COUNCIL OF STATE AND TERRITORIAL EPIDEMIOLOGISTS

2009 NATIONAL ASSESSMENT OF EPIDEMIOLOGY CAPACITY

Findings and Recommendations

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TABLE OF CONTENTS

Background

Beginning in 2001, the Council of State and Territorial Epidemiologists (CSTE) conducted the first of a series of periodic assessments to assess the epidemiology capacity of state and territorial health departments in the United States, structured around the Ten Essential Services of Public Health (ESPH) (1) and estimates of capacity overall and within each of eight program areas (Bioterrorism/Emergency response, Chronic diseases, Environmental health, Infectious diseases, Injury, Maternal and child health, Occupational health, and Oral health). The initial assessment in 2001 showed inadequate capacity in all epidemiology programs except infectious diseases and chronic diseases and insufficient infrastructure to perform the four ESPH that most rely on epidemiology (2). After the distribution of nearly $1 billion in federal bioterrorism funds during fiscal year 2002, CSTE conducted follow-up assessments in 2004 and 2006. The 2004 assessment found both an overall increase in the number of epidemiologists working in state health departments and lower capacity in several epidemiology programs than in the 2001 assessment (3). The findings from both reports prompted CSTE to focus its workforce priorities and activities on strengthening the public health system around four priority areas (5):

1. Measuring epidemiology capacity and facilitating employment of trained epidemiologists needed within public health systems;
2. Establishing applied epidemiology competencies and addressing the training gap;
3. Identifying specific barriers to recruiting and retaining applied epidemiologists; and
4. Addressing funding gaps and leadership issues.

The 2006 assessment, in addition to measuring epidemiology capacity, assessed the status of state workforce competency and training needs and barriers to recruitment and retention of epidemiologists. The 2006 assessment found that, even though the number of epidemiologists remained the same as in 2004, the workforce had a higher level of academic and on-the-job training, and epidemiology capacity in several areas further improved (6). However, in many areas, workforce competency was suboptimal, and a need for additional training was clearly recognized.

The 2009 assessment aimed to complete the periodic enumeration and description of epidemiologists nationwide and to measure the current status of core epidemiology capacity; to reassess competency-specific training needs and barriers to recruiting and retaining epidemiologists; and to assess, for the first time, overall surveillance system technology capacity and substance abuse epidemiology capacity.

Methods

The 2009 assessment used core questions from the previous three Epidemiology Capacity Assessments (ECAs) to measure changes in epidemiology and surveillance capacity in state health departments over time. Substance abuse capacity was added to the list of program areas for which program-specific capacity was assessed. These questions focused on enumerating and describing the public health epidemiology workforce, funding, training, and ability to provide the ESPH to support the community. The 2009 ECA used core workforce competency and training questions from the 2006 ECA. A new module was added to assess the current status of implementation of important technologies that enhance surveillance capacity and are a precursor to use of electronic medical records for public health purposes, i.e., electronic laboratory reporting, Web-based provider reporting, routine geographic information system coding of vital statistics and reportable disease data.

After pilot testing the 2009 assessment in three states, CSTE distributed it online to all 50 states, the District of Columbia, and eight US territories in April 2009. State Epidemiologists or their delegates completed the assessment online before the end of June 2009. The final results comprise responses for all 50 states and the District of Columbia. *Because only two territories with one epidemiologist each responded, the territories are not included in this data analysis.*

Results and Conclusions

1 National epidemiology capacity has eroded since 2004, with the largest drop in the past 3 years.

- After a reduction in the number of epidemiologists by 2.5% from 2004 to 2006, the number further decreased 10% from 2006 to 2009, and the number per 100,000 population decreased by 12%.
- For three of the four ESPH related to surveillance and epidemiology capacity, the percentage of states with at least substantial capacity decreased by 4–24 percentage points, whereas the percentage of states with minimal to no capacity increased by 4–10 percentage points.
- Surveillance and epidemiology capacity decreased in several program areas, most notably in bioterrorism/emergency response, for the second consecutive ECA, from a high of 80% of states having substantial or higher capacity in 2004 to 73% having that level of capacity in 2009.
- Respondents estimated that at least 1490 *additional* epidemiologists are needed nationwide for optimal epidemiology capacity in all program areas.

2 A large percentage of states continue to have minimal to no capacity to carry out several ESPH and minimal to no capacity in a number of program areas to carry out basic surveillance and epidemiology functions.

- ESPH #9 (Evaluate effectiveness, accessibility, and quality of personal and population-based health services): 31% of states reported minimal to no capacity—the highest percentage yet—and only 14% reported at least substantial capacity.
- ESPH #10 (Research for new insights and innovative solutions to health problems): 43% of states reported minimal to no capacity, and only 18% reported at least substantial capacity.
- Four program areas continue to have >30% of states with minimal to no surveillance and epidemiology capacity: injury, 32%; environmental health, 35%; oral health, 61%; and occupational health, 68%.
- Overall, 76% of states have minimal to no capacity related to substance abuse.

3 Many states still do not have the technology capacity needed to move the way they conduct surveillance into the early 21st century, a preparedness and public health vulnerability. States lack automated electronic laboratory reporting, Web-based provider reporting, and use of cluster-detection software, resulting in less timely and less complete reporting, reduced ability to rapidly detect outbreaks, continued drainage of resources into the work of reporting, and reduced ability to expand surveillance to conditions with large numbers of affected persons. They do not routinely geocode address data and thus cannot take advantage of geographic information system technologies to routinely examine the geographic distribution of disease events or the nature of neighborhood of residence as a demographic factor to describe and respond to disparities in disease and in health.

- Electronic laboratory reporting is operable in only 53% of states, Web-based provider reporting in 41%, and cluster-detection software in 24%.
- Routine geocoding is done in <50% of states: 39% geocode births; 41%, deaths; and 29%, all reportable disease data.

4   The need continues for a strong workforce development effort.
- More than 30% of states expressed a need for additional staff training for 23 of 27 applied epidemiology competencies assessed.
- 8.1% of the public health epidemiology workforce with master's or higher level training left during 2008.
- Another 17% of the current epidemiology workforce anticipates leaving in the next 5 years.

Despite these challenges, the 2009 ECA provided some encouraging findings and additional insights into what can help achieve higher epidemiology capacity.
- The size of the state is critical in determining how many epidemiologists are needed at the state level, with the largest states ($\geq$6 million population) both having and optimally needing less than half the number of epidemiologists per capita as the smallest states (<2.65 million population).
- A much higher percentage of states that have a lead epidemiologist assigned to a program area have substantial surveillance and epidemiology capacity compared with states with no lead epidemiologist in that program area.
- Some program areas improved in surveillance and epidemiology capacity from 2006 to 2009, particularly maternal and child health, which improved from 44% to 55% of states having at least substantial capacity.
- Only 60–100 additional epidemiologists are needed nationally in each of the four program areas with the least current capacity to achieve optimal capacity in those areas: injury, occupational health, substance abuse, and oral health.
- A higher percentage of the workforce has formal academic training in epidemiology than in previous assessments, a steady trend since 2001. A total of 56% are trained at the master's level or higher.
- The state epidemiology workforce has generally higher competency ratings than in 2006.
- Almost all state health departments collaborate with academic and health professional organizations to provide educational opportunities to employees and the developing workforce.

Recommendations

1   Develop a strategy to achieve optimal epidemiology capacity.
- The Centers for Disease Control and Prevention (CDC) and CSTE should collaborate on using data from the ECAs to establish numeric and structural goals for epidemiology capacity for state health departments in part on the basis of their size. The current fiscal crisis in most states is likely to result in further erosion of capacity. Standards are needed as targets for rebuilding when rebuilding becomes feasible.
- As part of cooperative agreement funding, CDC should encourage all states to have a lead epidemiologist for each program area, including substance abuse.

- To clarify the benefits of having at least substantial surveillance and epidemiology capacity in each area, CSTE and CDC should develop documentation of the benefits of full capacity on the basis of examples provided from states with a high level of capacity.
- State and federal agencies involved in developing epidemiology capacity need to come together to discuss gaps in epidemiology capacity and ways to work together to overcome them.

2   Assist states to achieve selected surveillance-related technology capacities.

- As part of public health preparedness funding, CDC should support states in achieving full functional technology capacity in the following areas: electronic laboratory reporting; Web-based provider reporting; use of cluster-detection software for outbreaks; routine geocoding of vital statistics, reportable diseases, and any other surveillance data for which personal street/mailing address information is collected (e.g., immunization registries).
- CDC should actively encourage states to routinely match geocoded data with census data and to present descriptive epidemiologic data on selected characteristics of neighborhood of residence, such as the percentage of residents in the neighborhood living in poverty.

3   Maintain efforts to establish training standards for applied public health epidemiologists and to provide training to enable a sustained, qualified public health epidemiology workforce.

- Federal, state, territorial, tribal, and local public health agencies should continue to aggressively promote the development and implementation of standards for applied epidemiology training using a competency-based model.
- CSTE and CDC should maintain the current direction in defining, measuring, and refining competencies. As part of this, an effort should be made to examine whether informatics skills should be included in any epidemiology competencies to enable implementation and use of technology advances, including use of the electronic medical record.
- State health departments and schools of public health need to continue to support the full integration of recently and newly developed applied epidemiology competencies for public health epidemiologists. They also need to provide or facilitate training for epidemiologists in the workforce around the Applied Epidemiology Competencies, particularly those that have been identified as highest need.

4   Conduct future assessments.

- Given the findings in this assessment, future assessments should continue to monitor both functional and numeric epidemiology capacity. Accurately monitoring the number of epidemiologists and funding source by program area (including substance abuse) and overall will be important.
- Future assessments also should continue to monitor key technology capacities because they are essential for public health preparedness-related monitoring and to enable access to a broader range of information for public health action.

