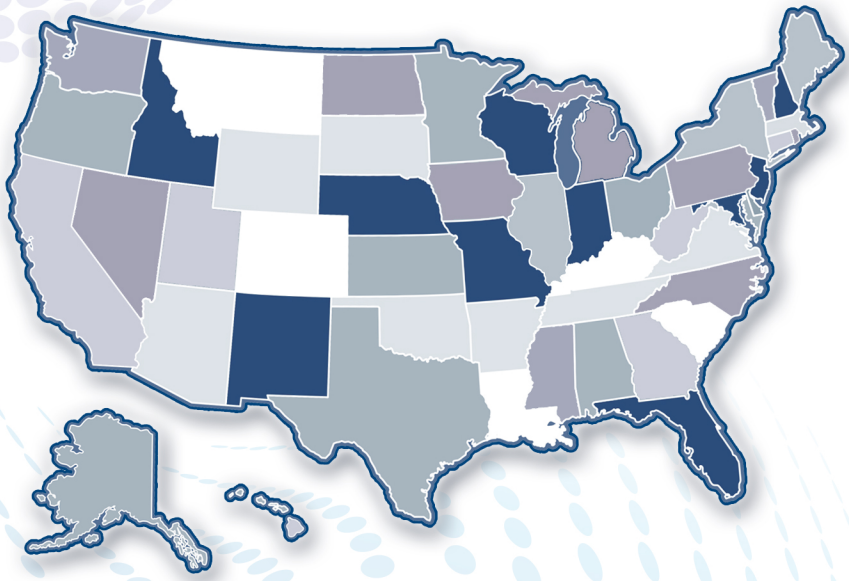
COUNCIL OF STATE AND TERRITORIAL EPIDEMIOLOGISTS

2013 ENVIRONMENTAL HEALTH EPIDEMIOLOGIC CAPACITY ASSESSMENT OF STATE AND TERRITORIAL HEALTH DEPARTMENTS



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Executive Summary

Environmental health is a core component of public health and an important program area in states and jurisdictions across the United States. Environmental epidemiologists study health outcomes associated with exposure to environmental toxicants or adverse weather events. For example, air pollution, extreme temperatures, contaminated food and water, heavy metals and pesticides have all been linked to human morbidity or mortality from cancer, injury, respiratory illness and other conditions.

Since 2001, the Council of State and Territorial Epidemiologists (CSTE) has periodically assessed the epidemiologic capacity of state and territorial health departments. For the 2013 Epidemiology Capacity Assessment, the association solicited data related to four specific epidemiologic program areas: environmental health, chronic disease, maternal and child health, and oral health. This report presents results from the Environmental Health Capacity module. It describes the current state of environmental epidemiology capacity, highlights exemplary aspects of environmentally-related functions and services, and identifies areas needing improvement and expansion nationally.

Results

Assessments were sent to the 50 State Epidemiologists and epidemiology representatives in Washington, DC, and six US territories. Of the 49 respondents (representing an 86% response rate), 41 (84%) reported having at least one environmental epidemiologist on staff. Results are based on data from these 41 respondents.

1. Environmental Epidemiology Workforce and Funding

- As noted above, 84% of respondents reported having at least one environmental epidemiologist on staff responsible for environmentally-related activities.
- In 2013, 219.3 full-time-equivalent employees were focused on environmental epidemiology, or an average 5.3 full time equivalents (FTEs) per responding jurisdiction.
- An estimated 37% increase in FTEs is needed to reach full environmental epidemiology capacity.
- Federal grants are the major source of funding for environmental epidemiology in state and territorial jurisdictions, with almost 60% of responding jurisdictions receiving more than half their environmental epidemiology funding from the federal government.
- During 2013, state and territorial health departments suffered reduced capacity for environmental epidemiology programs, functions, or activities:
    - 34% reported a decrease in staff.
    - 31% reported a decrease in state or territorial funding.
    - 76% reported a decrease in federal or other funding.

2. Environmental Health Capacity and Activities

- Generally, health departments report adequate capacity to monitor and investigate environmental-related exposures and health outcomes:

  - 56% conduct work on five or more environmental exposures, with 95% conducting work on one or more heavy metals.
  - 56% conduct work on four or more environmentally-related health outcomes.
  - 51% conduct work on five or more environmental program focus areas.
  - 93% conduct environmental public health surveillance.
  - 78% participate in both acute reportable disease investigations and analysis of chronic disease data.

- On the other hand, health departments report minimal capacity to evaluate environmental services and to conduct research:
  - 81% report partial, minimal, or no capacity to conduct program evaluations.
  - 85% report partial, minimal, or no capacity to conduct environmental public health research.

3. Data Access and Support

- Environmental epidemiologists have adequate access to data sources and IT infrastructure/support to effectively analyze and disseminate information concerning environmentally-related exposures and/or health outcomes:
  - Over 80% of respondents have access to more than 11 environmentally-related data sources.
  - Less than 20% lack access to needed software.

4. Ability to Collect and Disseminate Data

- Environmental epidemiologists report adequate capacity to collect and disseminate environmental public health data:
  - 80% of respondents reported environmental epidemiology involvement in the development of surveillance reports, abstract submissions, and grants or cooperative agreements.
  - 61% reported having public access to interactive or queriable online systems for data sharing or peer-reviewed publications on environmental health topics.

5. Organizational Structure

- Most (68%) environmental epidemiologists are located within environmental public health programs.
- Few respondents (< 33%) reported past or anticipated future organizational changes that might impact environmental epidemiologists or environmental health capacity.

6. Collaborations

- Collaborations between environmental epidemiology programs and academic partners are common nationwide:
  - 83% of respondents report collaborations with colleges or universities.
- However, collaboration is limited with other organizations or agency types:
  - Less than 30% of respondents report collaborations with volunteer groups, environmental advocacy organizations, health care associations or other groups outside academia.

- Interagency collaborations between environmental health and most other public health programs are strong, with a few notable exceptions such as injury prevention, substance abuse prevention, and mental health programs.

Recommendations

1. Develop a plan to identify existing and new sources of federal, state and local funding to sustain and expand environmental health capacity.

- As federal funding sources dwindle, CSTE should work with state and local partners to identify available resources and advocate for new funding at the state and local levels.
- CSTE, in collaboration with the Centers for Disease Control and Prevention and other federal agencies, should educate federal law-makers and key decision-makers about the importance of environmental epidemiology within the broader public health system.

2. Outline a strategy to target available resources to areas of greatest need.

- Resources should be directed toward:
    - Increasing the number of environmental epidemiologists in the national workforce.
    - Expanding access to and use of existing public health data sources, such as hospital discharge records, syndromic surveillance data and Medicaid data.
    - Investigating the utility of new or novel data sources, such as electronic health records.
    - Creating new and enhancing existing public environmental health data resources.
    - Increasing opportunities for cross-training environmental epidemiologists across a variety of public health program areas.

3. Provide and promote training on more methodological environmental epidemiology activities, such as evaluating existing environmental public health services and conducting environmentally-focused public health research.

4. Increase opportunities for collaboration at the federal, state and local levels to promote and expand environmental epidemiology capacity.

- Additional collaborations between environmental epidemiology programs and external partners are necessary to promote and expand environmental health capacity in most jurisdictions.
    - Such collaborations may be necessary to improve the ability of environmental epidemiology programs to evaluate existing services and to contribute to general knowledge through research projects.
    - These relationships may also generate or identify new funding sources to expand available capacity and services.
    - Partnerships with other institutions may lead to research on innovative solutions to environmental public health problems, as well as new insights into those problems.
- Strengthening internal collaborations between environmental and other public health program areas, such as injury prevention and mental health, should be encouraged.

Introduction

Environmental health is a core component of public health and an important program area in states and jurisdictions across the United States. Environmental epidemiology is the study of health outcomes associated with exposure to environmental toxicants or adverse weather events. Health outcomes of interest may include, but are not limited to, heat-related illness, adverse birth outcomes, asthma and other respiratory conditions, infectious diseases, cardiovascular disease, poisoning/intoxication and cancer. Environmental exposures associated with adverse health outcomes include air pollution, extreme temperatures and other climatological factors, contaminated food or water, heavy metals, and pesticides and other chemicals.

