if they collaborated with local health departments (LHDs) or tribal organizations within their borders on climate and health surveillance. Of the 14 respondents, 10 said they did collaborate, 1 did not, and 3 did not know.



The 10 states who said they collaborated with LHDs and/or tribal organizations said they provided technical assistance; access to surveillance data/exchange of state and local data; networking opportunities through group calls or communities of practice; and workshops or presentations.

Here are specific quotes provided by respondents:

“Our department engages in crucial bidirectional data exchange with Local and Tribal Health Departments (LHDs/THDs). They access our state-level data, while we pull granular local data elements. Elements of collaboration include formal Data Use Agreements, jointly developing and refining case definitions, and electronic reporting systems. Such information sharing is critical for rapidly disseminating outbreak investigation information, enhancing statewide situational awareness, enabling faster detection, and supporting targeted interventions, ultimately strengthening our collective public health response.”

“We have developed a Heat Risk Dashboard. This dashboard provides county-specific displays as well. We have also developed county-specific "heat-health profiles" which are .pdf reports that include heat and health surveillance information, but are updated less frequently. We have supported individual LHD requests for climate and health surveillance information when requested (as long as request is reasonable from a resource perspective). We have conducted workshops and webinars, and have funded mini-grants the last few years.”

“We work with locals to implement our climate adaptation actions. We do not access local data sources.”

“[We collaborate on] data collection and reporting of infectious diseases, insect vectors, cooling center use, and demographic data.”

“LHDs access state data, either on their own or in conjunction with us.”

“Our department collaborates with local health authorities within our jurisdiction on climate and health surveillance. We engaged with LHAs during the development of an HRI webpage, incorporating links to each LHA's resources on HRI to facilitate easier access to local information. Secondly, we worked closely with LHAs that had previously released reports to align methodologies and ensure consistency between state and local data. This collaboration included harmonizing ESSENCE query parameters, CCDD category usage, and inclusion/exclusion criteria, thereby minimizing discrepancies.”

“We work with a large LHD to make sure all heat-related deaths are documented in the city. The LHD participates in our Climate and Health Workgroup (has members from many several agencies)



“WE PROVIDE MINI GRANTS, COUNTY ENVIRONMENTAL HEALTH PROFILES, TECHNICAL ASSISTANCE, TRACKING DATA PORTAL, DATA REQUESTS, PRESENTATIONS. WE GATHER LOCAL DATA VIA PUBLIC HEALTH NURSE FOLLOW UP THAT IS THEN FED TO OUR STATE AGENCY.”

CSTE MEMBER

which meets once a month to discuss projects and opportunities to work together and support one another's work.”

“Our Environmental Public Health (EPH) unit supports the convening of a Local Public Health Authority (LPHA) Community of Practice (CoP), which aims to establish a network of support among LPHAs working in climate and health planning. The bi-monthly CoP offers a space for LPHAs to build connection and support social resiliency while emphasizing peer-to-peer learning and collaboration. In 2025, the CoP hosted 2 workshops on ESSENCE and the use of environmental hazard and health outcome data in climate-related risk communications in support of LPHA requirements to complete a local or regional climate and health adaptation plan. EPH offers 1:1 environmental health technical assistance to all LPHAs as needed. This includes, but is not limited to, integrating environmental health data into community health assessments and climate and health adaptation plans. Additionally, EPH publishes an annual climate change and state health outcomes report which LPHAs and partners utilize to support climate adaptation work. We meet monthly to provide a collaborative space to share updates, discuss ongoing projects, and exchange feedback on work related to climate change and environmental health focusing on issues such as air quality from wildfire smoke and extreme heat. Other ongoing project collaborations with LHDs include technical assistance and mutual data sharing components.”

“Our department informs LHDs through the Health Alert Network of extreme weather threats and provides syndromic surveillance results as needed to support response actions. If an LHD reaches out, we can also provide them with surveillance data directly. Our regional epidemiologists also support LHDs with syndromic surveillance as needed. The Climate and Health Program also coordinates a standing workgroup of LHD staff in various roles to review seasonal forecasts, debrief on response efforts, and discuss local needs to improve future state-level preparedness planning and responses.”