BACKGROUND

A number of forces have driven the need to determine the public health epidemiology capacity of the United States. The Centers for Disease Control and Prevention (CDC) and state and local health departments have long needed data on the public health workforce to enable them to plan how to carry out basic public health functions specified in state law. How many public health epidemiologists does each state have? Do they have a sufficient number? What is the optimal number toward which each should aim to conduct basic public health functions? What is the makeup of the epidemiology workforce? What should it be? Schools of public health, responsible for much of the training of the epidemiologic workforce, have asked the same questions and what competencies the current public health epidemiology workforce have and which they should have. In 1988 and again in 2002, the Institute of Medicine recognized the need for public health epidemiology capacity and recommended that every health department regularly and systematically collect, assemble, analyze, and make available information about the health of the community, including statistics on health status, community health needs, and epidemiologic and other studies of health problems (7,8). Furthermore, in the fall of 1994, the American Public Health Association adopted the Ten Essential Services of Public Health (ESPH) as the national standard for public health (1). Many of these services depend on epidemiology capacity to monitor health status, analyze data, investigate health problems and hazards in the community, develop insights and innovative solutions to limit them, and evaluate the effectiveness of control efforts. Healthy People 2010 included an objective relating to epidemiology capacity. Objective 23-14 is "increase in the proportion of Tribal, State and local public health agencies that provide or assure comprehensive epidemiology services to support essential public health services, including quickly detecting, investigating, and responding to diseases to prevent unnecessary transmission" (9).

In November 2001, CSTE conducted the first comprehensive nationwide assessment of core epidemiology capacity in state and territorial health departments. This assessment was conducted in part to collect baseline information for monitoring progress with Healthy People objective 23-14. It also marked the status of national state- and territory-based epidemiology capacity before the distribution of approximately $1 billion in federal funding annually to state health departments for bioterrorism (BT) and public health emergency preparedness. In this first assessment, the 39 responding states reported employing 1366 epidemiologists, of whom 48% worked in infectious diseases and 62% were supported with federal funding (2).

Building on interest generated by the 2001 Epidemiology Capacity Assessment (ECA) and the need for additional detail, CSTE conducted two additional ECAs after 2001, in 2004 and 2006. In addition to measuring core capacity, the 2004 ECA focused on the infrastructure of public health surveillance programs and training opportunities for epidemiologists once they were employed in health departments. All states and the District of Columbia (DC) responded. Core capacity, as measured by the number of epidemiologists in the same 39 states responding to the 2001 ECA, jumped 20%, with all additional capacity in bioterrorism/emergency response (BT/ER) and maternal and child health (MCH) program areas. Federal funding was largely responsible for the increase, with 75% of all capacity supported with federal funds. Results also revealed that 28.5% of epidemiologists lacked any formal training or academic coursework in epidemiology at the time they were employed (3,4).

The 2006 ECA built on the training needs identified in 2004 and CSTE and CDC work to develop applied epidemiology competencies (10,11). It measured applied epidemiologic competencies

and associated training needs as well as core epidemiology capacity. Again, the response rate of the 50 states and DC was 100%. Key findings included a slight drop (2.5%) in the total number of epidemiologists, of whom 74% were supported with federal funds; estimated need for a 34% increase in the total number to be able to fully conduct core public health functions, and a reduction in the percentage who lacked any formal epidemiology training to 15% (6,12–14).

Since 2006, several dynamics have created a need to assess capacity in 2009. Federal public health preparedness funding has decreased; the economic downturn has created budget problems at all levels of government; the country is under new leadership; and 2010—the year by which a sustained increase in epidemiologic capacity is to be achieved—is approaching. In addition, the reach of health departments is beginning to extend into substance abuse prevention, and health departments have the opportunity and expectation to take advantage of technology advances to support disease surveillance and intervention.

The 2009 ECA had several goals: to complete the periodic enumeration and description of epidemiologists nationwide and to measure the current status of core epidemiology capacity; to reassess competence-specific training needs and barriers to recruiting and retaining epidemiologists; and to assess, for the first time, overall surveillance system technology capacity and substance abuse epidemiology capacity.

METHODS

Instrument Development and Distribution

In September 2008, an ECA workgroup was organized under the charge of the CSTE Executive Board to begin revising the 2006 ECA tool. The advisory group comprised 11 persons from academia and state health departments.

The resulting questionnaires were piloted in March 2009 in three states (Kentucky, North Carolina, and Pennsylvania) and revised on the basis of feedback from those states. The final questionnaires contained three core modules (Core 1: Epidemiology Capacity; Core 2: Workforce Competency, Training, and Needs; and Core 3: Technologic Capacity—Appendix A). On April 1, 2009, CSTE distributed electronic instructions and a link to a secure website for access to the electronic versions of the assessment to the State or Territorial Epidemiologist in all 50 state health departments, DC, and four US territories, outlying areas, and freely associated states (American Samoa, Guam, Puerto Rico, and US Virgin Islands). The online assessment also was converted into PDF formatting for printing and distributed by request. CSTE accepted responses by the online software, mail, or fax according to state preference.

In addition to the three modules, an individual electronic worksheet (Appendix B) was included with instructions for accessing it, to be distributed by the State Epidemiologist electronically to each epidemiologist in the health department. The purpose of the individual worksheets was to obtain, for the first time, more granular information about several important competency and training issues than could be obtained from a composite answer given from the perspective of the State Epidemiologist and to assist the State Epidemiologist in compiling summary data on number of epidemiologists by program area and funding source. The individual worksheet contained questions about individual funding source, program area, academic training, length of experience, intention to leave in the next 5 years, self-assessment of competency in 27 applied competency areas, and need for training.

To access the secure website, each State Epidemiologist was provided a unique user name and password and asked to complete the online assessment by April 15, 2009. Because not all states had completed responses by late April by which time the outbreak of influenza A (H1N1) 2009 had begun, the deadline was extended to the end of June 2009. CSTE provided conference call help sessions during April 2009. During these sessions, a CSTE staff member was available to assist health departments and answer questions. In addition, each state and territory was given the e-mail address and telephone number of CSTE staff to contact for questions during business hours. Throughout the data-collection period, CSTE sent each state e-mail reminders of deadlines, websites, and state login and passwords. Each respondent state was given the opportunity to view its results and complete or revise its online submission until the data-collection period ended. For states with a 10% or greater change from 2006 in the total number of epidemiologists on the basis of summing the completed individual worksheets, CSTE contacted the State Epidemiologist to determine or verify the number of epidemiologists so that the total number of epidemiologists in all states and a response rate to the individual worksheet questions could be accurately calculated.

The final results of the core capacity assessment comprise responses from all 50 states and DC (100% response rate). Because only two territories with one epidemiologist each responded, they are not

included in this analysis. The number of responding states varied somewhat by question. Of the total 2193 epidemiologists enumerated by the State Epidemiologist, 1544 (70%) completed individual worksheets. The number of respondents to individual worksheet questions also varied by question.

Statistical Analysis

Data were analyzed using SAS version 9.1 and Microsoft Excel 2007, and results were tabulated for all responses from the 50 states and DC.

Two descriptive variables were created to enable categorization of states and a per capita measure of numeric epidemiology capacity: state population size and number of epidemiologists per 100,000 population. States were separated into three categories of 17 states each by population size: small (<2.65 million population based on July 1, 2008, US Census estimates), medium (2.64–5.999 million population), or large ($\geq$6 million population). State population size was used in the following ways: to examine whether it factored in the number of epidemiologists per 100,000 population and in ability to achieve core public health functions; and to examine selected responses to determine whether it factored in the range of responses given.

Additional Assessment Information and Instructions

Most questions referred to the state health department. The 2009 ECA explained who was considered a state health department epidemiologist, which did not change from 2006.

Who should be counted as a STATE Health Department Epidemiologist?
Epidemiologists employed or contracted by the STATE HD. For example, epidemiologists who work at the LOCAL or STATE level who are employed or contracted by the state are considered STATE epidemiologists.

The definition of an epidemiologist and who should be counted as an epidemiologist did not change from 2006.

What is an Epidemiologist?
According to Last (15), an Epidemiologist is defined as "an investigator who studies the occurrence of disease or other health-related conditions or events in defined populations. The control of disease in populations is often also considered to be a task for the epidemiologist." The discipline of Epidemiology is defined as the "study of the distribution and determinants of health-related states or events in specified populations, and the application of this study to control of health problems." "Study" includes surveillance, observations, hypothesis testing, analytic research, and experiments. "Distribution" refers to analysis by time, place, and classes of persons affected. "Determinants" are all the physical, biological, social, cultural, and behavioral factors that influence health. "Health-related states and events" include diseases, causes of death, behaviors such as use of tobacco, reactions to preventive regimens, and provisions and use of health services. "Specified populations" are those with identifiable characteristics such as precisely defined numbers. "Applications to control …" makes explicit the aims of epidemiology—"to promote, protect, and restore health."

Who should be counted as an Epidemiologist?

Epidemiologists in state and territorial health departments are any person(s) who perform functions consistent with the above definition. When considering who should be counted as an epidemiologist, respondents were instructed to focus on the functions performed by the individual rather than the job title.

When indicated, the following scale was used:

Not at all, None: None of the activity, knowledge, or resources described within the question.

Minimal: <25% (but >0%) of the activity, knowledge, or resources described within the question.

Partial: $\geq$25% (but <50%) of the activity, knowledge, or resources described within the question.

Substantial: $\geq$50% (but <75%) of the activity, knowledge, or resources described within the question.

Almost Full: $\geq$75% (but <100%) of the activity, knowledge, or resources described within the question.

Full: 100% of the activity, knowledge, or resources described within the question.

Additional instructions included the following:

- Enter additional text to explain answers when indicated.
- Select only one response unless otherwise specified.
- Describe half-time employees as ½ (i.e., 0.5 FTE).
- Enter "0" if your response to a question is 0 (zero). Please do not leave the field blank.

RESULTS

Functional Epidemiology Capacity

Overall Epidemiology Capacity to Address the Essential Services of Public Health

In 1994, the American Public Health Association adopted the Ten Essential Services of Public Health (ESPH) (Box 1) (3). As in earlier ECAs, in the 2009 assessment, CSTE examined each of the four ESPH that rely heavily on epidemiologic functions: ESPH 1, 2, 9, and 10. For two of these four ESPH, most respondents indicated substantial to full capacity: ESPH 1 (65%) and ESPH 2 (63%) (Table 1 and Figure 1). However, only a minority of respondents reported substantial to full capacity for ESPH 9 (14%) and ESPH 10 (18%), and >30% of states had minimal to no capacity to perform ESPH 9 or 10. Compared with the 2006 ECA, the percentage of states having at least substantial capacity to perform the ESPH decreased for all but ESPH 10 (see Trends, Section VII).

Box 1. | The Ten Essential Services of Public Health*

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.**

* Source: Public Health Functions Steering Committee. Public health in America: the essential public health services. Washington, DC: US Public Health Service, Public Health Functions Steering Committee; 1995 (reference 1).