Over the past 25 years, the importance of building epidemiology capacity and expanding a skilled applied public health workforce has been recognized by many national medical and public health agencies. According to a 2002 Institute of Medicine report, "in order to protect and promote health and well-being, the nation needs a strong governmental public health infrastructure."[1] The authors of this report note that strengthening this infrastructure is key to ensuring the public's health into the future. The importance of improving upon our national public health infrastructure was also addressed by both Healthy People 2010 and Healthy People 2020.[2,3] In fact, Healthy People 2020 lists 17 objectives related to public health infrastructure, with one specifically focused on state and local jurisdictions conducting public health system assessments.

The Council of State and Territorial Epidemiologists (CSTE) is the professional membership organization representing applied epidemiologists in the United States. Part of the organization's mission is to "support effective public health surveillance and epidemiologic practice through…capacity development."[4] In order to meet this objective, it is imperative to understand current workforce needs and state and territorial epidemiological capacity. Therefore, CSTE has periodically assessed both the national epidemiology workforce and core epidemiology capacity within state and territorial health departments (HDs).[5] The organization's first national Epidemiology Capacity Assessment (ECA) was conducted in 2001, and has been repeated every two to four years since then. In these ECAs, CSTE has examined the capacity of state and territorial health departments to provide each of the Ten Essential Services of Public Health that relate to epidemiologic functions, specifically 1-2 and 9-10 below.

Ten Essential Services of Public Health[6]

1. Monitor health status to identify and solve community health problems.
2. Diagnose and investigate health problems and health hazards in the community.
3. Inform, educate, and empower people about health issues.
4. Mobilize community partnerships and action to identify and solve health problems.
5. Develop policies and plans that support individual and community health efforts.
6. Enforce laws and regulations that protect health and ensure safety.
7. Link people to needed personal health services and assure the provision of health care when otherwise unavailable.
8. Assure competent public and personal healthcare workforce.
9. Evaluate effectiveness, accessibility, and quality of personal and population-based health services.
10. Research for new insights and innovative solutions to health problems.

In 2012, CSTE released a new strategic plan, with its first organizational priority being to build and sustain applied epidemiology programs at the state and territorial levels. Important objectives falling under that mandate include enhancing non-infectious disease programs, such as

environmental health, chronic disease, and occupational health, among others.[4,7] These programs have few sources of federal funding and generally receive little state funding. Documenting current capacity, assuring states capitalize on available resources, and identifying new funding sources are CSTE priorities. Therefore, the current ECA (2013) includes additional modules to provide a detailed assessment of several non-infectious disease epidemiologic program areas, including environmental health—the focus of this report.

Methods

Assessment Development and Administration

Assessment questions for the Environmental Health ECA (EH ECA) module were developed by CSTE National Office staff and members of the CSTE Environmental Health Subcommittee. Questions address the following topics: (1) environmental health epidemiology capacity and activities, (2) data access and support, (3) data collection and dissemination, (4) organizational structure and capacity and (5) collaborations with internal and external partners and participation in national workgroups/meetings. A copy of the assessment instrument comprises the appendix. All questions focus on state-level (rather than local-level) environmental epidemiology capacity.

Although this report focuses on the EH ECA module, it also includes environmental health-specific results from the Core ECA module to provide additional context. Specifically, we included Core ECA data related to the presence of a program area specific lead epidemiologist, overall epidemiology and surveillance capacity, and the number of epidemiologists working in environmental health.

All ECA assessment questions—from both the core and ancillary modules—were pilot tested in five states (Alaska, Florida, Idaho, Massachusetts and Tennessee), revised based on respondent feedback, and posted online in August 2013. Assessments were administered to the State Epidemiologist in all 50 states and Washington, DC, and to the CSTE epidemiology point of contact in six US territories. An invitation to participate in the assessment was sent to these individuals via e-mail, with links to the modules and PDF attachments of each module. Responses were collected via a secure server link. The primary points of contact were the State Epidemiologists, who were then charged with having each individual module (e.g., the EH ECA module) completed by the most appropriate staff person within the agency. For more detailed information on assessment development and administration, please see the 2013 Core ECA Report.

Definitions

The Core ECA module defines an epidemiologist as “an investigator who studies the occurrence of disease or other health-related conditions or events in defined populations.”[8] An environmental epidemiologist (EE) is, therefore, a person who collects, analyzes, interprets, and disseminates data related to acute and chronic diseases or risk factors where an environmental exposure is important. For the purpose of this assessment, EEs are classified as persons who:

- Work at least 50% of their time at the health department doing HD-related environmental epidemiologic work, and
- Work in the HD even if they receive their paycheck from another organization (e.g., an academic institution).

CDC/CSTE Applied Epidemiology fellows and other fellows engaged in environmental epidemiology are also included.

Most response options for the core and EH ECA modules are ‘yes/no’ or some variation thereof. However, two Likert scales were used for several questions in this assessment. The first relates to the HD’s or EE’s capacity to conduct specific essential public health activities within their jurisdiction. Respondents were asked to respond to each activity according to the following scale:

- None, Not at all – None of the activity, knowledge, or resources described within the question are met.

- Minimally – Less than 25% (but greater than 0%) of the activity, knowledge, or resources described within the question are met.
- Partially – 25% or greater (but less than 50%) of the activity, knowledge, or resources described within the question are met.
- Substantially – 50% or greater (but less than 75%) of the activity, knowledge, or resources described within the question are met.
- Almost fully – 75% or greater (but less than 100%) of the activity, knowledge, or resources described within the question are met.
- Full – 100% of the activity, knowledge, or resources described within the question are met.

The second scale relates to the level of collaboration between EEs and other HD programs and is defined simply as 'Strong, Some, Very little, No collaboration at this time, and No epidemiologists in this program area in our state.'

Statistical Analysis

Statistical analyses were conducted using SAS Version 9.3 (SAS Institute; Cary, NC). Categorical variables were summarized by calculating frequencies and percentages, and numeric variables were summarized using means, medians, standard deviations (SDs), and ranges.

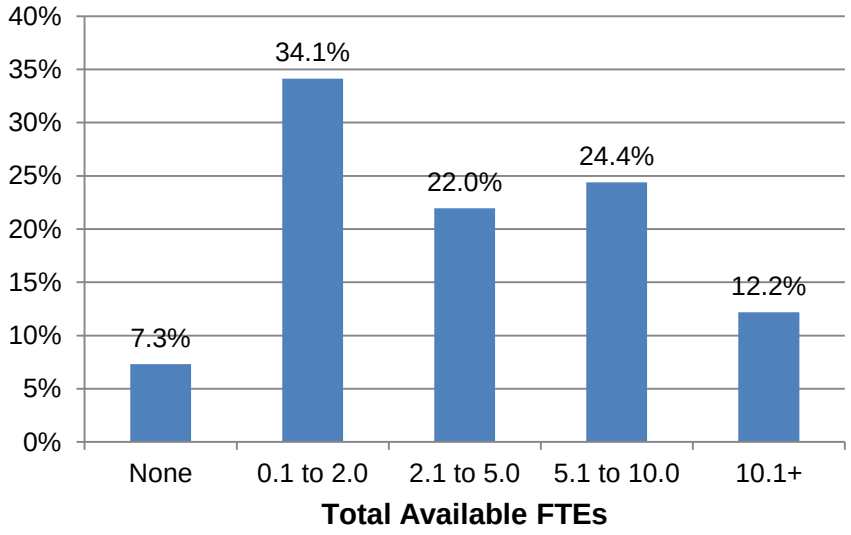
Results

Environmental Epidemiology Workforce and Funding

Among the 57 state and territorial HDs assessed, 49 (86.0%) responded to at least one question on the EH ECA module. Forty-one (83.7%) of the 49 respondents indicated that their HD has at least one EE who is responsible for environmentally-related activities (***EH Question 1***). Additionally, 34 (69.4%) reported having a lead epidemiologist for environmental health (***Core Question 4***).Respondents from four (50%) of the eight states/territories without an EE on staff indicated in comments that the EH tasks included in this module were being handled in some capacity within their jurisdiction, either within the health agency itself using other departments/sections or in another agency.