“We provide technical assistance to LHDs and tribes on how to access data, data analysis, and other resources. We have a LHD technical assistance coordinator (1 staff person) and a tribal technical assistance coordinator (1 staff person). These staff establish relationships with the local entities, assess their needs for support, and coordinate assistance. This includes things like regular CoP calls for LHDs. Technical assistance spans a variety of topics, not just epidemiology and surveillance, but is often related to these topics. We give support in many ways, including but not limited to, presentations, group calls about data sources and other data-related topics, providing office hours with state climate epidemiologists where LHD staff can ask questions, working with local entities one-on-one to explore their data and surveillance questions, providing online data tools, providing information on where they can find other data and tools, etc.”

CLIMATE SURVEILLANCE PRIORITIES:

Another assessment question asked respondents to rate their department's public health priorities for surveillance and monitoring of climate threats.

Of the respondents who answered, extreme heat was rated as the highest priority (20/21), with air quality (18/21) close behind. For about half of the respondents, vector-borne disease (11/21) and injury risk due to extreme weather (10/21) were also noted, followed by flooding (9/21).

Moderate priorities included mental health with 15/21 respondents, followed by waterborne disease (14/21), and flooding (11/21). The lowest priority for respondents were climate migration (12/20), food insecurity (11/21), and drought (10/21).

A high priority area added in "other" was smoke from wildfires and prescribed burns. A moderate priority area added was extreme cold.

	High	Moderate	Low	
Climate Threats	Priority	Priority	Priority	Total
Extreme Heat	20	1	0	21
Air Quality	18	3	0	21
Vector-Borne Disease	11	8	2	21
Injury Risk (Due to Extreme Weather)	10	8	3	21
Flooding	9	11	1	21
Waterborne Disease	4	14	3	21
Drought (Including Food System Disruption)	3	8	10	21
Energy Insecurity	5	7	9	21
Food Insecurity	2	8	11	21
Mental Health	5	15	1	21
Climate Migration	0	8	12	20
Other	1	1	0	2

STATUS OF MONITORING CLIMATE THREATS:

This question asked respondents to indicate their department's status for monitoring climate threats that were emerging and/or in active surveillance. Respondents were actively monitoring all threats listed, except for climate migration. The threats listed most often as in active surveillance were extreme heat, vector-borne disease, air quality, waterborne disease and injury risk due to extreme weather. The threats that were listed most often as emerging were energy insecurity, mental health, food insecurity, flooding and climate migration, closely followed by air quality, injury risk due to extreme weather and drought.

For some threats, depending on the jurisdiction, some respondents reported they were in active surveillance while others were currently seeing it as an emerging threat (e.g. air quality, injury risk due to extreme weather, flooding and waterborne disease). However, many other threats were seen as emerging with few or no jurisdictions reporting them in active surveillance (e.g. drought, energy insecurity, food insecurity, mental health and climate migration).

Other emerging climate threats added by respondents were water insecurity; smoke from wildfires and prescribed burns. A threat added to active surveillance was wildfire smoke.

Climate Threats	Emerging Threat	In Active Surveillance
Air Quality	10	16
Extreme Heat	8	20
Vector-Borne Disease	6	19
Injury Risk (Due to Extreme Weather)	10	11
Flooding	11	7
Waterborne Disease	9	12
Drought (Including Food System Disruption)	10	3
Energy Insecurity	15	3
Food Insecurity	12	1
Mental Health	15	3
Climate Migration	11	0
Other	2	1

AVAILABILITY OF EXPOSURE DATA:

Respondents then rated, on a scale of 0-4, the availability of exposure data for the climate threats they had identified as high priority or highly emerging. The number of responses varied, as there was variation for high or emerging choices.

Respondents viewed the exposure data for extreme heat as the most available, and identified the exposure data for mental health as the least available. Most respondents placed the exposure data for flooding at about the midpoint.

The availability of exposure data for other climate threats was dependent on jurisdiction, with mixed ratings for air quality, and generally mid-range ratings for vector-borne disease and injury risk due to extreme weather.

Drought, energy insecurity, food insecurity and climate migration earned low ratings for exposure data availability. Other threats added to the rating were smoke from wildfires, water insecurity, and wildfire smoke.