Table 1.	Epidemiologic capacity to perform the epidemiology-related essential services of public health*—2009 Epidemiology Capacity Assessment, 50 states and District of Columbia

ESSENTIAL SERVICE	NONE		MINIMAL		PARTIAL		SUBSTANTIAL		ALMOST FULL		FULL	
	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%
1. Monitor health status to identify and solve community health problems.	0	0	4	7.8	14	27.5	22	43.1	8	15.7	3	5.9
2. Diagnose and investigate health problems and health hazards in the community.	1	2.0	4	7.8	14	27.5	21	41.2	8	15.7	3	5.9
9. Evaluate effectiveness, accessibility, and quality of personal and population-based health services.	3	5.9	13	25.5	28	54.9	2	3.9	3	5.9	2	3.9
10. Research for new insights and innovative solutions to health problems.	5	8.9	17	33.3	20	39.2	6	11.8	2	3.9	1	2.0

*Essential services given are related to epidemiology. Source: Public Health Functions Steering Committee. Public health in America: the essential public health services. Washington, DC: US Public Health Service, Public Health Functions Steering Committee; 1995 (reference 1)."
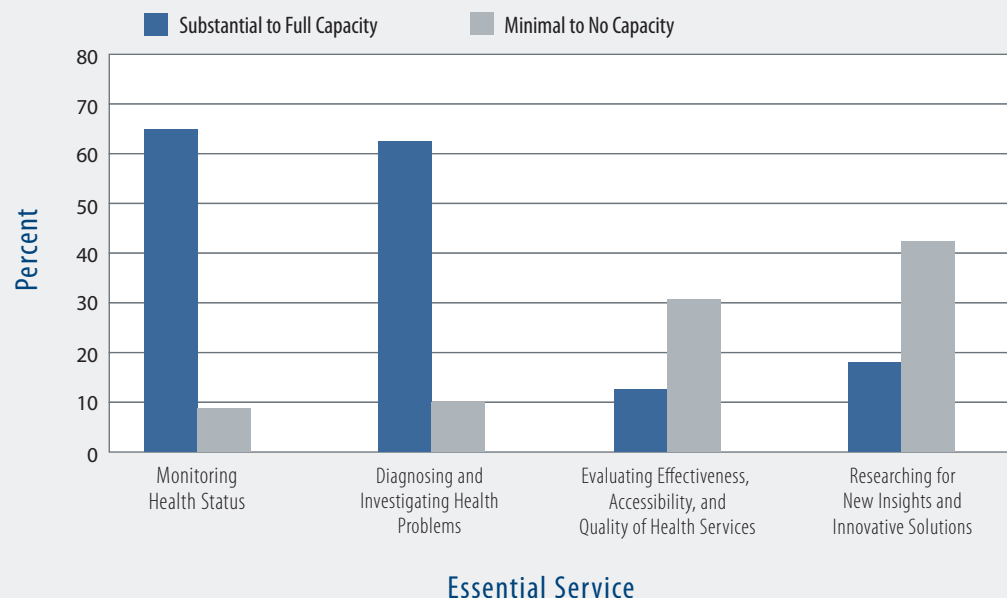
Figure 1.	Epidemiology capacity to perform epidemiology-related essential services of public health—2009 Epidemiology Capacity Assessment, 50 states and District of Columbia

Program-Level Epidemiology and Surveillance Capacity

Health departments' epidemiology and surveillance capacity varied by program area (Table 2 and Figure 2). For four program areas—infectious diseases, BT/ER, MCH, and chronic diseases—most respondents indicated substantial to full capacity. Only for infectious diseases (92%) did >75% of respondents indicate this level of capacity. For three program areas—substance abuse (76%), occupational health (68%), and oral health (61%)—most states reported minimal to no capacity.

| Table 2. | Epidemiology and surveillance capacity, by program area—2009 Epidemiology Capacity Assessment, 50 states and District of Columbia | | | | | | | | | | | | |

PROGRAM AREA	NONE		MINIMAL		PARTIAL		SUBSTANTIAL		ALMOST FULL		FULL	
	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%
Infectious diseases	1	2.0	0	0	3	5.9	22	43.1	20	39.2	5	9.8
Bioterrorism/Emergency response	0	0	4	7.8	10	19.6	15	29.4	18	35.3	4	7.8
Maternal and child health	2	3.9	4	7.8	17	33.3	18	35.3	7	13.7	3	5.9
Chronic diseases	1	2.0	8	15.7	15	29.4	16	31.4	8	15.7	3	5.9
Environmental health	3	5.9	15	29.4	14	27.5	11	21.6	6	11.8	2	3.9
Injury	5	9.8	11	21.6	18	35	12	24	3	5.9	2	3.9
Occupational health	16	31.4	19	37.3	7	13.7	5	9.8	2	3.9	2	3.9
Substance abuse	21	41.2	18	35.3	6	11.8	6	11.8	0	0	0	0
Oral health	12	23.5	19	37.3	17	33.3	2	3.9	0	0	1	2.0

| Figure 2. | Epidemiology and surveillance capacity, by program area*—2009 Epidemiology Capacity Assessment, 50 states and District of Columbia |
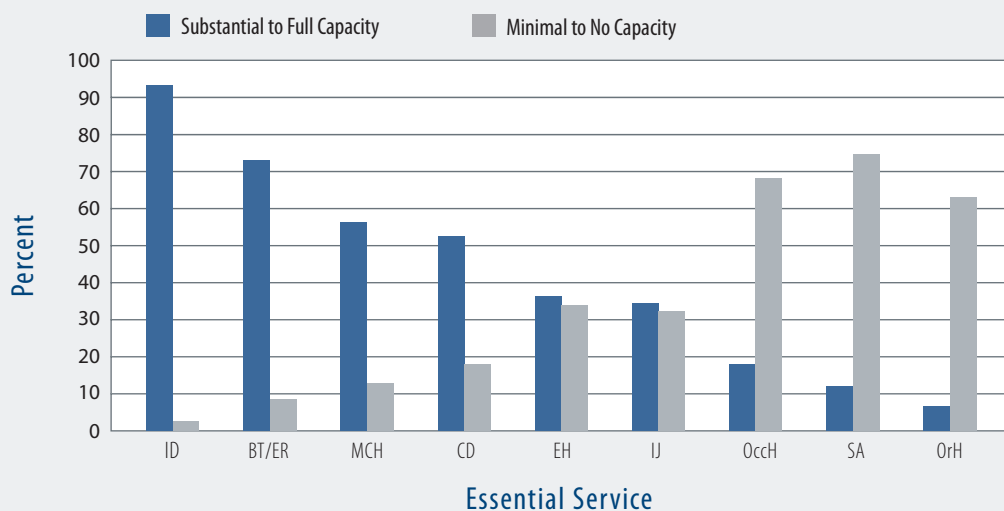
*ID: infectious diseases; BT/ER: bioterrorism/emergency response; MCH: maternal and child health; CD: chronic diseases; EH: environmental health; IJ: injury; OccH: occupational health; SA: substance abuse; OrH: oral health.

Publications

Dissemination of information is another functional epidemiologic capacity. The 2009 ECA examined the number of several types of publications by program area. Publication production, regardless of type, was closely associated with program area epidemiology and surveillance capacity, with the major exception of BT/ER, in which the number of all forms of formal publications were much lower than might be expected on the basis of its high functional capacity (Table 3, Figure 3).

Table 3. Formal epidemiology-based publications published during 2008, by program area—2009 Epidemiology Capacity Assessment, 46 responding jurisdictions

PROGRAM AREA	NO. RESPONDING STATES	NO. PEER REVIEWED PUBLISHED ARTICLES IN 2008	NO. ABSTRACTS ACCEPTED FOR PRESENTATION AT NATIONAL CONFERENCES HELD IN 2008	NO. OTHER* REPORTS IN 2008
Infectious diseases	46	182	271	431
Chronic diseases	43	89	165	366
Environmental health	43	56	101	146
Maternal and child health	43	47	123	122
Injury	43	31	46	119
Bioterrorism/Emergency response	45	27	53	60
Occupational health	43	12	34	42
Substance abuse	43	11	19	27
Oral health	43	7	9	27

*Reports approved by a state process and published electronically or on paper and/or posted on a website for public consumption.

Figure 3. Percentage of states producing formal epidemiology-based publications in 2008, by program area* and type of publication, and percentage of states reporting substantial to full epidemiology capacity, by program area—2009 Epidemiology Capacity Assessment, 46 responding jurisdictions

*ID: infectious diseases; BT/ER: bioterrorism/emergency response; MCH: maternal and child health; CD: chronic disease; EH: environmental health; IJ: injury; OccH: occupational health; SA: substance abuse; OrH: oral health; EpiSurv Capacity: percentage reporting substantial to full epidemiology and surveillance capacity.
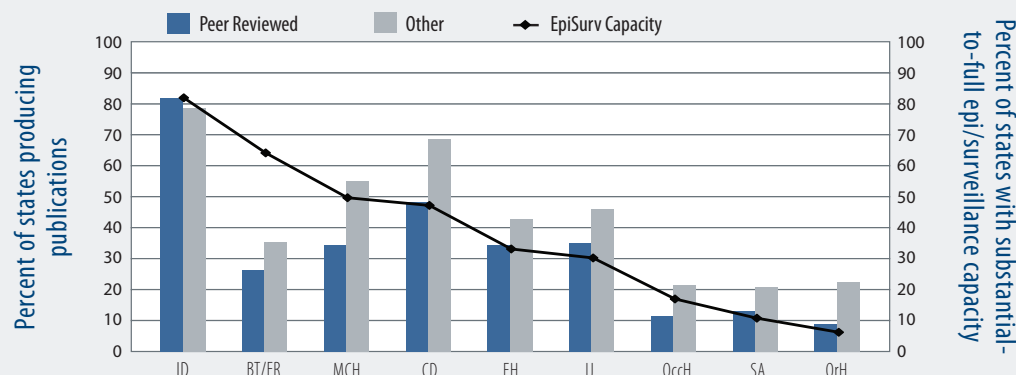
RESULTS

Numeric Epidemiology Capacity

Total Number of Epidemiologists and Number per 100,000 Population

State Epidemiologists verified a total of 2193 epidemiologists in the 50 states and District of Columbia (DC). The larger the state population, the more epidemiologists the state employed, although the number by state population size overlapped considerably (Table 4). The national population-based estimate for 2009 was 0.72 epidemiologists per 100,000 population. States employed a median of 0.77 epidemiologists per 100,000 population (range: 0.19–4.05). Small states had >2.5-fold more epidemiologists per 100,000 population than did large states (Table 4).