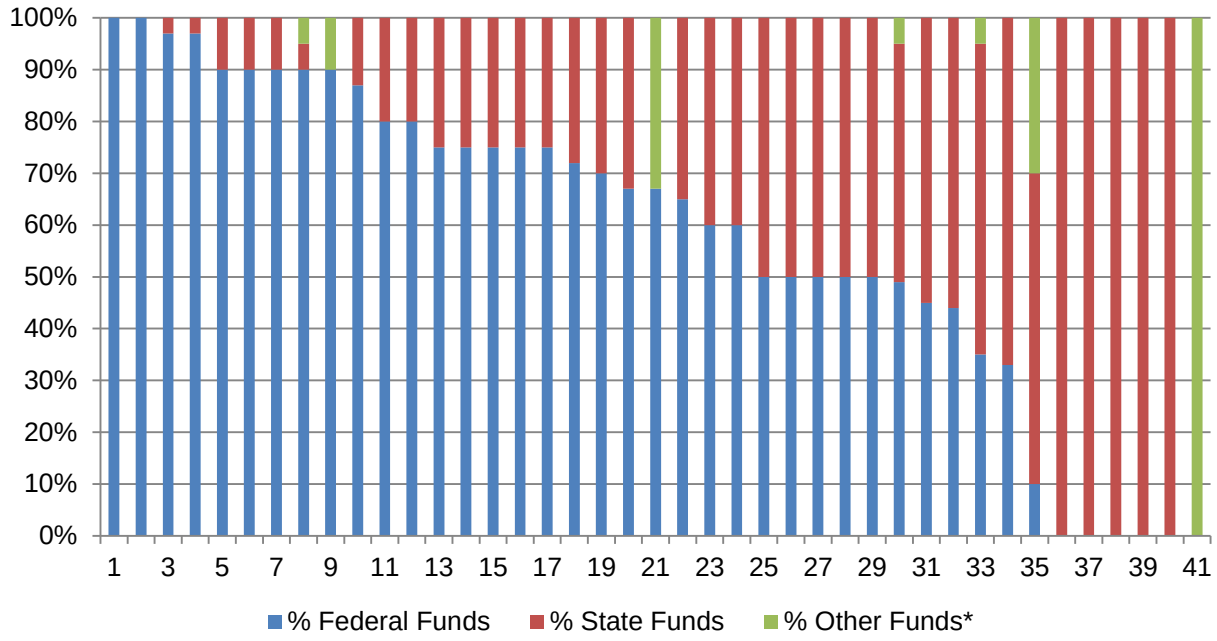
All results in subsequent sections pertain to the 41 respondents with at least one EE on staff for both Core and EH Module questions. In all, respondents reported 219.3 full time equivalent (FTE) epidemiologists focused on environmental health during 2013 (mean = 5.3/state, median = 3/state, range = 0-26/state) (***Core Question 7***). The majority of respondents (56.2%) reported having between 0.1 and 5.0 FTEs. Seven jurisdictions (17.1%) reported having 10 or more EEs (Figure 1). Respondents estimated that an additional 101.8 EE FTEs (mean = 2.5/state, median = 2/state, range = 0-15/state) would be necessary to reach full environmental epidemiology capacity.

Figure 1. Number of Environmental Epidemiology Full-Time-Equivalents (FTEs); Core ECA, N=41



Federal sources accounted for the majority of EE funding, with 24 jurisdictions (58.5%) receiving over half of their EE funds from federal grants. Only 10 jurisdictions (24.4%) received over half of their EE funding from state sources. Two jurisdictions received 100% of EE funding from federal sources, five received 100% of funding from state sources, and only one received 100% of EE funding from other sources (***EH Question 4***; Figure 2).

Figure 2. Percent of Environmental Epidemiology Funding by Source; EH ECA



* "Other Funds" include dedicated revenue, program fees or citations, and local foundations or trusts.

Finally, respondents were asked about changes in staff and available funding for EE within their HDs (***EH Questions 18-20***). About half of respondents reported no changes in (1) the number of staff in EE programs or performing EE functions or activities (46.3%) and (2) the amount of state or territorial funding for EE-related activities (56.1%). However, 14 jurisdictions (34.2%) lost EE staff, and 13 (31.7%) saw a decrease in state/territorial EE funding. Thirty-one jurisdictions (75.6%) reported a decrease in the amount of federal or other grant funding supporting EEs programs, funding or activities.

Environmental Health Capacity and Activities

The 41 respondents with at least one EE on staff were asked to characterize the types of activities, functions, and capacities related to environmental health in their jurisdictions.

EH Question 2 assessed the type of work performed by EEs in individual health departments over the previous year. As shown in Table 1, work categories included environmental exposures, health outcomes, and program focus topic areas.

> *Exposures.* Over half of respondents (56.1%) reported conducting work on five or more exposures, of nine choices listed on the assessment, with the most common being heavy metals. All but two jurisdictions (4.9%) respond to cases of human exposure to heavy metals, including lead (90.2%), arsenic (78.1%), mercury (68.3%), cadmium (9.8%) and uranium (2.4%). Fully 70.7% of responding jurisdictions investigate cases of exposure to carbon monoxide (70.7%). The exposure category receiving the least attention among respondents was substance abuse (31.7%).

Health Outcomes. More than half of respondents (56.1%) conduct work on four or five specific health outcomes, out of five possible choices, the most common being cancer (82.9%), asthma (78.1%) and heat-related illness (70.7%). Respondents could also mention other health outcomes not listed on the assessment tool, and the most commonly cited outcome in this open comment area was cardiovascular disease (22.0% or 9 jurisdictions).

Program Focus. Finally, respondents were asked about public health programs in which EEs are involved. Of the nine listed program areas, 51.2% reported involvement in five or more, with the most commonly cited being environmental public health tracking and disaster/preparedness (78.1% each), followed by healthy homes (75.6%), and climate change (65.9%). The program area receiving the least attention by the EEs in the responding jurisdictions was the built environment (36.6%). Other programs not listed in the assessment but reported by respondents included foodborne disease or food safety (4, 9.8%), waterborne disease and drinking water monitoring (4, 9.8%).

Table 1. Work of Environmental Epidemiologists by Exposures, Health Outcomes, and Program Focus; EH ECA, N=41

Categories	Sub-Categories	n	%
Exposures	Lead	37	90.2
	Arsenic	32	78.1
	Carbon monoxide	29	70.7
	Mercury	28	68.3
	Radiation	27	65.9
	Chemical poisonings	26	63.4
	Other exposures	26	63.4
	Pesticide poisonings	21	51.2
	Substance abuse	13	31.7
Health Outcomes	Cancer	34	82.9
	Asthma	32	78.1
	Heat-related illness	29	70.7
	Birth outcomes	23	56.1
	Infectious disease	20	48.8
	Other health outcomes	18	43.9
Program Focus	Environmental Public Health Tracking or similar program	32	78.1
	Disaster/other preparedness response	32	78.1
	Healthy Homes	31	75.6
	Climate change	27	65.9
	Agency for Toxic Substances & Disease Registry site assessment	26	63.4
	Occupationally-related disease	24	58.5
	Biomonitoring	21	51.2
	Other environmental program focus	19	46.3
	Health impact assessments	15	36.6
	Built environment	15	36.6

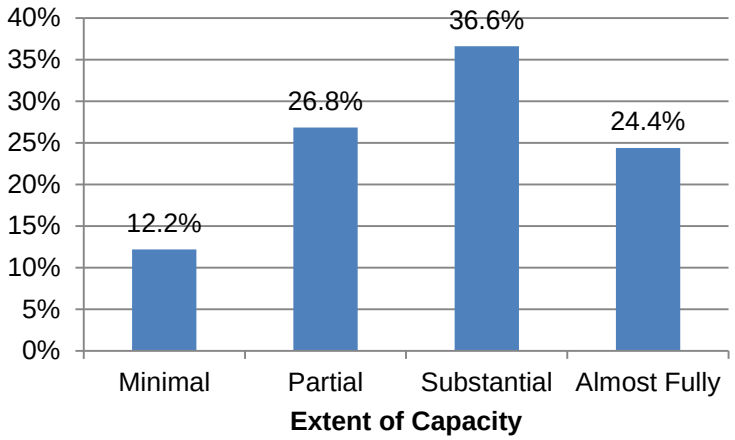
In order to understand the overall scope of EE functions, respondents were asked to characterize specific activities by frequency: routinely or frequently done versus rarely or not at all done (***EH Question 3***; Table 2). Public health surveillance was, by far, the most common routine activity (92.5%), followed by investigating reportable acute diseases and analysis of chronic disease data (77.5% each). Rarely-performed functions included environmental health-related research (67.5%) and investigations of non-reportable acute diseases (60.0%). Respondents were also able to comment on other common EE functions, and the most common additional functions cited were risk assessment (5, 12.5%) and health education or risk communication (4, 10.0%).