	Does Not Meet Needs			Meets Needs	
	0	1	2	3	4
Climate Threats					
Air Quality	0	4	3	7	5
Extreme Heat	0	0	4	4	11
Vector-Borne Disease	0	1	7	8	2
Injury Risk (Due to Extreme Weather)	0	2	6	6	3
Flooding	0	3	11	3	1
Waterborne Disease	0	1	5	7	2
Drought (Including Food System Disruption)	4	5	4	0	1
Energy Insecurity	2	6	5	1	0
Food Insecurity	3	6	3	1	1
Mental Health	1	10	2	3	1
Climate Migration	5	3	1	0	0
Other	1	1	0	1	0

AVAILABILITY OF HEALTH OUTCOME DATA:

Respondents then rated, on a scale of 0-4, the availability of health outcome data for the climate threats they had identified as high priority or highly emerging. The number of responses varied, as there was variation for high or emerging choices.

Respondents viewed the health outcome data for extreme heat and vector-borne disease as the most available. Most respondents placed health outcome data at about the midpoint for air quality, injury risk due to extreme weather, and flooding.

Respondents indicated health outcome data was least available for climate migration, drought, energy insecurity, and food insecurity. Availability of health outcome data for mental health impacts was also rated low. Other threats added to the rating were smoke from wildfires, water insecurity, and wildfire smoke.

	Does Not Meet Needs			Meets Needs	
	0	1	2	3	4
Climate Threats					
Air Quality	0	3	8	6	2
Extreme Heat	0	1	1	14	4
Vector-Borne Disease	0	0	4	10	4
Injury Risk (Due to Extreme Weather)	0	2	11	3	1
Flooding	2	3	11	1	0
Waterborne Disease	0	2	3	6	4
Drought (Including Food System Disruption)	5	5	3	0	0
Energy Insecurity	4	7	2	0	0
Food Insecurity	3	4	3	0	0
Mental Health	0	7	7	4	0
Climate Migration	8	2	1	0	0
Other	0	1	2	0	0

BARRIERS TO ENHANCING SURVEILLANCE (OTHER THAN FUNDING):

This question asked, “Other than funding as a general barrier, what are the three greatest barriers preventing your department from enhancing surveillance in the high priority areas?” The top answer was bandwidth (lack of resources/competing priorities). Another highly mentioned barrier was that data are lacking, do not exist, or have quality issues.

The next two categories listed as barriers to enhance surveillance in high priority areas were the need for additional training on data sets/best analytic methods and the lack of real-time monitoring.

All categories received at least one vote, showing that there are diverse reasons jurisdictions are challenged to conduct surveillance, even when the climate threat is seen as a high priority. Other barriers added to the ranking were the connection between data and decision-making and inconsistent leadership support/political opposition.

Barriers to Enhancing Climate Surveillance (in ranked order)	Number
Bandwidth (lack of resources/competing priorities)	18
Data are Lacking / Does Not Exist / Data Quality Issues	12
Need for Additional Training on Data Sets / Best Analytic Methods	8
Lack of Real-Time Monitoring	6
Lack of Leadership Support / Political Opposition	4
Underutilized Partners (inside / outside of agency)	3
Lack of Streamlined Processes When Working with Multiple Data Sets	3
Inadequate IT / Technology / Analytic Capacity	3
Challenges Accessing Existing Data	2
Other	2
Lack of Data Sharing Agreements	1
Limitations in Public Access to Data	1

This next question sought more detail about the barriers for enhancing surveillance they had identified as the top three. Respondents were asked to say more about their challenges and ideas for improvement. The many specific responses are summarized below.

Here are specific quotes provided by respondents grouped by theme:

Staffing & Resource Challenges:

- “Current staffing levels mean immediate public health needs are prioritized, which can lead to delays or postponements in surveillance and epidemiology initiatives. This limits our ability to fully explore new projects, develop specialized expertise, or implement new methodologies for long-term public health enhancement.”
- “The absence of dedicated epidemiologists for climate and health programs, limits our capacity for exploring and improving use of existing and new data for surveillance.”
- “Funding and staff are disproportionately lower than the opportunities and needs for analysis and production of actionable findings. We maintain a list of climate-related study questions (both internal and recommended by partners), but we lack staff capacity to investigate.”
- “We have a small group responsible for vector-borne disease, rabies (which is very prominent in our county), toxic substance exposures, and climate health. All other program areas are mandated by state and local code, and always receive priority before climate health. Often the best we can do is keep leadership and partners aware of the health consequences of climate change.”
- “We don't have syndromic surveillance algorithms for some health outcomes of interest. We know these are available, but don't have staffing resources to implement them.”