Table 4.	Number of epidemiologists and number per 100,000 population, by state size—2009 Epidemiology Capacity Assessment, 50 states and District of Columbia						
		EPIDEMIOLOGISTS			EPIDEMIOLOGISTS PER 100,000 POPULATION		
STATE POPULATION	NO. STATES AND DC	No.	MEDIAN	RANGE	No.*	MEDIAN†	RANGE†
Small (<2.65 M)	17	275.5	11	4–62	1.35	1.41	0.19–4.05
Med (≥2.65 M to <6 M)	17	817.8	35.8	20–107.5	1.16	1.1	0.43–2.77
Large (≥6 M)	17	1099.5	61	13.5–142	0.52	0.54	0.19–1.54
Total U.S.	51	2192.8	32	4–142	0.72	0.77	0.19–4.05

Based on sum of all epidemiologists in category and total population of category.
† Based on state-specific numbers of epidemiologists and population.

Estimated Need for Additional Epidemiologists

State epidemiologists were asked to estimate the number of additional epidemiologists they needed to fully carry out the four ESPH regardless of resources. The 36 states (representing 68% of the estimated US population as of July 1, 2008) that responded to this question estimated needing an *additional* 1490 epidemiologists, more than double the 1470 epidemiologists the same 36 states enumerated in the 2009 ECA. Responses from these 36 states indicated the distribution of the optimal number of epidemiologists per 100,000 was also a function of state size (Figure 4).

Each of the 15 nonresponding states had at least one program area with less than substantial surveillance and epidemiology capacity and most had at least three. One non-responding state had six program areas with no capacity. Thus, the number of additional epidemiologists needed may be considerably higher than the 1490 enumerated.

Figure 4. | Current and optimal number of epidemiologists per 100,000 population, by state size*—2009 Epidemiology Capacity Assessment, 36 agencies
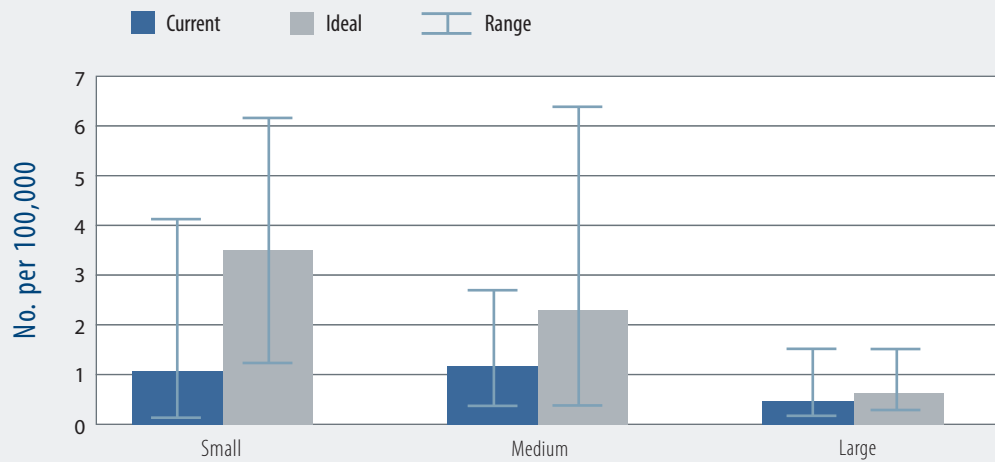
*Small: <2.65 million; medium: <2.65 million to <6 million; large: >6 million.

Each program area was deemed to need >60 additional epidemiologists to achieve full capacity to carry out the four epidemiology-related ESPH. Except for environmental health, four of the five program areas in which <50% of states had even substantial capacity (i.e., injury, occupational health, substance abuse, and oral health) needed relatively small numbers of additional epidemiologists (60–100 each) to reach full capacity, compared with other, more established program areas (Figure 5).

Figure 5. | Additional number of epidemiologists needed, by program area*—2009 Epidemiology Capacity Assessment, 36 jurisdictions
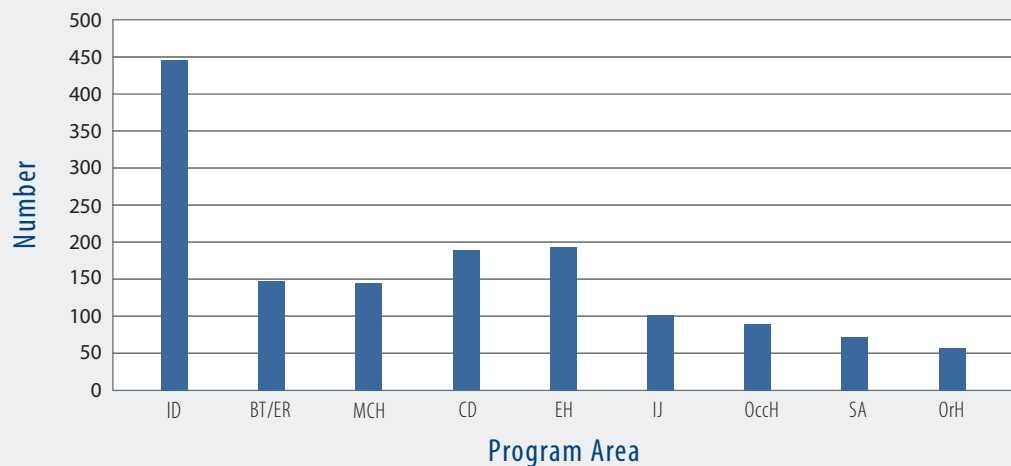
*ID: infectious diseases; BT/ER: bioterrorism/emergency response; MCH: maternal and child health; CD: chronic diseases; EH: environmental health; IJ: injury; OccH: occupational health; SA: substance abuse; OrH: oral health.

RESULTS

Technology Epidemiology Capacity

Laboratory and Disease Reporting

The 2009 ECA included questions about technical capacity, specifically about reporting of diseases and laboratory findings. The assessment asked whether the state had fully functional automated electronic laboratory reporting (ELR, Box 2), Web-based provider reporting, and a National Electronic Disease Surveillance System (NEDSS)–compliant database for reporting information to CDC and was collaborating to make electronic medical records useful for public health purposes. Although all states either had a NEDSS-compliant database (90%) or planned to implement one in the next 2 years (10%), many fewer had ELR (53%) or Web-based provider reporting (41%) (Table 5). In addition, >30% of states had no concrete date for implementing ELR (31%) or Web-based provider reporting (49%); this did not vary by state size. Despite the gaps in current capacity, most states reported actively collaborating with local medical groups to make electronic medical records useful for public health purposes.

Box 2.	Automated Electronic Laboratory Reporting (ELR)

ELR is a system that automatically scans laboratory data at the laboratory each day to detect reportable laboratory finding information, packages it in a form that can be received by the state, and automatically enters it into the reportable disease database. Such a system eliminates most of the work of reporting at laboratories and data entry at the state and enables reporting of large-volume laboratory findings that might not otherwise be able to be collected because of the labor involved in completing forms and entering data. A fully functional automated ELR system for purposes of 2009 Epidemiology Capacity Assessment included reporting from at least one private laboratory.

Table 5.	Laboratory and disease reporting technical capacity—2009 Epidemiology Capacity Assessment, 50 states and District of Columbia

CAPACITY	No. RESPONDENTS	YES No. (%)	NO, BUT PLANNED No. (%)	NO, UNKNOWN WHEN No. (%)
Fully functional automated ELR*	51	27 (53)	8 (16)	16 (31)
Have you expanded the number of conditions for which you receive due to ELR* [among those with ELR]?	27	10 (37)	17 (63)	-
Formal Web-based provider disease reporting system in which providers complete a case report form online, and data are automatically entered into a reportable disease database without re-entry	51	21 (41)	5 (10)	25 (49)
Reports input into a NEDSS*-compliant disease database	51	46 (90)	5 (10)	-
Actively collaborating with medical groups on making electronic medical records useful for public health purposes	51	30 (59)	18 (35)	3 (6)

ELR: electronic laboratory reporting; NEDSS: National Electronic Disease Surveillance System.

Data Analysis and Response Capacity

The assessment asked whether states routinely used cluster-detection software, routinely geocoded selected data, or used an outbreak-management system. A minority of states reported using these data analysis and response advances, and few had definite plans to implement them (Table 6, Figure 6). Larger states were more likely than smaller states to geocode births, deaths, and reportable disease information (births and deaths: 59% of large states, 47% of medium states, 18% of small states; reportable diseases: 41% of large states, 29% of medium states, 18% of small states).

Table 6.	Technical capacity in data analysis and response—2009 Epidemiology Capacity Assessment, 50 states and District of Columbia			
CAPACITY	No. RESPONDENTS	YES No. (%)	NO No. (%)	UNKNOWN No. (%)
Routinely use automated cluster-detection software	51	12 (24)	38 (74)	1 (2)
Routinely geocode all births	51	20 (39)	25 (49)	6 (12)
Routinely geocode all deaths	51	21 (41)	24 (47)	6 (12)
Routinely geocode all case report data from reportable diseases and laboratory findings	51	15 (29)	34 (67)	2 (4)
Routinely geocode all case data on at least some reportable diseases [among states that do not geocode all]	34	13 (38)	21 (62)	0 (0)
Use an outbreak-management-system*	51	16 (31)	35 (69)	0 (0)

*An outbreak-management system supports the initial characterization, investigation, response, and containment of outbreaks through data collection and analysis.

Figure 6.	Prevalence of selected surveillance, analysis, and response technology capacities – 2009 Epidemiology Capacity Assessment, 50 states and District of Columbia
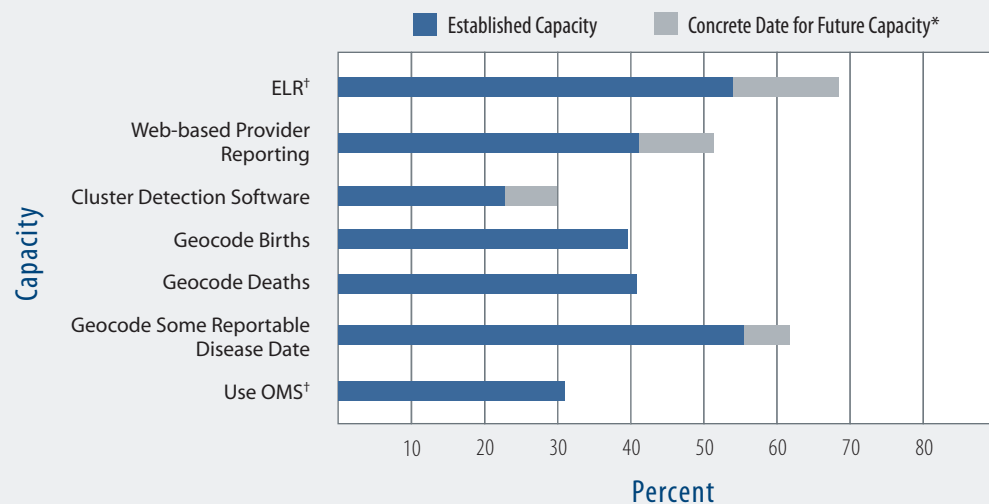
* Not asked for geocoding births or deaths or for using OMS.
† ELR: electronic laboratory reporting; OMS: outbreak-management system.