Table 2. Overall Scope of Environmental Epidemiologist Functions; EH ECA, N=40

	Routinely/Frequently	Rarely/Not at All
Activities	**%**	**%**
Public health surveillance	92.5	7.5
Investigation of acute environmentally related diseases/ poisonings reportable in your state	77.5	22.5
Analysis of chronic disease data associated with environmental exposures	77.5	22.5
GIS/mapping activities supporting environmental investigations	67.5	32.5
Investigation of acute environmentally related diseases/ poisonings NOT reportable in your state	40.0	60.0
Hypothesis-testing research related to environmental health	32.5	67.5

Finally, respondents were asked to assess HD capacity to provide environmental health services (***Core Question 6***; Figure 3) and four essential environmental public health services (***EH Question 5***; Table 3). No jurisdictions reported either zero capacity or full capacity for environmental health epidemiology and surveillance (Core).

Figure 3. Extent of the Epidemiology and Environmental Capacity in Environmental Health; Core ECA, N=41



Few respondents reported full capacity to address any of the four essential environmental public health services (EH module). Most respondents had the capacity to meet or fulfill the following services at least 50% of the time: diagnose/investigate environmental public health problems/health hazards (63.4%) and monitor environmental/health status to identify and solve community environmental public health problems (58.5%). However, the respondents reported minimal capacity (able to fulfill or meet less than 50% of the time) for evaluation (80.5%) and public health research (85.4%).

Table 3. Available Environmental Epidemiology Capacity for Essential Environmental Public Health Services; EH ECA, N=41

	≥ 50% Capacity[1]		< 50% Capacity[2]	
Essential Services	**N**	**%**	**N**	**%**
Diagnose and investigate environmental public health problems and health hazards in the community	26	63.4	15	36.6
Monitoring environmental and health status to identify and solve community environmental public health problems	24	58.5	17	41.5
Evaluate effectiveness, accessibility, and quality of personal and population-based environmental public health service	8	19.5	33	80.5
Research for new insights and innovative solutions to environmental public health problems	6	14.6	35	85.4

[1] Includes "Full", "Almost Full", and "Substantial" categories.

[2] Includes "Partial", "Minimal", and "None, Not at All" categories.

Data Access and Support

The EH ECA module assessed the type of data access and IT infrastructure/support available to environmental epidemiology staff within responding state and territorial HDs. *Data access* was defined to include individual-level medical information, aggregate or summary public health data, demographic or socioeconomic data, and epidemiologic or environmental journals and scientific literature. *IT infrastructure* was defined to include data storage, data security, and software access and support.

Healthcare data sets and software to manage and analyze data are important components of the EE's toolkit. Of the 15 public health-related data sets assessed (***EH Question 6***), over 75% of respondents had access to all but three (Table 4). The most commonly available data sets pertained to childhood lead exposure (97.6%), public drinking water quality (95.1%), and state mortality/vital statistics (92.7%). The least commonly available information sources were Medicare data (22.0%), Medicaid data (48.8%), and state emergency medical system data (43.9%). Five respondents (12.2%) reported that state emergency department data were not collected within their jurisdiction, making emergency department data the most common untapped data source in the assessment. Of the eight software packages assessed (***EH Question 7***), over half of respondents had access to the following: SAS (95.1%), geographic information system (GIS) software (e.g., ArcGIS; ESRI: Redlands, CA; 95.1%), EpiInfo (CDC: Atlanta, GA; 78.1%), data encryption software (58.5%), and SQL-based software (56.1%). The two software packages reportedly needed, yet unavailable, for most respondents were encryption software (17.1%) and SPSS (IBM; Armonk, NY; 14.6%). The software packages most commonly reported as not needed by responding EEs were SUDAAN (RTI International: Research Triangle Park, NC; 70.7%), STATA (StataCorp: College Station, TX; 68.3%), and SPSS (48.8%).

EH Question 24 assessed EEs access to current medical, epidemiologic, and public health journals, whether in hardcopy or electronic format. Thirty jurisdictions (73.2%) had such access, while 10 (24.4%) did not, and one (2.4%) did not know if such access were available. Finally, 33 (80.5%) reported adequate IT infrastructure and services, six (14.6%) reported inadequate available services, and two (4.9%) were uncertain (***EH Question 25***).

Table 4. Environmental Epidemiologists' Access to Public Health Data Sets and Data Management and Analysis Software; EH ECA, N=41

	Yes		No		Don't know *or* Not collected	
Data Access	**n**	**%**	**n**	**%**	**n**	**%**
Childhood Lead data	40	97.6	1	2.4	0	0.0
Public Drinking Water Quality data	39	95.1	2	4.9	0	0.0
State mortality data (not in WONDER)/Vital Statistics	38	92.7	1	2.4	2	4.9
State hospital discharge data	37	90.2	2	4.9	2	4.9
Statewide cancer registry data	37	90.2	4	9.8	0	0.0
Birth Certificate data	37	90.2	3	7.3	1	2.4
State BRFSS data (not via CDC website)	35	85.4	3	7.3	3	7.3
Poison Control Center data	35	85.4	3	7.3	3	7.3
Air Quality data	35	85.4	4	9.8	2	4.9
State emergency department data	33	80.5	3	7.3	5	12.2
Birth Defects data	33	80.5	4	9.8	4	9.8
Syndromic surveillance data	32	78.1	6	14.6	3	7.3
State Medicaid data	20	48.8	15	36.6	6	14.6
State EMS data	18	43.9	14	34.2	9	22.0
State Medicare data	9	22.0	20	48.8	12	29.3
	Yes		**No, but needed**		**No, not needed**	
Software Access	**n**	**%**	**n**	**%**	**n**	**%**
SAS	39	95.1	1	2.4	1	2.4

GIS software	39	95.1	1	2.4	1	2.4
EpiInfo	32	78.1	1	2.4	8	19.5
Encryption software	24	58.5	7	17.1	10	24.4
SQL	23	56.1	5	12.2	13	31.7
SPSS	15	36.6	6	14.6	20	48.8
STATA	12	29.3	1	2.4	28	68.3
SUDAAN	10	24.4	2	4.9	29	70.7

Ability to Collect and Disseminate Data

The ability of environmental epidemiologists to analyze and disseminate environmental health-related data and information was assessed in ***EH Questions 8-12***. Data sharing was assessed based on the presence of a public access interactive or queriable online system that displays environmentally-related epidemiologic data within a jurisdiction (***EH Question 8***). An example of such a system is a state Environmental Public Health Tracking portal presenting summary data on the prevalence of asthma or private well testing information in a tabular or GIS format. Twenty-five states (61.0%) reported having such a system. Thirteen (31.7%) did not have access to such a system, and three (7.3%) did not know if such a system were available.

The products that result from the wide array of functions and activities in which EEs are involved and the utilization of available public health-related data sets were also assessed. Most respondents (82.9%) reported that EEs were involved in grant or cooperative agreement submissions during the previous 12 months; 33 (80.5%) reported that EEs were the primary preparer of published state or territorial surveillance or other epidemiologic reports; 34 (82.9%) reported that their EEs participated in scientific presentations or poster sessions at state or national meetings requiring abstract submission in the past 12 months; and 25 (61.0%) reported that EEs were authors or co-authors on peer-reviewed published literature related to environmentally-related topics over the past year.

Organizational Structure

State or territorial organizational structure can have a significant impact on the essential environmental epidemiology services provided within a jurisdiction, as well as regular environmental epidemiology services and available resources. Among responding jurisdictions, the majority of EEs (68.3%) are located within an environmental public health program (***EH Question 13***). Six (14.6%) reported that EEs are located within an epidemiology or public health program that includes other epidemiologists (e.g., infectious disease epidemiologists), and five (12.2%) stated that EEs are embedded within separate categorical disease and surveillance program units (e.g., cancer).