Data Challenges:

- “Challenges include the length in time to get all-cause data, limited ability to assess data, and we're unsure whether data will lead to change.”
- “Data sources are added or subtracted based on federal funding. There is little consistency.”
- “It is challenging to coordinate effectively and obtain timely feedback from jurisdiction-specific partners because of the reliance on other departments for data analysis and dashboard development, who are also limited in their capacity to assist.”
- “The lack of access to some important data sources which might exist in our state, such as syndromic surveillance, workers' compensation data, EMS data, and Vital Statistics data is a challenge.”

- “Data for exposures to climate hazards are often lacking. In some cases, data are just not being captured by anyone.”
- “Current medical coding practices make it difficult to ascertain climate-relatedness of health outcomes.”
- “Syndromic surveillance completeness is dependent on facility participation and reporting. There are some counties with no participating facilities.”
- “Hospital and emergency department data, which are much more complete than syndromic data, are released in spring for the previous year. This data lag limits trend monitoring in annual reports.”
- “The challenge is achieving optimal data granularity for public health surveillance, especially in climate and health. While we grasp broad trends like heat illness, detailed data often isn't consistently available or integrated. For example, specifics like A/C functionality in heat-related deaths, or granular EMS call data to pinpoint geographic "hot spots" for cooling centers, are often missing from standard statewide records. This hampers our ability to conduct thorough analyses, identify trends in vulnerable populations, and make highly targeted, evidence-based decisions to improve public health outcomes.”
- “Heat surveillance has not proceeded to the full extent with EMS data from the local fire department, and there has not been good coordination with the fire department for a method to share findings for action.”
- “Real-time monitoring is difficult for heat-related deaths, as there are many delays in getting complete cause of death information in death records.”
- “We are using a clunky method for heat surveillance - query, download table, cut and paste into new table – using temperature data from a university center and heat index data then joining with emergency department data. We need to better automate data flow.”
- “While exposure data for air quality and temperature are available, the monitors that provide the data are often geographically spread out leaving gaps across the state. This means we are often limited in our ability to analyze exposure against health outcome data to better identify localized health impacts. Sometimes, where there is improved coverage, data quality is lacking.”
- “Flooding data is the big hole. We have home flooding data from our annual survey, but that begins in 2022 and it takes six months to a year for data collection and cleaning.”
- “Real-time monitoring is challenging for many infectious disease outcomes, including vector-borne diseases, because of delays in reporting. The time it takes to confirm an infection and close a case can be weeks, if not months, after onset of symptoms. Environmental

surveillance data is an early signal of virus activity before human cases are reported, but all diseases lend themselves to environmental surveillance.”

Training Challenges:

- “Minimal training sometimes requires individuals to seek out resources, hindering project development.”
- “More training is needed on how to use datasets and methods to analyze particular climate data. Epidemiologists may not be trained on climate data or not advanced enough in technical statistical methods needed for many climate analyses.”
- “We often need to leverage outside partners such as climatologists and academics/researchers to help with training on data and analytic methods. Often, they are performing the analyses. Some staff can conduct specific analyses given their experience, but are not well versed on other methods; for example, modeling air quality in relation to pollution, wildfire smoke, or heat.”

Lack of Leadership & Support Challenges:

- “There is a lack of support from policy/decision makers at the state level; no staff dedicated to this topic or area of surveillance aside from syndromic surveillance data analysts.”
- “Changes in leadership can cause disruptions in work and change priority areas.”
- “Environmental epidemiology programs across the country have long noted reprioritization of support for and capacity in environmental epidemiology vs. other epidemiology disciplines. Examples include organizational job classification language that is communicable disease specific, historic epidemiology training, conference focus on communicable disease, and difficulty/resistance to incorporating environmental and injury epi. Even when state leadership supports environmental public health prioritization, program capacity is highly dependent on federal leadership prioritization and funding availability. Given our improved understanding of the interplay between upstream and downstream causal factors and modifiers, we hope that instead of an either/or approach we can work toward increased collaboration and de-siloing.”
- “There is local variability in support for climate health: local public health partners report that local leadership can have an outsized impact on support for climate and health conversations and public health actions. In areas where support is lacking or actively impeded, programs have responded by limiting their focus to hazards/exposures and health outcomes outside of the climate context.”
- “There is no funding set aside for climate health surveillance, in public health. Our county planning department does have some planning and resilience funding for climate change.”