Funding

All respondents reported receiving federal funding and all but one received state funding to support epidemiology activities within the state health department. Other sources of funding were much less common (22% of respondents) and invariably accounted for <1% of funding. On average, each state health department received 75% of its funding from the federal government and 23% from the state (Table 7). These percentages did not differ appreciably from 2006 (see Trends).

Table 7.	Funding sources for epidemiology activities in state health departments—2009 Epidemiology Capacity Assessment, 50 states and District of Columbia

FUNDING SOURCE	PERCENTAGE OF FUNDING				No. STATES	
	MIN	MAX	MEDIAN	MEAN	YES	NO
Federal	30%	98%	75%	75%	51	0
State	2%	65%	24%	23%	50	1
Other	<1%	<1%	0%	*	11	40

*One state entered <1%; no other respondents answered the question regarding percentage of other funding..

Characterization of the Epidemiology Workforce

Information in this section is based mostly on responses from the 1544 full-time equivalent (FTE) epidemiologists who completed the individual worksheet. Seventy percent of all epidemiologists working in state health departments completed the worksheet, but not all responded to each question.

Program Area

The largest group of responding epidemiologists worked in infectious diseases (49.9%), followed by chronic diseases (11.5%), MCH (9.5%), BT/ER (8.0%) and environmental health (7.6%). All other areas had <3% each, with few FTE epidemiologists working in oral health or substance abuse epidemiology (0.3% and 0.4%, respectively) (Figure 7).

Figure 7. Number of responding epidemiologists working in each program area*—2009 Epidemiology Capacity Assessment (N = 1544)

* ID: infectious diseases; CD: chronic disease; BT/ER: bioterrorism/emergency response; MCH: maternal and child health; EH: environmental health; IJ: injury; OccH: occupational health; SA: substance abuse; OrH: oral health.
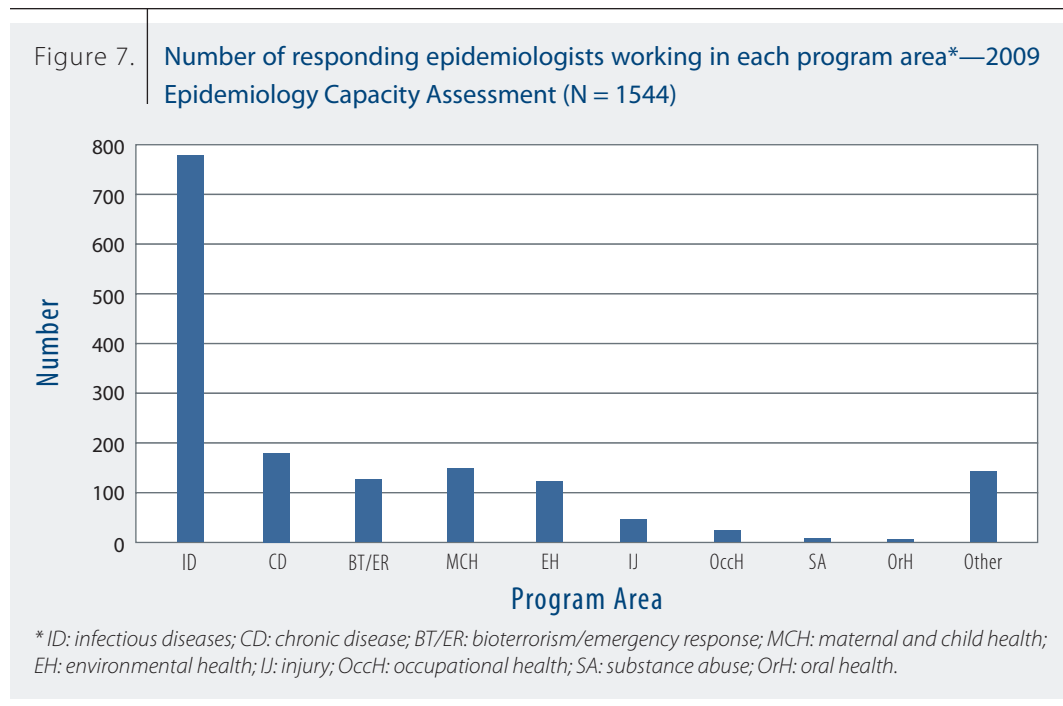
Epidemiology Training

A total of 1544 responding epidemiologists described their level of academic training in epidemiology by program area. The most common epidemiology training was an MPH, MSPH, or other master's degree (38.0%) (Table 8). Another 18.4% had either a PhD or a medical professional degree and a degree in epidemiology. Approximately 86.6% of all epidemiologists had received some formal epidemiology training. Infectious diseases had the lowest percentage of any program area with at least 50 staff with some formal epidemiology training (77.5%).

| Table 8. | Epidemiology training of persons* working as epidemiologists in state health departments, by program area[†] and level of epidemiology training—2009 Epidemiology Capacity Assessment (N = 1544) |

LEVEL OF EPIDEMIOLOGY TRAINING	PROGRAM AREA									
	ID		CD		BT/ER		MCH		EH	
	No.	%	No.	%	No.	%	No.	%	No.	%
1. PhD, DrPH, other doctoral degree in epidemiology	39.3	5.1	20.8	11.8	7.8	6.3	24.5	17.0	12.0	10.2
2. Professional background (e.g., MD, DO, DVM, DDS) with a dual degree in epidemiology	95.3	12.4	10.0	5.6	21.3	17.2	11.3	7.8	6.0	5.1
3. MPH, MSPH, other master's degree in epidemiology	317.2	41.2	66.1	37.3	45.8	37.0	42.8	29.7	46.5	39.6
4. BA, BS, other bachelor's degree in epidemiology	7.5	1.0	1	0.6	0.5	0.4	1	0.7	2.0	1.7
5. Completed formal training program in epidemiology (e.g., EIS)	56.3	7.3	8.5	4.8	14.3	11.6	8.3	5.8	5.8	5.0
6. Completed some coursework in epidemiology	163.8	14	43.6	24.6	21.3	17.2	35.3	24.5	29.5	25.2
7. Received on-the-job training in epidemiology	81.5	21.3	24	13.6	12	9.7	18	12.5	13.5	11.5
8. No formal training in epidemiology (i.e., epidemiologist does not fit in any of the above categories)	9	1.2	3.0	1.7	1	0.8	3	2.1	2	1.7
TOTAL	769.8	100	177.0	100	123.8	100	144.2	100	117.3	100

*Persons are expressed as full-time equivalent positions, resulting in fractions of persons whose positions are split between 2 or more program areas.

† Includes 141 "Other" that are not shown. ID: infectious diseases; CD: chronic disease; BT/ER: bioterrorism/emergency response; MCH: maternal and child health; EH: environmental health; IJ: injury; OccH: occupational health; SA: substance abuse; OrH: oral health.

Table 8.
Continued

Epidemiology training of persons* working as epidemiologists in state health departments, by program area† and level of epidemiology training—2009 Epidemiology Capacity Assessment (N = 1544 epidemiologists)

LEVEL OF EPIDEMIOLOGY TRAINING	PROGRAM AREA									
	IJ		OCCH		SA		ORH		COMBINED TOTAL*	
	No.	%	No.	%	No.	%	No.	%	No.	%
1. PhD, DrPH, other doctoral degree in epidemiology	0.5	1.3	3	13.6	0	0	0	0	121	7.8
2. Professional background (e.g., MD, DO, DVM, DDS) with a dual degree in epidemiology	3	7.7	1	4.5	0	0	1	27.0	164	10.6
3. MPH, MSPH, other master's degree in epidemiology	16	40.8	9.5	43.2	2.5	39.8	0.2	5.4	586	38.0
4. BA, BS, other bachelor's degree in epidemiology	0	0	0	0	0	0	0	0	14	0.9
5. Completed formal training program in epidemiology (e.g., EIS)	5.8	14.8	1	4.5	0	0	0	0	103	6.7
6. Completed some coursework in epidemiology	8.3	21.2	7	31.8	1.3	20.7	2	54.1	349	22.6
7. Received-on-the job training in epidemiology	4.5	11.5	0.5	2.3	1.5	23.9	0.5	13.5	177	11.5
8. No formal training in epidemiology (i.e., epidemiologist does not fit in any of the above categories)	1	2.6	0	0	1	15.9	0	0	30	1.9
TOTAL	39.2	100	22	100	6.3	100	3.7	100	1544	100

Persons are expressed as full-time equivalent positions, resulting in fractions of persons whose positions are split between 2 or more program areas.

† Includes 141 "Other" that are not shown. ID: infectious diseases; CD: chronic disease; BT/ER: bioterrorism/emergency response; MCH: maternal and child health; EH: environmental health; IJ: injury; OccH: occupational health; SA: substance abuse; OrH: oral health.

Workforce Competence, Training Needs and Development

State Epidemiologist Perspective

State Epidemiologists characterized the adequacy of their staff according to a selected set of competencies from the Applied Epidemiology Competencies—those that mid-level epidemiologists are expected to need—developed by CSTE and CDC (8). The highest percentage of State Epidemiologists rated their staff members as competent in "applying privacy laws to protect confidentiality including HIPAA [Health Insurance Portability and Accountability Act]" (86%); "using critical thinking to determine the existence of public health problems" (84%); "following ethics guidelines/principles in studies, research and data use" (84%); "collaborating with others to identify problems and form recommendations" (84%); and "creating and managing a database" (80%) (Table 9).

The highest percentage of State Epidemiologists indicated their staff were not competent in "develop[ing] program logic models and theories of action" (29%); "conven[ing] and provid[ing] appropriate data for communicating planning processes" (18%); and "conduct[ing] a community health status assessment and prioritize[ing] identified issues" (14%).