Less than a third of respondents (29.3%) reported organizational changes that impacted environmental epidemiology within their jurisdiction (***EH Questions 14-15***). Among these, three reported creating a new environmental health structure containing EE activity, and one reported structural changes related to the consolidation of EE activities and integration into a non-environmental health program within the agency. Two reported a loss of funding and two reported a loss of staff without replacement. Additionally, six respondents (14.6%) anticipated organizational changes in the next year that will impact EE activities (***EH Questions 16 and 17***). Two of these respondents expected a new environmental health structure to be created containing EE activity, and two expected the EEs to be integrated into other existing programs.

Collaborations

A final focus of the EH ECA module was to assess internal and external collaborations related to environmental health. Such collaborations may be beneficial in expanding or strengthening existing environmental epidemiology capacity and activities. Thirty-five jurisdictions (85.4%) reported having important interaction between EEs and academic centers, including giving university lectures, supervising student internships or theses, etcetera (***EH Question 21***). As shown in Table 5 (***EH Question 22***), much of the collaboration between EEs and colleges or universities is also project-related (82.9%). However, over half of respondents report no collaborations with managed care organizations (80.5%), private environmental advocacy-related voluntary organizations (68.3%), private health-directed voluntary organizations (63.4%), or associations of healthcare organizations and professionals (58.5%).

Table 5. Project-Related Collaboration between Environmental Epidemiologists and Other Agencies or Organizations; EH ECA, N=41

	Yes		No		Don't Know	
Collaborators	**n**	**%**	**n**	**%**	**n**	**%**
Colleges or universities	34	82.9	7	17.1	0	0.0
Private voluntary organizations (health-directed)	12	29.3	26	63.4	3	7.3
Private voluntary organizations (environmental advocacy-related)	10	24.4	28	68.3	3	7.3
Associations of health care organizations and professionals	10	24.4	24	58.5	7	17.1
Industry or trade organizations	7	17.1	31	75.6	3	7.3
Managed care organizations	3	7.3	33	80.5	5	12.2

Internal collaborations are also common in the participating jurisdictions (***EH Question 23***; Table 6). Twenty-two respondents (55.0%) reported having strong collaborations between EEs and cancer programs, and an additional 16 (40.0%) reported a strong collaborative relationship with infectious disease programs. Half of respondents have some collaboration between EEs and public health preparedness, and 45.0% report collaborations with chronic disease programs. Very little collaboration between environmental epidemiology and injury prevention (35.0%) or mental health (25.0%) programs was reported. “No collaboration” was most commonly reported for mental health and substance abuse programs (47.5% each). In addition, eight states (20.0%) reported that there are no epidemiologists available in these two program areas within their state.

An equal number of respondents (18, 43.9%) reported being involved in and not being involved in national workgroups or local medical groups focused on making electronic medical records useful and available for disease surveillance, prevention, or control purposes (***EH Question 26***). Lack of involvement in such groups may be related to funding or travel restrictions. A majority of jurisdictions (46.3%) reported having some, although inadequate, funding for EE travel to national meetings, and an additional 11 respondents (26.8%) reported having no funding available for travel support (***EH Question 28***). Other restraints, such as agency-imposed restrictions on national travel were reported by 12 (29.3%) state and territorial jurisdictions.

Table 6. Levels of Collaboration between Environmental Epidemiologists and Epidemiologists in Other Health Department Program Areas; EH ECA, N=41

Other Health Department Program Areas	Strong		Some		Very Little		No collaboration at this time		No epidemiologists in this program area	
	n	%	n	%	n	%	n	%	n	%
Cancer	22	55.0	13	32.5	3	7.5	2	5.0	0	0.0
Infectious Disease	16	40.0	14	35.0	9	22.5	1	2.5	0	0.0
Public Health Preparedness	15	37.5	20	50.0	4	10.0	1	2.5	0	0.0
Occupational Health	14	35.0	8	20.0	3	7.5	5	12.5	10	25.0
Vital Statistics	14	35.0	14	35.0	7	17.5	3	7.5	2	5.0
Maternal and Child Health	12	30.0	15	37.5	9	22.5	3	7.5	1	2.5
Other Chronic Disease	10	25.0	18	45.0	5	12.5	7	17.5	0	0.0
Injury	7	17.5	11	27.5	14	35.0	6	15.0	2	5.0
Substance Abuse	3	7.5	2	5.0	8	20.0	19	47.5	8	20.0
Other	1	2.5	3	7.5	0	0.0	0	0.0	0	0.0
Mental Health	0	0.0	3	7.5	10	25.0	19	47.5	8	20.0

Discussion

The 2013 EH ECA module solicited important information on the current state of environmental epidemiology capacity, exemplary aspects of environmentally-related epidemiology functions and services, and areas in need of improvement and expansion nationally. Overall, the news is not good. Although EEs are generally able to carry out the two essential public health services[6] focused on assessment—monitoring health and investigating/diagnosing health problems/hazards—their ability to perform other essential services has been compromised by insufficient funding and insufficient staff. In particular, there is a need to enhance states' capacity for environmental epidemiology program evaluation, research, workforce development, and community partnerships beyond academia.

Currently, there are almost 220 FTEs dedicated to environmental epidemiology among responding state and territorial health departments. This number represents only about 8% of the total, national epidemiologic workforce (2,645 FTEs among all program areas). The environmental-specific epidemiology workforce trails in total FTEs compared to infectious disease (1,292 FTEs), chronic disease (339 FTEs), maternal and child health (276 FTEs), and bioterrorism/emergency response (257 FTEs) epidemiology. Additionally, 34% of jurisdictions noted a decrease in environmental epidemiology staff in the past year. Responding health departments note that it is necessary to increase the environmental epidemiology workforce by an average of 37% (an additional 102 FTEs) to reach full capacity, nationwide.

Nationally, the majority of EE funding comes from federal sources, with 24 of 41 responding state and territorial health departments receiving more than 50% of their EE-specific support from federal grants. However, there are few federal funding sources currently available for environmental health activities (e.g., grant for environmental public health tracking and biomonitoring grants). Furthermore, not all states receive federal support for environmental health activities, unlike the general epidemiology support provided through CDC Epidemiology and Laboratory Capacity for Infectious Diseases cooperative agreements, which fund every state in some capacity. State dollars also comprise an important funding source for environmental epidemiology services. (Ten responding jurisdictions receive more than half of their EE funding from state sources). Unfortunately, there was a significant decrease in both state and federal funding in the 12-month period preceding this assessment. Among respondents, 31% noted a decrease in available state or territorial funding, and 76% noted a decrease in federal funding. This reduction in revenue—especially from the federal government, the main source of EE funding nationwide, albeit limited—may have substantial negative impacts on future environmental epidemiology capacity, if new funding sources are not identified.

However, there are some exemplary aspects related to national environmental epidemiology functions and activities that should be highlighted, and which could serve as a model of productivity and collaboration for other epidemiology program areas. In general, health departments report adequate capacity to diagnose, investigate, and monitor environmentally-related exposures and health outcomes. Most respondents report sufficient access to a variety of public health data sources, software, and IT infrastructure necessary for performing EE functions and services. Environmental epidemiologists are extremely productive nationwide, with 80% of health departments reporting EE involvement in the creation and/or publication of environmentally-focused surveillance or epidemiology reports, abstract submissions resulting in posters or presentations at state and national conferences, and grant or cooperative agreement submissions to secure additional funding. Collaborations with external university or academic

partners are common, as well as internal agency programs such as infectious or chronic disease epidemiology programs.

However, workforce and funding constraints have limited EEs' ability to evaluate environmental epidemiology services or to conduct public health research, and about 40% of respondents did not publish in peer-reviewed journals in the year preceding this assessment and lack a public access interactive or queriable online system for sharing environmental-related data. Furthermore, external collaborations with other organization types, such as associations of health care professionals or environmental advocacy groups, are minimal to nonexistent. These limitations in capacity represent key opportunities to improve and expand environmental epidemiology functions and services in the future.

One area of concern not addressed in the 2013 ECA is the aging public health workforce and its impact on the future of environmental epidemiology and public health programs, generally. It has been well-documented that the proportion of workers 65 years and older has increased over the past few decades, across the nation and across all employment sectors, and is expected to grow even more in the next few years.[9] The National Association of County and City Health Officials (NACCHO) reports that the average age of local health department leaders has increased, as well.[10] However, there is little to no data available on the aging of the public health workforce at all levels of government. Therefore, future ECAs may solicit data on the age, tenure, and years to retirement of epidemiologists in specific program areas.