Ideas for Improvement:

- “Achieving sustained investment and long-term capacity building hinges on a stronger, shared strategic vision and alignment with public health priorities across all legislative and federal levels. Consistent, dedicated resources are not merely beneficial, but essential for effective and lasting public health success. Enhanced collaboration and proactive advocacy at every level would be instrumental in securing not only crucial funding for critical advancements, but also legislative change to improve data reporting, opening up existing funding to include extreme heat, and improving access to safe environments (e.g., cool spaces, healthy food, clean drinking water).”
- “Sharing other jurisdictions’ best practices and guidance on how other jurisdictions have overcome some of these barriers would be helpful for those epidemiologists who are taking on these activities on top of their existing duties.”
- “It might be helpful to learn some more about what data sets are out there (that are available at a fine geographic scale). Could see something like a community of practice that looked at difference data sets, explored how to access/process them, etc. being helpful.”
- “None of us epidemiologists know much modelling beyond linear and logistic regression, and it's been a long time since we did a time-to-event analysis. We would like to account for duration of exposure to heat in addition to event co-occurrence with heat, but don't know how. A best practices manual for calculating excess events that co-occur with heat exposure would be so helpful.”
- “Better data to understand the circumstances of exposure that could inform adaptations/interventions. For example, knowing whether a heat-related illness was a worker, someone recreating, or something else entirely would be helpful.”
- “We need data on who has access to A/C in our county.”
- “We would like our heat surveillance to proceed to the full extent with EMS data from the local fire department, but need good coordination for a method to share findings for action. It takes some plugging away to build a relationship of trust and shared interests.”
- “Some exposures would have to be assessed at the population level. Could partner with a research organization to obtain better data to do exposure-outcome assessments and demonstrate that programs like heat alert systems have some impact on reducing heat-related illnesses in the state.”
- “It would be helpful to be able to better attribute health outcomes to extreme weather in our data. This relates to case definition, awareness of physicians and medical record abstractors to consider environmental factors as contributing causes, and circumstances of exposure.”

- “Access to all-payer data (ideally with case notes) may help.”
- “CoPs that would be helpful - creative data sourcing.”
- “Having good case studies/examples as templates would help tremendously. Most important, however, is funding/resources to make this possible within our agency.”
- “Our team has leveraged coding skills to automate processes, streamlining workflows and freeing up time for other critical tasks as a response to recent staff cuts and the prioritization of other funded projects.”
- “The lengthy review process, involving multiple departments with varying levels of data analysis expertise, complicates efforts. To address this, we strive to ensure thorough internal reviews to minimize issues during the formal review process.”
- “It would be beneficial to implement a check-in process for new programs or employees to ensure they are aware of available resources and best practices in data analysis.”
- “For infectious disease reporting, we often see the tip of the iceberg, as reporting depends on patients seeking care, physicians ordering appropriate testing, and available diagnostics being able to detect infections when they're there. This often means that people with means and the most severe forms of disease are often the cases that get detected, with more vulnerable populations less likely to access the healthcare necessary for testing. How to work around these data challenges would be immensely helpful.”

NEEDED ASSISTANCE:

This last question sought to learn what assistance would be helpful from CSTE or its Climate, Health, and Equity Subcommittee - a forum for epidemiologists and other public health professionals who work in the climate and health field at STLTS. Responses from jurisdictions fell into multiple categories and are summarized below.