State Epidemiologists indicated a need for additional training for all competencies (Table 9). In two areas, >50% of respondents reported a need for additional training: "describe human subjects' research and apply IRB [institutional review board] processes" (59%); and "use leadership and systems thinking in epidemiologic planning and policy development" (59%). For 23 of the 27 competencies assessed, >30% of states indicated a need for additional training.

Table 9. State Epidemiologist's assessment of staff competence *and* training needs in regard to the Applied Epidemiology Competencies*—2009 Epidemiology Capacity Assessment (N = 51)

APPLIED EPIDEMIOLOGY COMPETENCIES	STAFF ARE *COMPETENT* IN THIS AREA			
	AGREE	NEUTRAL	DISAGREE	DON'T KNOW
	No. (%)	No. (%)	No. (%)	No. (%)
Apply privacy laws to protect confidentiality, including HIPAA*	44 (86)	5 (10)	0	2 (4)
Follow ethics guidelines/ principles in studies, research, and data use	43 (84)	7 (14)	0	1 (2)
Use critical thinking to determine existence of public health problem	43 (84)	7 (14)	0	1 (2)
Collaborate with others to identify problems and form recommendations	43 (84)	6 (12)	1 (2)	1 (2)
Create and manage a database	42 (82)	7 (14)	1 (2)	1 (2)
Apply understanding of causes of diseases in practicing epidemiology	40 (78)	8 (16)	1 (2)	2 (4)
Utilize scientific evidence to support actions or interventions	40 (78)	8 (16)	1 (2)	2 (4)
Assist in design of investigation, including hypothesis generation	40 (78)	7 (14)	2 (4)	2 (4)
Articulate need for investigation from literature review and data assessment	40 (78)	7 (14)	3 (6)	1 (2)
Design surveillance for public health issues, and identify key surveillance findings	40 (78)	8 (16)	2 (4)	1 (2)
Communicate epidemiology findings orally and in writing to nonprofessional audiences	36 (71)	13 (25)	1 (2)	1 (2)
Create analysis plan, and conduct analysis of data	35 (69)	13 (25)	2 (4)	1 (2)
Assess the limitations of a study's results	34 (67)	14 (27)	2 (4)	1 (2)
Apply epidemiologic principles to make recommendations on data validity	34 (67)	12 (24)	4 (8)	1 (2)
Employ appropriate statistical and communication software	34 (67)	12 (24)	2 (5)	3 (6)
Practice culturally appropriate epidemiologic activities	33 (65)	14 (27)	2 (4)	2 (4)
Describe differences between public health practice and research	32 (63)	14 (28)	4 (8)	1 (2)
Conduct evaluation of surveillance systems	28 (55)	19 (37)	3 (6)	1 (2)
Demonstrate the skills and principles of risk communication	28 (55)	19 (37)	3 (6)	1 (2)
Apply appropriate fiscal and administrative guidelines to epidemiology practice	28 (55)	17 (33)	4 (8)	2 (4)
Describe human subjects' research, and apply IRB* processes	26 (51)	23 (45)	1 (2)	1 (2)
Use leadership and systems thinking in epidemiologic planning and policy development	24 (47)	19 (37)	6 (12)	2 (4)
Establish cultural/social/political bias for recommendations/interventions	24 (47)	22 (43)	4 (8)	1 (2)
Convene and provide appropriate data for communicating planning processes	24 (47)	16 (31)	9 (18)	2 (4)
Use knowledge of environmental and behavioral sciences in epidemiologic practice	22 (43)	25 (49)	3 (4)	1 (2)
Conduct a community health status assessment, and prioritize identified issues	21 (41)	22 (43)	7 (14)	1 (2)
Develop program logic models and theories of action	13 (25)	22 (43)	15 (29)	1 (2)

*Tier 2 CDC/CSTE Applied Epidemiology Competencies were selected as a general level of assessment for all epidemiologists. IRB: institutional review board: HIPAA; Health Insurance Portability and Accountability Act.

Table 9. *Continued*	State Epidemiologist's assessment of staff competence *and* training needs in regard to the Applied Epidemiology Competencies*—2009 Epidemiology Capacity Assessment (N = 51)

APPLIED EPIDEMIOLOGY COMPETENCIES	*ADDITIONAL TRAINING* IS NEEDED			
	AGREE	NEUTRAL	DISAGREE	DON'T KNOW
	No. (%)	No. (%)	No. (%)	No. (%)
Apply privacy laws to protect confidentiality, including HIPAA*	9 (18)	16 (31)	24 (47)	2 (4)
Follow ethics guidelines/ principles in studies, research, and data use	12 (24)	15 (29)	22 (43)	2 (4)
Use critical thinking to determine existence of public health problem	17 (33)	13 (25)	18 (35)	3 (6)
Collaborate with others to identify problems and form recommendations	12 (24)	12 (24)	25 (49)	2 (4)
Create and manage a database	15 (29)	15 (29)	18 (35)	3 (6)
Apply understanding of causes of diseases in practicing epidemiology	22 (43)	10 (20)	22 (43)	2 (4)
Utilize scientific evidence to support actions or interventions	22 (43)	8 (16)	19 (37)	2 (4)
Assist in design of investigation, including hypothesis generation	18 (35)	12 (24)	17 (33)	3 (6)
Articulate need for investigation from literature review and data assessment	16 (31)	12 (24)	21 (41)	2 (4)
Design surveillance for public health issues, and identify key surveillance findings	18 (35)	14 (27)	16 (31)	2 (4)
Communicate epidemiology findings orally and in writing to nonprofessional audiences	20 (39)	10 (20)	19 (37)	2 (4)
Create analysis plan, and conduct analysis of data	20 (39)	17 (33)	11 (22)	3 (6)
Assess the limitations of a study's results	19 (37)	12 (24)	17 (33)	3 (6)
Apply epidemiologic principles to make recommendations on data validity	21 (41)	11 (22)	16 (31)	3 (6)
Employ appropriate statistical and communication software	21 (41)	13 (25)	14 (27)	3 (6)
Practice culturally appropriate epidemiologic activities	18 (35)	10 (20)	20 (39)	3 (6)
Describe differences between public health practice and research	21 (41)	12 (24)	16 (31)	2 (4)
Conduct evaluation of surveillance systems	20 (39)	12 (24)	14 (27)	2 (4)
Demonstrate the skills and principles of risk communication	25 (49)	12 (24)	12 (24)	2 (4)
Apply appropriate fiscal and administrative guidelines to epidemiology practice	22 (43)	11 (22)	15 (29)	3 (6)
Describe human subjects' research, and apply IRB* processes	30 (59)	13 (26)	16 (31)	2 (4)
Use leadership and systems thinking in epidemiologic planning and policy development	30 (59)	6 (12)	11 (22)	4 (8)
Establish cultural/social/political bias for recommendations/interventions	24 (47)	11 (22)	16 (31)	2 (4)
Convene and provide appropriate data for communicating planning processes	22 (43)	10 (20)	15 (29)	4 (8)
Use knowledge of environmental and behavioral sciences in epidemiologic practice	18 (35)	17 (33)	10 (20)	2 (4)
Conduct a community health status assessment, and prioritize identified issues	22 (43)	15 (29)	11 (22)	3 (6)
Develop program logic models and theories of action	24 (47)	13 (25)	10 (20)	3 (6)

Tier 2 CDC/CSTE Applied Epidemiology Competencies were selected as a general level of assessment for all epidemiologists. IRB: institutional review board: HIPAA; Health Insurance Portability and Accountability Act.

Tier-Level Epidemiologist Perspective

The 2009 ECA, for the first time, provided the opportunity for individual epidemiologists to assess their competency and training needs (Tables 10–13). Individual epidemiologists were asked to indicate the tier to which belonged and then to assess themselves according to their tier's specific set of competencies. The four tiers are Tier 1—entry-level; Tier 2—mid-level; Tier 3a—senior-level supervisor or manager; and Tier 3b—senior scientist/subject area expert.

In general, as the tier level increased, a higher percentage of epidemiologists indicated they were competent, and a lower percentage indicated needing additional training. From Tier 1 to Tier 3b, the percentage of epidemiologists who indicated they were competent increased from 35% for Tier 1 to 63% for Tier 2 to 72% and 71%, respectively, for Tiers 3a and 3b. Conversely, from Tier 1 to Tier 3b, the percentage of epidemiologists who indicated needing additional training decreased from 33% for Tier 1 to 25% for Tier 2 to 19% each for Tiers 3a and 3b (Table 14).

For no competency area did at least 70% of entry-level epidemiologists indicate they were competent (Table 10). The two areas with the lowest competency levels were "apply appropriate fiscal and administrative guidelines to epidemiology practice" (14%) and "describe how policy decisions are made" (17%). For more than half of the competencies, at least 30% of entry-level epidemiologists said they needed additional training. The highest competencies for which the percentage of Tier 1 epidemiologists indicated needing additional training were "implement new or revise existing surveillance systems and report key surveillance findings" (44%) and "support evaluation of surveillance systems" (44%).

In 15 (50%) of competency areas, at least 70% of mid-level epidemiologists indicated they were competent (Table 11). The lowest competency levels were for "assist in the development of program logic models and theories of action" (34%) and "apply appropriate fiscal and administrative guidelines to epidemiologic practice" (34%); the latter was the same competency for which entry-level epidemiologists had particularly low competency. For six competencies, at least 30% of mid-level epidemiologists said they needed additional training. The highest percentage of Tier 2 epidemiologists responded they needed additional training for "conduct a community health assessment and recommend priorities of potential public health problems to be addressed" (40%) and "assist in the development of program logic models and theories of action" (40%).

Senior-level epidemiologists with program management and/or supervisory responsibilities indicated 17 (55%) areas in which at least 70% considered themselves competent (Table 12). The two areas with the lowest competency levels were "lead community public health planning processes" (45%) and "lead epidemiology unit in preparing for emergency response" (49%). For only one area did at least 30% of Tier 3a epidemiologists report needing additional training: "develop and manage information systems to improve effectiveness of surveillance, investigation, and other epidemiologic practices" (31%). This was followed by "create operational and financial plans for future epidemiologic activities" (29%).