While infectious disease is still an important global public health focus, domestic public health priorities increasingly include chronic illnesses or other acute non-infectious diseases. As such, federal, state, and local public health and medical agencies have shifted or expanded their priorities to include these other preventable causes of morbidity and mortality. CSTE and CDC also recognize the need to build and strengthen capacity in these other epidemiologic program areas, and specifically in environmental health.

Environmental health—encompassing both the natural and built environment—is especially important because environmental exposures can have a profound impact on human health. Potentially adverse environmental exposures are extremely diverse and widespread: chemical or biological substances in the air we breathe, the food we eat or the water we drink; natural or man-made disasters, such as hurricanes or bioterrorism; extreme heat and other physical hazards; built environments that constrain physical activity because of lack of sidewalks or green spaces; disease vectors, such as mosquitoes and ticks; and others. The World Health Organization estimates that about 25% of global morbidity and mortality can be attributed to such environmental factors.[11]

In its 2012 strategic plan, CSTE proposed to "enhance environmental health…epidemiologic programs."[7] Healthy People 2020 objectives include 24 specific objectives related to improving the health of Americans by promoting a healthy environment and focusing on specific environmental health issues.[12] The CDC has further demonstrated its commitment to environmental health by dedicating funding to an emerging environmental health issue (climate and health funding via the Climate-Ready States and Cities Initiative in 2011 and 2012) and expanding existing programs (funding to expand the number of Environmental Public Health Tracking states in 2014). Hopefully, this increasing focus on environmental issues and new funding opportunities may help to address current limitations in US environmental epidemiology capacity.

Several assessment limitations must be noted.

- *Response Rate.* First, the response rate for the Environmental Health Module of the 2013 ECA was 86%. There may be important differences between responders and non-responders that we are unable to assess or control for in our analysis. Six out of the eight non-responders were US territories. Future CSTE ECAs should focus on finding out more about non-responders and their reasons for omitting information contained in the program area-specific modules. Futhermore, the total number of jurisdictions with EEs on staff may be an underestimate given the less than perfect response rate.
- *Quality/Accuracy of Responses.* Second, the information collected by the ECA is based on self-assessment of perceived capacity, and the internally-designated assessment respondent likely varied across jurisdictions (e.g., state epidemiologist versus subordinate epidemiologist working part time on environmental issues versus full time environmental epidemiologist). Thus, respondents' day-to-day involvement in environmental epidemiology functions likely varied, as well as the methods used to collect information to complete the EH ECA module and the quality and accuracy of responses.
- *State-Level Capacity Only.* The ECA focused on state-level capacity only. Results cannot be extrapolated to the county or local level. CSTE has conducted local-level evaluations of epidemiologic capacity in the past, in partnership with NACCHO, and plans to do so again in the future.

The 2013 EH ECA module is the first official assessment of national environmental epidemiology capacity and workforce needs in the US. As such, it represents an important CSTE step toward building and sustaining applied epidemiology programs focused on environmental health. Potential next steps include soliciting recommendations for strengthening capacity from the environmental epidemiology community, coordinating with partners to develop relevant training activities, and conducting additional assessments that address identified areas of need and that target local environmental epidemiology capacity.

Recommendations

Based on EH ECA results, there are a number of activities that can be undertaken by CSTE and public health leaders at all levels of government to enhance capacity for environmental epidemiology in the United States.

1. Develop a plan to identify existing and new sources of federal, state and local funding to sustain and expand environmental health capacity.

- As federal funding sources dwindle, CSTE should work with state and local partners to identify available resources and advocate for new funding at the state and local levels.
- CSTE, in collaboration with the CDC and other federal agencies, should educate federal law-makers and key decision-makers about the importance of environmental epidemiology within the broader public health system.

2. Outline a strategy to target available resources to areas of greatest need.

- Resources should be directed toward:
    - Increasing the number of environmental epidemiologists in the national workforce.
    - Expanding access to and use of existing public health data sources (e.g., hospital discharge records, syndromic surveillance data, Medicaid data).
    - Investigating the utility of new or novel data sources, such as electronic health records.
    - Creating new and enhancing existing public environmental health data resources.
    - Increasing opportunities for cross-training of environmental epidemiologists across a variety of public health program areas.

3. Provide and promote training on more methodological environmental epidemiology activities, such as evaluating existing environmental public health services and conducting environmentally-focused public health research.

4. Increase opportunities for collaboration at the federal, state and local levels to promote and expand environmental epidemiology capacity.

- Additional collaborations between environmental epidemiology programs and external partners are necessary to promote and expand environmental health capacity in most jurisdictions.
    - Such collaborations may be necessary to improve the ability of environmental epidemiology programs to evaluate existing services and to contribute to general knowledge through research projects.
    - These relationships may also generate or identify new funding sources to expand available capacity and services.
    - Partnerships with other institutions may lead to research for on innovative solutions to environmental public health problems, as well as new insights into these problems.
- Strengthening internal collaborations between environmental and other public health program areas, such as injury prevention and mental health, should be encouraged.

References

1. Institute of Medicine, Board on Health Promotion and Disease Prevention, Committee on Assuring the Health of the Public in the 21st Century. (2002). *The Future of the Public's Health in the 21st Century*. Washington, DC: National Academies Press.
2. Centers for Disease Control and Prevention (CDC). (2011). *Healthy People 2010*. Atlanta, GA: CDC. Retrieved from http://www.cdc.gov/nchs/healthy_people/hp2010.htm.
3. US Department of Health and Human Services (DHHS) (2014). *Healthy People 2020*. Washington, DC: US DHHS. Retrieved from http://www.healthypeople.gov/2020/default.aspx.
4. Council of State and Territorial Epidemiologists (CSTE). (2014). About CSTE. Atlanta, GA: CSTE. Retrieved from http://www.cste.org/?page=About_CSTE.
5. Council of State and Territorial Epidemiologists (CSTE). (2014). Workforce: Capacity Assessments. Atlanta, GA: CSTE. Retrieved from http://www.cste.org/group/ECA.
6. Centers for Disease Control and Prevention (CDC). (2014). *The Public Health System and the 10 Essential Public Health Services.* Atlanta, GA: CDC. Retrieved from http://www.cdc.gov/nphpsp/essentialServices.html.
7. Council of State and Territorial Epidemiologists (CSTE). (2012). CSTE Strategic Plan. Atlanta, GA: CSTE. Retrieved from http://www.cste.org/resource/resmgr/PDFs/cstestrategicplan.pdf.
8. Last JM, ed. (2001). *A Dictionary of Epidemiology, 4th Edition*. New York: Oxford University Press.
9. US Department of Labor, Bureau of Labor Statistics (BLS). (2008). *Older Workers.* Washington, DC: US Department of Labor, BLS. Retrieved from http://www.bls.gov/spotlight/2008/older_workers/.
10. National Association of County and City Health Officials (NACCHO). (2011). 2010 National Profile of Local Health Departments. Washington, DC: NACCHO. Retrieved from http://nacchoprofilestudy.org/materials/2010-profile-study/.
11. World Health Organization (WHO). (2006). Preventing Disease Through Healthy Environments. Geneva, Switzerland: WHO.
12. US Department of Health and Human Services (DHHS). (2014). Healthy People 2020: Environmental Health. Washington, DC: US DHHS. Retrieved from http://www.healthypeople.gov/2020/topicsobjectives2020/overview.aspx?topicid=12.

Appendix

Environmental Health Epidemiologic Capacity Assessment of State and Territorial Health Departments

Environmental epidemiologists (EE) *in state and territorial health departments are persons who collect, analyze, interpret and disseminate data related to acute and chronic diseases or risk factors where an environmental exposure is important.* EEs may be involved with surveillance and epidemiology of conditions related to chemical or radiological exposures in the general population. In some states, EEs may be involved in epidemiologic activities for environmentally related communicable diseases via food and water. And in some states, they may also support epidemiological activities associated with occupational exposures if there isn't a designated occupational epidemiologist.