Technical Assistance:

Jurisdictions shared that they would benefit from technical assistance on:

- Developing evaluation methods to measure lives saved.
- Communicating about public health without polarizing people politically.
- Identifying and analyzing exposure data, and how data have been used in other jurisdictions.
- Calculating excess events that co-occur with heat or wildfire smoke exposure.
- Incorporating climate resilience work into normal county health surveillance.
- Responding to events (e.g., What air quality level prompts a shutdown of school and other outdoor activities? How effective/ineffective are cooling centers? How to conduct a disaster-style epidemiology study after a flooding event).
- Using EMS data for heat surveillance.
- Finding data sources and researching food insecurity, drought, and mental health.
- Identifying which networks of data sources are best for rural locations, flooding, and water related emergency management.
- Developing an air quality monitoring system countywide.
- Monitoring health outcomes of climate hazards using CDC's ESSENCE, and standardizing ways to classify health outcomes as attributed to climate hazards.
- Accessing cited reports on climate trends to provide insights into regional/statewide trends.
- Analyzing climate data (for public health professionals, not necessarily climate scientists).

Advocacy and Guidance:

Jurisdictions shared that they would like assistance:

- Advocating for heat-related illness, especially occupational, as a reportable condition.
- Developing a position statement or guidance on which climate and health hazards should be the focus of surveillance, and which other activities would be helpful to prepare (e.g., good communications toolkits, response plans, etc.).
- Supporting equity, collaboration, and systems thinking across epidemiology subdisciplines. Perhaps additional workgroups, meetings, or other convenings to support an integrated approach to climate epidemiology and bridge disciplinary divides.
- Offering self-paced training on data sources and methods for surveillance.
- Developing standards for attributing outcomes to climate hazards beyond syndromic surveillance (e.g., factors-influenced coding system for disease constellations and ICD-10 codes.)
- Identifying online dashboards or data maps they could refer interested parties to.

Funding:

Jurisdictions stated that they would appreciate it if CSTE:

- Had more CSTE fellows.
- Made memberships available for free or through grant support.
- Provided resources on funding opportunities.

Conclusions

A total of 23 different jurisdictions, state and local, completed a survey to assess capacity, needs, and gaps related to climate and health surveillance and epidemiology.

The two main sources of funding to support climate and health surveillance were the Public Health Emergency Preparedness Program (PHEP) at 70% and Environmental Public Health Tracking (EPHT) at 57%. At least half a dozen other funding sources were listed, suggesting that jurisdictions often must piece together support to maintain programs.

Specifically asked about CDC's Public Health Infrastructure Grant (PHIG) and the Data Modernization Initiative (DMI), only 38% of respondents indicated they used funds from those sources.

A question that generated several detailed responses asked jurisdictions to describe the impact of proposed federal public health funding reductions, the Reductions in Force, and elimination of program areas at HHS/CDC. Seventy-four percent of respondents answered this optional question, making clear there is a significant impact. With funding in peril, respondents expressed deep concern about losing staff or programs, potentially leading to diminished capacity to conduct surveillance, work with data, provide technical assistance or respond to emerging threats.

This assessment sought to learn more about data sources and uses for climate and health surveillance. When asked which data sources were most used at the national level, the most cited sources were U.S. Census Data, National Weather Service Climate Data, CDC's EPHT, NOAA Climate Data, and CDC's Health and Heat Tracker. CSTE Environmental Health Indicators and NASA Climate Data Indicators were listed as accessed at least once. Half a dozen national sources were "never looked at." This would suggest a potential to promote these underutilized sources to help jurisdictions identify how they could be used to enhance monitoring and surveillance activities.

Respondents said they used national data sources most often for external presentations and reports, internal purposes, and trend monitoring. To a lesser extent, respondents used National Weather Service Climate Data and CDC Heat and Health Tracker for real-time monitoring, and Census Bureau and NOAA Climate Data for research. More jurisdictions might use these sources with a better understanding of their applications.

Asked about state and local sources, the most cited sources used regularly were Emergency Department visits, Vital Statistics, Syndromic Surveillance, Hospital Discharge data, and Infectious Disease data. The most common uses for state data were trend monitoring and developing external presentations and reports. As with the national sources, many state-based resources were "never looked at," creating an opportunity to promote their availability and utility.

Respondents were asked if they collaborated with local health departments or tribal organizations within their borders on climate and health surveillance. Ten jurisdictions said they did by providing technical assistance, access and exchange of data, and networking opportunities.