At least 70% of senior scientist epidemiologists considered themselves competent in 16 (53%) of areas (Table 13). The two areas with the lowest competency were "describe financial and budgetary processes of the agency" (31%) and "lead community public health planning processes" (40%), which also was one of the lowest competency areas for Tier 3a. These were the two competency areas for which at least 30% of Tier 3b epidemiologists indicated needing additional training (32% each)

| Table 10. | Entry-level epidemiologists' self-assessment of competence in the Tier 1 Applied Epidemiology Competencies and additional training need—2009 Epidemiology Capacity Assessment (N = 341) |

TIER 1 COMPETENCIES	STAFF ARE *COMPETENT* IN THIS AREA			
	AGREE	NEUTRAL	DISAGREE	DON'T KNOW
	No. (%)	No. (%)	No. (%)	No. (%)
Promote ethical conduct in epidemiologic practice	199 (58)	80 (23)	50 (15)	12 (4)
Demonstrate ability to listen effectively when epidemiologic findings are presented or discussed	196 (57)	102 (30)	31 (9)	12 (4)
Apply knowledge of privacy laws to protect confidentiality, including HIPAA* and applicable state and local privacy laws	194 (57)	88 (26)	48 (14)	11 (3)
Maintain databases	173 (51)	81 (24)	77 (23)	10 (3)
Practice professional development	172 (50)	117 (34)	37 (11)	15 (4)
Use effective communication technologies	171 (50)	116 (34)	41 (12)	13 (4)
Collaborate with others inside and outside the agency to identify the problem	163 (48)	108 (32)	64 (19)	6 (2)
Prepare written and oral reports and presentations that communicate necessary information to agency staff	164 (48)	107 (31)	60 (18)	10 (3)
Recognize the existence of a public health problem	154 (45)	115 (34)	66 (19)	6 (2)
Identify key findings from the study	149 (44)	101 (30)	79 (23)	12 (4)
Support the organization's vision in all programs and activities	139 (41)	120 (35)	66 (19)	16 (5)
Follow ethics guidelines and principles when planning studies; conducting research; and collecting, disseminating, and using data	128 (38)	86 (25)	114 (33)	13 (4)
Use analysis plans, and analyze data	117 (34)	108 (32)	107 (31)	9 (3)
Identify surveillance data needs	115 (34)	142 (42)	77 (23)	7 (2)
Identify the role of laboratory resources in epidemiologic activities	113 (33)	95 (28)	120 (35)	13 (4)
Practice culturally sensitive epidemiologic activities	102 (30)	111 (33)	112 (33)	16 (5)
Apply understanding of human and environmental biology and behavioral sciences and principles to determine potential biological mechanisms of disease	101 (30)	97 (28)	130 (38)	13 (4)
Use knowledge of human and environmental biology and behavioral sciences and principles to determine potential biological mechanisms of disease	97 (28)	92 (27)	137 (40)	15 (4)
Recognize the basic principles of risk communication	88 (26)	112 (33)	118 (35)	23 (7)
Assist in evaluation of programs	87 (26)	100 (29)	142 (42)	12 (4)
Assist in design of investigation, including creating hypotheses	85 (25)	107 (31)	135 (40)	14 (4)
Describe human subjects research and apply IRB* processes, as directed	80 (23)	67 (20)	180 (53)	14 (4)
Provide epidemiologic input for community planning processes	78 (23)	100 (29)	144 (42)	19 (6)
Implement new or revise existing surveillance systems, and report key surveillance findings	78 (23)	115 (34)	133 (39)	15 (4)
Define cultural/social/political framework for recommended interventions	74 (22)	100 (29)	152 (45)	15 (4)
Support evaluation of surveillance systems	72 (21)	111 (33)	139 (41)	19 (6)
Assist in conducting a community health status assessment and characterizing investigative processes	68 (20)	95 (28)	160 (47)	18 (5)
Use identified informatics tools in support of epidemiologic practice	68 (20)	96 (28)	149 (44)	28 (8)
Describe how policy decisions are made within the agency	57 (17)	98 (29)	169 (50)	17 (5)
Apply appropriate fiscal and administrative guidelines to epidemiology practice	49 (14)	73 (21)	192 (56)	27 (8)

*IRB: institutional review board; HIPAA: Health Insurance Portability and Accountability Act.

Table 10. *Continued*	Entry-level epidemiologists' self-assessment of competence in the Tier 1 Applied Epidemiology Competencies and additional training need—2009 Epidemiology Capacity Assessment (N = 341)			

TIER 1 COMPETENCIES	*ADDITIONAL TRAINING* IS NEEDED			
	AGREE	NEUTRAL	DISAGREE	DON'T KNOW
	No. (%)	No. (%)	No. (%)	No. (%)
Promote ethical conduct in epidemiologic practice	55 (16)	82 (24)	131 (38)	73 (21)
Demonstrate ability to listen effectively when epidemiologic findings are presented or discussed	56 (16)	75 (22)	137 (40)	73 (21)
Apply knowledge of privacy laws to protect confidentiality, including HIPAA* and applicable state and local privacy laws	60 (18)	70 (21)	142 (42)	69 (20)
Maintain databases	100 (29)	80 (23)	93 (27)	68 (20)
Practice professional development	92 (27)	85 (25)	92 (27)	72 (21)
Use effective communication technologies	76 (22)	92 (27)	104 (30)	69 (20)
Collaborate with others inside and outside the agency to identify the problem	84 (25)	95 (28)	89 (26)	73 (21)
Prepare written and oral reports and presentations that communicate necessary information to agency staff	96 (28)	76 (22)	103 (30)	66 (19)
Recognize the existence of a public health problem	94 (28)	88 (26)	92 (27)	67 (20)
Identify key findings from the study	98 (29)	88 (26)	81 (24)	74 (22)
Support the organization's vision in all programs and activities	69 (20)	89 (26)	113 (33)	70 (21)
Follow ethics guidelines and principles when planning studies; conducting research; and collecting, disseminating, and using data	102 (30)	74 (22)	88 (26)	77 (23)
Use analysis plans, and analyze data	133 (39)	77 (23)	64 (19)	67 (20)
Identify surveillance data needs	129 (38)	78 (23)	62 (18)	72 (21)
Identify the role of laboratory resources in epidemiologic activities	112 (33)	73 (21)	86 (25)	70 (21)
Practice culturally sensitive epidemiologic activities	105 (31)	84 (25)	83 (24)	69 (20)
Apply understanding of human and environmental biology and behavioral sciences and principles to determine potential biological mechanisms of disease	136 (40)	69 (20)	72 (21)	64 (19)
Use knowledge of human and environmental biology and behavioral sciences and principles to determine potential biological mechanisms of disease	135 (40)	71 (21)	72 (21)	63 (18)
Recognize the basic principles of risk communication	114 (33)	92 (27)	65 (19)	70 (21)
Assist in evaluation of programs	141 (41)	81 (24)	49 (14)	70 (21)
Assist in design of investigation, including creating hypotheses	145 (43)	75 (22)	52 (15)	69 (20)
Describe human subjects research and apply IRB* processes, as directed	120 (35)	66 (19)	80 (23)	75 (22)
Provide epidemiologic input for community planning processes	131 (38)	80 (23)	61 (18)	69 (20)
Implement new or revise existing surveillance systems, and report key surveillance findings	151 (44)	78 (23)	42 (12)	
Define cultural/social/political framework for recommended interventions	144 (42)	70 (21)	55 (16)	72 (21)
Support evaluation of surveillance systems	149 (44)	82 (24)	43 (13)	67 (20)
Assist in conducting a community health status assessment and characterizing investigative processes	148 (43)	77 (23)	39 (11)	77 (23)
Use identified informatics tools in support of epidemiologic practice	147 (43)	56 (16)	64 (19)	74 (22)
Describe how policy decisions are made within the agency	129 (38)	87 (26)	49 (14)	76 (22)
Apply appropriate fiscal and administrative guidelines to epidemiology practice	140 (41)	66 (19)	55 (16)	80 (23)

IRB: institutional review board; HIPAA: Health Insurance Portability and Accountability Act.

Table 11. Mid-level epidemiologists' self-assessment of competence in the Tier 2 Applied Epidemiology Competencies and additional training need—2009 Epidemiology Capacity Assessment (N = 669)

TIER 2 COMPETENCIES	STAFF ARE *COMPETENT* IN THIS AREA			
	AGREE	NEUTRAL	DISAGREE	DON'T KNOW
	No. (%)	No. (%)	No. (%)	No. (%)
Communicate epidemiologic information through giving oral presentations or contributing to the development of written documents to nonprofessional audiences	552 (83)	86 (13)	17 (3)	14 (2)
Use critical thinking to determine whether a public health problem exists	551 (82)	95 (14)	10 (1)	13 (2)
Collaborate with others inside and outside the agency to identify the problem and form recommendations	533 (80)	102 (15)	22 (3)	12 (2)
Articulate the need for further investigation or other public health action from literature review and assessment of current data	524 (78)	114 (17)	18 (3)	13 (2)
Follow ethics guidelines and principles when planning studies; conducting research; and collecting, disseminating, and using data	522 (78)	114 (17)	18 (3)	15 (2)
Apply knowledge of privacy laws to protect confidentiality, including HIPAA* and applicable state and local privacy laws	517 (77)	105 (16)	30 (4)	17 (3)
Promote ethical conduct in epidemiologic practice	499 (75)	125 (19)	29 (4)	16 (2)
Define database requirements, and manage a database	490 (73)	117 (17)	50 (7)	12 (2)
Assist in the development of measurable and relevant goals and objectives	486 (73)	142 (21)	28 (4)	13 (2)
Use current knowledge of causes of disease to guide epidemiologic practice	484 (72)	126 (19)	46 (7)	13 (2)
Use scientific evidence in preparing recommendations for action or intervention	481 (72)	145 (22)	31 (5)	12 (2)
Create analysis plans, and conduct analysis of data	478 (71)	135 (20)	42 (6)	14 (2)
Apply knowledge of epidemiologic principles and methods to make recommendations regarding the validity of epidemiologic data	468 (70)	160 (24)	26 (4)	15 (2)
Assist in the design of an investigation, including hypothesis generation	465 (70)	140 (21)	50 (7)	14 (2)
Use effective communication technologies	465 (70)	162 (24)	24 (4)	18 (3)
Implement new or revise existing surveillance system, and identify key surveillance findings	449 (67)	150 (22)	53 (8)	17 (3)
Describe differences between public health practice and public health research	448 (67)	172 (26)	35 (5)	14 (2)
Design surveillance for a public health issue, and identify surveillance data needs	447 (67)	165 (25)	45 (7)	12 (2)
Practice culturally sensitive epidemiologic activities	386 (58)	196 (29)	72 (11)	15 (2)
Provide epidemiologic input for community planning processes	358 (54)	202 (30)	93 (14)	16 (2)
Apply understanding of human and environmental biology and behavioral sciences and principles to determine potential biological mechanisms of disease	357 (53)	194 (29)	105 (16)	13 (2)
Describe human subjects research, and apply IRB* processes, as necessary	351 (52)	167 (25)	130 (19)	21 (3)
Use laboratory resources to support epidemiologic activities	351 (52)	130 (19)	166 (25)	22 (3)
Conduct evaluation of surveillance systems	348 (52)	200 (30)	108 (16)	13 (2)
Demonstrate the basic principles of risk communication	320 (48)	217 (32)	103 (15)	29 (4)
Assess the need for special analyses	308 (46)	252 (38)	86 (13)	23 (3)
Conduct a community health assessment, and recommend priorities of potential public health problems to be addressed	295 (44)	208 (31)	151 (23)	15 (2)
Establish cultural/social/political framework for recommendations or interventions	263 (39)	261 (39)	129 (19)	16 (2)
Assist in the development of program logic models and theories of action	228 (34)	235 (35)	181 (27)	25 (4)
Apply appropriate fiscal and administrative guidelines to epidemiologic practice	225 (34)	228 (34)	186 (28)	30 (4)

*IRB: institutional review board; HIPAA: Health Insurance Portability and Accountability Act.