For this assessment, environmental epidemiologists are classified as persons who:

- Work at least 50% of their time at the health department doing health department related environmental epidemiologic work
- Work in health department even if they receive their paycheck from another organization (e.g., an academic institution)
- CDC/CSTE Applied Epidemiology fellows and other 'fellows' designated for EE should be included

I. Environmental Epidemiology Activities

1. Does the health department have at least one environmental epidemiologist who is responsible for environmentally-related activities? ***If NO, then go to Section VIII.***

☐ Yes ☐ No

2. During the past 12 months, have EEs in your health department done work related to:

EXPOSURES:			***ENVIRONMENTAL PROGRAM FOCUS:***		
Radiation	☐ Yes	☐ No	Occupationally related disease	☐ Yes	☐ No
Lead	☐ Yes	☐ No	Healthy Homes	☐ Yes	☐ No
Chemical Poisonings (in addition to those listed separately)	☐ Yes	☐ No	Health Impact Assessments (HIA)	☐ Yes	☐ No
Pesticide Poisonings	☐ Yes	☐ No	Environmental Public Health Tracking or program which links broad environmental data and health outcome data	☐ Yes	☐ No
Substance Abuse	☐ Yes	☐ No	Built Environment	☐ Yes	☐ No
Carbon Monoxide	☐ Yes	☐ No	Biomonitoring	☐ Yes	☐ No
Mercury	☐ Yes	☐ No	Climate Change	☐ Yes	☐ No
Arsenic	☐ Yes	☐ No	ATSDR Site Assessment	☐ Yes	☐ No
Other exposures (specify) _____	☐ Yes	☐ No	Disaster/Other Preparedness Response	☐ Yes	☐ No

Other Env Program focus (specify) _____ ☐ Yes ☐ No

HEALTH OUTCOME:

Heat-related illness	☐ Yes	☐ No
Birth outcomes	☐ Yes	☐ No
Asthma	☐ Yes	☐ No
Cancer	☐ Yes	☐ No
Infectious Diseases	☐ Yes	☐ No
Other diseases (*specify*) _____	☐ Yes	☐ No
Other diseases (*specify*) _____	☐ Yes	☐ No

3. In order to better understand the overall scope of your EEs' functions, please select activities from the list below that EEs in your health agency have participated in during the last 12 months.

a. Public health surveillance	☐ Routine/Frequently	☐ Rarely/ Not at all
b. Investigation of acute environmentally related diseases/poisonings that are reportable in your state	☐ Routine/Frequently	☐ Rarely/ Not at all
c. Investigation of acute environmentally related diseases/poisonings that are NOT reportable in your state	☐ Routine/Frequently	☐ Rarely/ Not at all
d. Analysis of chronic disease data associated with environmental exposures	☐ Routine/Frequently	☐ Rarely/ Not at all
e. Hypothesis-testing research related to environmental health	☐ Routine/Frequently	☐ Rarely/ Not at all
f. GIS/mapping activities supporting environmental investigations	☐ Routine/Frequently	☐ Rarely/ Not at all
g. Other (specify) _____	☐ Routine/Frequently	☐ Rarely/ Not at all
h. Other (specify) _____	☐ Routine/Frequently	☐ Rarely/ Not at all
i. Other (specify) _____	☐ Routine/Frequently	☐ Rarely/ Not at all

4. What are the funding sources for EE epidemiology staff within the STATE HD? (Specify value for percentage (e.g., "40" for 40%) of total funding for each source. If no funding, enter "0" for that source. Values should total 100.)

☐Federal Funds	Specify Percentage: ___%
☐State Funds	Specify Percentage: ___%
☐Other, please specify _____	Specify Percentage: ___%

For question 5, please use the following scale:

None, Not at all	None of the activity, knowledge or resources described within the question are met.
Minimally	Less than 25 percent (but greater than 0 percent) of the activity, knowledge or resources described within the question are met.
Partially	25 percent or greater (but less than 50 percent) of the activity, knowledge or resources described within the question are met.
Substantially	50 percent or greater (but less than 75 percent) of the activity, knowledge or resources described within the question are met**.**
Almost Fully	75 percent or greater (but less than 100 percent) of the activity, knowledge or resources described within the question are met.
Full	100 percent of the activity, knowledge or resources described within the question are met.

5. Does your state health department have adequate Environmental Epidemiologic capacity to provide the following essential environmental public health services and related activities? (For more information about these services, click here or visit http://www.cdc.gov/nceh/ehs/home/healthservice.htm.

Monitor environmental and health status to identify and solve community environmental public health problems	**Diagnose and investigate** environmental public health problems and health hazards in the community
☐ None, Not at all	☐ None, Not at all
☐ Minimally	☐ Minimally
☐ Partially	☐ Partially
☐ Substantially	☐ Substantially
☐ Almost Fully	☐ Almost Fully
☐ Full	☐ Full
Evaluate effectiveness, accessibility, and quality of personal and population-based environmental public health service	**Research** for new insights and innovative solutions to environmental public health problems
☐ Not at all	☐ Not at all
☐ Minimally	☐ Minimally
☐ Partially	☐ Partially
☐ Substantially	☐ Substantially
☐ Almost Fully	☐ Almost Fully
☐ Full	☐ Full

II. Access to Data and Consultants

6. Does one or more of the EE staff have access to the following data sets? *("Access" means that the epidemiologist has access to the data set for analyses (not necessarily on their own desk top) plus the coding and variable descriptions necessary to understand the structure and meaning of the data.*

State mortality data (not via WONDER)/ Vital Statistics
☐ Yes ☐ No ☐ Don't know

State hospital discharge data
☐ Yes ☐ No ☐ Not collected in our state ☐ Don't know

State-wide cancer registry data
☐ Yes ☐ No ☐ Not collected in our state ☐ Don't know

State Medicaid data
☐ Yes ☐ No ☐ Don't know

Medicare data for your state
☐ Yes ☐ No ☐ Don't know

State BRFSS data (not via CDC web site)
☐ Yes ☐ No ☐ Don't know

State emergency department data
☐ Yes ☐ No ☐ Not collected in our state ☐ Don't know

Poison Control Center data
☐ Yes ☐ No ☐ Not collected in our state ☐ Don't know

State EMS data
☐ Yes ☐ No ☐ Not collected in our state ☐ Don't know

Syndromic surveillance data
☐ Yes ☐ No ☐ Not collected in our state ☐ Don't know

Birth Defect data
☐ Yes ☐ No ☐ Not collected in our state ☐ Don't know

Birth Certificate data
☐ Yes ☐ No ☐ Don't know

Air Quality data
☐ Yes ☐ No ☐ Not collected in our state ☐ Don't know

Childhood Lead data
☐ Yes ☐ No ☐ Not collected in our state ☐ Don't know

Public Drinking Water Quality data (public drinking water, private drinking water)
☐ Yes ☐ No ☐ Not collected in our state ☐ Don't know

III. Data Analysis, Interpretation, and Dissemination

7. Do EEs have access to the following software packages:

a. SAS	☐ Yes	☐ No but needed	☐ No not needed
b. SPSS	☐ Yes	☐ No but needed	☐ No not needed
c. STATA	☐ Yes	☐ No but needed	☐ No not needed
d. SUDAAN	☐ Yes	☐ No but needed	☐ No not needed
e. EpiInfo	☐ Yes	☐ No but needed	☐ No not needed
f. Encryption software	☐ Yes	☐ No but needed	☐ No not needed
g. GIS (geographic information system) software	☐ Yes	☐ No but needed	☐ No not needed
h. SQL	☐ Yes	☐ No but needed	☐ No not needed
i. Other software (*Specify, if Yes and No but needed*)	_____		
j. Other software (*Specify, if Yes and No but needed*)	_____		

8. Does your state have a public access interactive or queriable on-line system that displays environmentally related epidemiologic data?
   ☐ Yes ☐ No ☐ Don't know

9. In the past 12 months, have grant or cooperative agreement applications been submitted where EE staff prepared "epidemiology" sections or where an EE was the primary preparer?
   ☐ Yes ☐ No ☐ Don't know

10. In the past 12 months, have EE staff published one or more state or territorial "burden" or "epidemiology" or "surveillance" reports on an environmentally-related disease topic?
    ☐ Yes ☐ No ☐ Don't know

11. In the past 12 months, have scientific presentations or posters at state or national meetings requiring abstract submission been given by EEs?
    ☐ Yes ☐ No ☐ Don't know

12. In the past 12 months, have EE staff been authors/coauthors on any peer reviewed published literature related to one or more environmentally related disease topics?
    ☐ Yes ☐ No ☐ Don't know

V. Organizational Placement and Funding

13. Where are the majority of EEs located within your health agency? (select the answer that most closely matches your department)