Seeking to learn more about public health priorities and emerging threats, respondents were asked to rate their highest priorities and emerging threats, and the associated status for monitoring and surveillance. Extreme heat was rated as the highest priority, with air quality a close second. About half the respondents also cited vector-borne disease and injury risk due to extreme weather. For some jurisdictions, smoke from wildfires was also a high priority. The threats that were listed most often as emerging were energy insecurity, mental health, food insecurity, flooding and climate migration. The threats listed most often as in active surveillance were extreme heat, vector-borne disease, air quality, waterborne disease, and injury risk due to extreme weather. However, it is important to note that many threats seen as emerging had few or no jurisdictions reporting them in active surveillance (e.g., drought, energy insecurity, food insecurity, mental health, and climate migration).

Assessment questions next addressed the availability of exposure data and health outcome data for climate threats identified as high priority or emerging. Using a scale of 0-4, respondents viewed exposure data for extreme heat as the most available, and exposure data for mental health as the least available. Exposure data for other climate threats varied, depending on jurisdiction. Respondents viewed the health outcome data for extreme heat and vector-borne disease as the most available, and health outcome data for climate migration, drought, energy insecurity, food insecurity, and mental health as least available.

There is a disconnect between many climate threats that were rated as high priority or highly emerging and the associated health exposure and/or health outcome data. To explore the obstacles that underpin this disconnect and possible pathways forward, respondents were asked to identify their top three barriers. The top barrier was bandwidth (lack of resources/competing priorities). Also cited frequently were data issues (e.g., lacking, do not exist, or have quality issues); need for additional training on data sets/best analytic methods; and the lack of real-time monitoring. There were a wide range of barriers mentioned which illustrate it is challenging for jurisdictions to conduct surveillance, even when the climate threat is seen as a high priority.

When asked to provide more detail on the barriers jurisdictions are facing, the responses were plentiful. Key challenges fell into the categories of staffing/resources, data, training, and lack of leadership and support. Lower staff levels coupled with competing priorities were cited as undermining surveillance and epidemiology activities. Data challenges included inability to get data or incomplete/inconsistent data, reliance on others for analysis, data lags, absence of data granularity, and problems in data sharing and data flow. Training challenges included lack of knowledge about resources, desire to do more advanced training, the need for specialized training for specific climate threats and cross-training for staff, and reliance on outside partners for training. Finally, respondents shared examples of the challenges when leadership and support is lacking: disengaged policymakers, changes in leadership, prioritizing communicable disease over environmental health, influence of local leadership, and lack of funding set aside for climate surveillance.

Respondents also had many suggestions for ways to address these challenges. These included aligning public health priorities across legislative and federal levels; enhanced collaboration and advocacy to secure funding; sharing best practices, guidance, and case studies; a community of practice focused on creative data sourcing and/or data sets at a fine geographic scale; partnering with research organizations; and a check-in process for new people or programs about available resources. There were many specific data suggestions, such as access to A/C use, all-payer data, and better data for vulnerable populations. Some respondents described help with data linkages, such as modeling for time-event analyses and health outcomes and their relationship to extreme weather (e.g., circumstance of exposure, environmental factors, physician awareness). Some respondents shared suggestions from their own experiences about useful strategies to combat challenges, such as being persistent to enhance data sharing, leveraging coding skills to automate processes, and ensuring thorough internal reviews for data-related documents before moving on for wider review.

The final survey question focused on the kind of assistance that would be helpful from CSTE or its Climate, Health, and Equity Subcommittee. Respondents had suggestions for technical assistance, advocacy, funding and training. Much of this assistance is aligned with the challenges and ideas for improvement, such as guides, case studies, and best practices for identifying and analyzing exposure and health outcome data specific to climate and geography. Help is also sought for evaluation methods, modelling, and risk communication. Given competing priorities, respondents also welcomed advice on how to maintain and integrate climate work into mandated surveillance activities.

Respondents also saw CSTE and the subcommittee as advocates, developing position statements or guidance on priority climate and health hazards. They sought continued collaboration across disciplines and integrated approaches to climate epidemiology. To address funding challenges, respondents hoped CSTE could provide more fellows, underwrite CSTE membership, and share information about funding opportunities.

Respondents also sought from CSTE more training designed specifically for public health professionals; websites with map displays for sharing; credible reports on state/regional climate trends; and standards for attributing outcomes to climate hazards beyond syndromic surveillance.

Appendix A: Climate and Health Surveillance Capacity Assessment