    ☐ Individual EEs are embedded within separate categorical disease and surveillance program units (e.g., cancer, communicable)

    ☐ Within an environmental public health program

☐ Within an epidemiology or population health program (unit that includes other epidemiologists such as infectious disease or MCH epidemiologists)
☐ In another institution or agency outside of the health department
☐ Other unit such as regulatory program, preparedness group, etc. (specify)
_____

14. In the past 12 months, have there been changes in the organizational structure of your department of health (DOH) which have impacted EE activities? ***If NO or Don't know, then go to Q30.***
☐ Yes ☐ No ☐ Don't know

15. If you answered yes to question 28, please describe organizational changes. (check all that apply)
☐ EE activities moved to another agency outside of the health department
☐ EE program broken up and embedded in other groups or units within agency
☐ New EH structure created which contains EE activities
☐ Merged from another program(s) into a separate EH program
☐ Consolidation of EE activities and embedded into a non-EH program group within the agency
☐ Other (specify)_____

16. Looking forward into the next 12 months, do you anticipate changes in the organizational structure of your DOH which will impact EEs? ***If NO or Don't know, then go to Q32.***
☐ Yes ☐ No ☐ Don't know

17. If you answered yes to question 29, please describe organizational changes. (check all that apply)
☐ EE activities moved to another agency outside of the health department
☐ EE program broken up and embedded in other groups or units within agency
☐ New EH structure created which contains EE activities
☐ Merged from another program(s) into a separate EH program
☐ Consolidation of EE activities and embedded into a non-EH program group within the agency
☐ Other (specify)_____

18. In the past 12 months, has there been any change in the number of staff related to EE programs, functions or activities?
☐ Increase ☐ Decrease ☐ Stay the same

19. In the past 12 months, have there been changes in the amount of state or territorial funding for EE related activities?
☐ Increase ☐ Decrease ☐ Stay the same

20. In the past 12 months, have there been changes in the amount of federal or other grant funding supporting EE related programs, function or activities (without considering the ending of federal funding for lead/healthy homes activities)?
☐ Increase ☐ Decrease ☐ Stay the same

VI. Outreach/Partnership/Collaboration

21. In the past 12 months, have EEs given university lectures, supervised student internships or theses, or had other important collaborations with an academic center?
☐ Yes ☐ No ☐ Don't know

22. In the past 12 months, have EEs collaborated closely on projects (e.g., publication of a report, preparation of an application, design or evaluation of a program or intervention) with one or more of the following agencies and/or organizations:

a. Private voluntary organizations (health directed) (e.g., American Heart Association)	☐ Yes	☐ No	☐ Don't Know
b. Private voluntary organization (environmental advocacy related) (e.g., Sierra Club)	☐ Yes	☐ No	☐ Don't Know
c. Managed care organizations (e.g., Kaiser Permanente)	☐ Yes	☐ No	☐ Don't Know
d. Associations of health care organizations and professionals (e.g., state medical society, hospital association)	☐ Yes	☐ No	☐ Don't Know
e. Colleges or Universities	☐ Yes	☐ No	☐ Don't Know
f. Industry or trade organizations	☐ Yes	☐ No	☐ Don't Know

23. Which of the following best characterizes the current level of collaboration between EEs and epidemiologists in other health department program areas?

	Strong	Some	Very Little	No collaboration at this time	No epidemiologists in this program area in our state
Infectious Disease	☐	☐	☐	☐	☐
Public Health Preparedness	☐	☐	☐	☐	☐
Injury	☐	☐	☐	☐	☐
Cancer	☐	☐	☐	☐	☐
Mental Health	☐	☐	☐	☐	☐
Substance Abuse	☐	☐	☐	☐	☐
Maternal & Child Health	☐	☐	☐	☐	☐
Other Chronic Disease	☐	☐	☐	☐	☐
Occupational Health	☐	☐	☐	☐	☐
Other (specify)_____	☐	☐	☐	☐	☐

Other (specify)_____	☐	☐	☐	☐	☐

VII. Miscellaneous

24. Do EEs have access to current medical, epidemiologic, and public health journals through either a conveniently located major science library, or a service that provides full-text electronic or hardcopy articles?
    ☐ Yes ☐ No ☐ Don't know

25. Do EEs have access to adequate IT infrastructure and services (e.g., adequate hardware, server space, virus protection, back-up mechanisms, and timely technical support)?
    ☐ Yes ☐ No ☐ Don't know

26. Are your EEs involved in work with national workgroups and/or local medical groups to collaborate on making electronic medical records useful for disease surveillance, prevention, or control purposes?
    ☐ Yes ☐ No ☐ Don't know

27. Please, briefly describe how are your EEs involved in work with national workgroups and/or local medical groups.

_____
_____
_____

28. Do EEs in your agency have adequate funding support to travel to national meetings (CSTE, NEHA, etc.)?
    ☐ Yes ☐ Some funding but not adequate ☐ No

29. Are EEs in your agency restrained from travel to national meetings for reasons other than funding (e.g. agency or state-wide travel bans)?
    ☐ Yes ☐ No ☐ Don't know

VIII. Comments

30. Would you like to comment on this assessment? What should have been covered but was not? What was covered but not in enough depth? What was covered that could have been omitted?

_____
_____
_____
_____

Thank you for completing this assessment for the Council of State and Territorial Epidemiologists (www.cste.org). A summary report of the responses will be drafted and returned to State Epidemiologists for distribution. If you have any questions about this module or the Epidemiology Capacity Assessment, please contact Monica Huang (mhuang@cste.org; 770-458-3811).

Core Epidemiology Capacity Assessment

For the first question, all program areas being assessed are included for reference. For the remaining questions, only the part related to environmental health has been included.

4. Is there a formal LEAD epidemiologist for each program area below?

	Yes	No	Unknown
Bioterrorism/Emergency Response	☐	☐	☐
Chronic Disease	☐	☐	☐
Environmental Health	☐	☐	☐
Genomics	☐	☐	☐
Infectious Disease	☐	☐	☐
Injury	☐	☐	☐
Maternal and Child Health	☐	☐	☐
Mental Health	☐	☐	☐
Occupational Health	☐	☐	☐
Oral Health	☐	☐	☐
Substance Abuse	☐	☐	☐
Vital Statistics	☐	☐	☐
Other	☐	☐	☐

6. What is the extent of the epidemiology and surveillance capacity in the following program areas in your STATE HD? If needed, please seek the guidance of other STATE HD staff within program specific areas when completing this question.

Please use the following scale:

Not at all	None of the activity, knowledge, or resources described within the question are met.
Minimal	Less than 25% (but greater than 0%) of the activity, knowledge, or resources described within the question are met.
Partial	25% or greater (but less than 50%) of the activity, knowledge, or resources described within the question are met.
Substantial	50% or greater (but less than 75%) of the activity, knowledge, or resources described within the question are met.
Almost fully	75% or greater (but less than 100%) of the activity, knowledge, or resources described within the question are met.
Full	100% of the activity, knowledge, or resources described within the question are met.

Environmental Health

☐ None ☐ Minimal ☐ Partial ☐ Substantial ☐ Almost Fully ☐ Full

*If none, are you currently developing a program or have plans to implement one?

☐ Yes ☐ No

7. Please indicate the total number of epidemiologists currently working for your state health department by Program Area and funding source. If an epidemiologist has responsibilities divided over more than one program area, please attribute the fraction of time the epidemiologist works in any given program area to the nearest 0.1 FTE (e.g., 0.2 ID, 0.4 BT/ER, 0.4 EH). State level epidemiologists include all those employed by the state, all those working at the state level who are either federal assignees (e.g., EISO, CEFO, PHPS) or contract employees (e.g., CSTE trainee, contracted from school of public health to work at or for the state health department), and state employees assigned to work in a regional office (e.g., to conduct contact investigations for a region of the state).

Environmental Health

Total number of epidemiologists (this total will sum from the answers below)

No. supported with federal funds from CDC _____
No. directly funded by CDC (e.g., CEFO, EIS, PHPS, etc.) _____
No. supported with federal funds from other agencies _____
No. supported with state funds _____
No. supported with funds from other sources (e.g., foundations) _____

Estimate of ideal number of additional epidemiologists needed to reach full capacity (the number of epidemiologists in addition to the current number regardless or resources).

_____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