Table 11. *Continued*	Mid-level epidemiologists' self-assessment of competence in the Tier 2 Applied Epidemiology Competencies and additional training need—2009 Epidemiology Capacity Assessment (N = 669)

TIER 2 COMPETENCIES	ADDITIONAL TRAINING IS NEEDED			
	AGREE	NEUTRAL	DISAGREE	DON'T KNOW
	No. (%)	No. (%)	No. (%)	No. (%)
Communicate epidemiologic information through giving oral presentations or contributing to the development of written documents to nonprofessional audiences	114 (17)	141 (21)	319 (48)	95 (14)
Use critical thinking to determine whether a public health problem exists	113 (17)	166 (25)	292 (44)	98 (15)
Collaborate with others inside and outside the agency to identify the problem and form recommendations	109 (16)	185 (28)	282 (42)	93 (14)
Articulate the need for further investigation or other public health action from literature review and assessment of current data	126 (19)	179 (27)	272 (41)	92 (14)
Follow ethics guidelines and principles when planning studies; conducting research; and collecting, disseminating, and using data	118 (18)	154 (23)	307 (46)	90 (13)
Apply knowledge of privacy laws to protect confidentiality, including HIPAA* and applicable state and local privacy laws	118 (18)	151 (23)	312 (47)	88 (13)
Promote ethical conduct in epidemiologic practice	127 (19)	163 (24)	285 (43)	94 (14)
Define database requirements, and manage a database	164 (25)	167 (25)	257 (38)	81 (12)
Assist in the development of measurable and relevant goals and objectives	136 (20)	181 (27)	265 (40)	87 (13)
Use current knowledge of causes of disease to guide epidemiologic practice	144 (21)	181 (27)	258 (39)	86 (13)
Use scientific evidence in preparing recommendations for action or intervention	150 (22)	172 (26)	262 (39)	85 (13)
Create analysis plans, and conduct analysis of data	190 (28)	175 (26)	120 (18)	184 (28)
Apply knowledge of epidemiologic principles and methods to make recommendations regarding the validity of epidemiologic data	193 (29)	160 (24)	232 (35)	84 (13)
Assist in the design of an investigation, including hypothesis generation	165 (25)	162 (24)	254 (38)	88 (13)
Use effective communication technologies	146 (22)	161 (24)	271 (41)	91 (14)
Implement new or revise existing surveillance system, and identify key surveillance findings	173 (26)	176 (26)	226 (34)	94 (14)
Describe differences between public health practice and public health research	119 (18)	186 (28)	273 (41)	91 (14)
Design surveillance for a public health issue, and identify surveillance data needs	189 (28)	173 (26)	218 (33)	89 (13)
Practice culturally sensitive epidemiologic activities	186 (28)	172 (26)	219 (33)	92 (14)
Provide epidemiologic input for community planning processes	194 (29)	179 (27)	202 (30)	94 (14)
Apply understanding of human and environmental biology and behavioral sciences and principles to determine potential biological mechanisms of disease	212 (32)	152 (23)	213 (32)	92 (14)
Describe human subjects research, and apply IRB* processes, as necessary	171 (26)	164 (25)	244 (36)	90 (13)
Use laboratory resources to support epidemiologic activities	193 (29)	141 (21)	236 (35)	99 (15)
Conduct evaluation of surveillance systems.125	229 (34)	164 (25)	194 (29)	82 (12)
Demonstrate the basic principles of risk communication	121 (18)	159 (24)	199 (30)	190 (28)
Assess the need for special analyses	124 (19)	184 (28)	164 (25)	197 (29)
Conduct a community health assessment, and recommend priorities of potential public health problems to be addressed	265 (40)	148 (22)	169 (25)	87 (13)
Establish cultural/social/political framework for recommendations or interventions	249 (37)	176 (26)	157 (23)	87 (13)
Assist in the development of program logic models and theories of action	268 (40)	148 (22)	155 (23)	98 (15)
Apply appropriate fiscal and administrative guidelines to epidemiologic practice	247 (37)	166 (25)	163 (24)	93 (14)

*IRB: institutional review board; HIPAA: Health Insurance Portability and Accountability Act.

Table 12.	Senior-level supervisor or manager epidemiologists' self-assessment of competence in the Tier 3a Applied Epidemiology Competencies and additional training need—2009 Epidemiology Capacity Assessment (N = 253)

TIER 3A COMPETENCIES	STAFF ARE *COMPETENT* IN THIS AREA			
	AGREE	NEUTRAL	DISAGREE	DON'T KNOW
	No. (%)	No. (%)	No. (%)	No. (%)
Ensure identification of public health problems pertinent to the population	239 (94)	10 (4)	1 (0)	3 (1)
Oversee surveillance activities	228 (90)	14 (6)	9 (4)	2 (1)
Ensure management of data from surveillance, investigations, or other sources	226 (89)	20 (8)	5 (2)	2 (1)
Evaluate conclusions and interpretations from investigations	225 (89)	19 (8)	6 (2)	3 (1)
Use basic public health sciences in epidemiologic practice	225 (89)	16 (6)	4 (2)	8 (3)
Ensure preparation of written and oral reports and presentations to professional and nonprofessional audiences, and ensure basic principles of risk communication are followed	220 (87)	20 (8)	2 (1)	11 (4)
Enforce policies that address security, privacy, and legal considerations when communicating epidemiologic information	212 (84)	28 (11)	10 (4)	3 (1)
Promote collaborations, strong partnerships, and team-building to accomplish epidemiology program objectives	212 (84)	25 (10)	11 (4)	5 (2)
Evaluate analysis of data from an epidemiologic investigation or study	209 (83)	33 (13)	8 (3)	3 (1)
Ensure investigation of acute and chronic conditions or other adverse outcomes in the population	208 (82)	37 (15)	5 (2)	3 (1)
Use management skills	206 (81)	38 (15)	6 (2)	3 (1)
Model interpersonal skills in communication with agency personnel, colleagues, and the public	202 (80)	35 (14)	4 (2)	12 (5)
Ensure study design and data collection, dissemination, and of use ethical and legal principles	199 (79)	43 (17)	10 (4)	1 (0)
Determine evidence-based interventions and control measures in response to epidemiologic findings	197 (78)	41 (16)	12 (5)	3 (1)
Promote the epidemiologic perspective in the agency strategic planning process	187 (74)	43 (17)	20 (8)	3 (1)
Bring epidemiologic perspective in the development and analysis of public health policies	182 (72)	43 (17)	22 (9)	6 (2)
Ensure the application of understanding of human and environmental biology and behavioral sciences and principles to determine biological mechanisms of disease	177 (70)	51 (20)	20 (8)	5 (2)
Ensure application of principles of informatics, including data collection, processing, and analysis in support of epidemiologic practice	174 (69)	59 (23)	19 (8)	1 (0)
Ensure evaluation of programs	170 (67)	60 (24)	21 (8)	2 (1)
Practice culturally sensitive epidemiologic activities	170 (67)	61 (24)	17 (7)	5 (2)
Use performance measures to evaluate and improve program effectiveness	170 (67)	59 (23)	21 (8)	3 (1)
Ensure professional development of epidemiology workforce	162 (64)	66 (26)	22 (9)	3 (1)
Lead the creation of the epidemiologic program's vision in the context of the agency's plan	160 (63)	65 (26)	25 (10)	3 (1)
Ensure the use of laboratory resources to support epidemiologic activities	159 (63)	53 (21)	36 (14)	5 (2)
Create operational and financial plans for future epidemiologic activities	150 (59)	62 (25)	38 (15)	3 (1)
Develop and manage information systems to improve effectiveness of surveillance, investigation, and other epidemiologic practices	146 (58)	69 (27)	36 (14)	2 (1)
Formulate a fiscally sound budget that will support the activities defined in the operational plan and is consistent with the financial rules of the agency	145 (57)	52 (21)	53 (21)	3 (1)
Oversee implementation of operational and financial plans	142 (56)	57 (23)	48 (19)	6 (2)
Develop requests for extramural funding to support additional epidemiologic activities and special projects	138 (55)	68 (27)	39 (15)	8 (3)
Lead epidemiology unit in preparing for emergency response	123 (49)	49 (19)	70 (28)	11 (4)
Lead community public health planning processes	115 (45)	85 (34)	47 (19)	6 (2)

| | Table 12. *Continued* | Senior-level supervisor or manager epidemiologists' self-assessment of competence in the Tier 3a Applied Epidemiology Competencies and additional training need—2009 Epidemiology Capacity Assessment (N = 253) |

TIER 3A COMPETENCIES	ADDITIONAL TRAINING IS NEEDED			
	AGREE	NEUTRAL	DISAGREE	DON'T KNOW
	No. (%)	No. (%)	No. (%)	No. (%)
Ensure identification of public health problems pertinent to the population	19 (8)	64 (25)	121 (48)	49 (19)
Oversee surveillance activities	32 (13)	46 (18)	125 (49)	50 (20)
Ensure management of data from surveillance, investigations, or other sources	31 (12)	59 (23)	115 (45)	48 (19)
Evaluate conclusions and interpretations from investigations	33 (13)	60 (24)	114 (45)	46 (18)
Use basic public health sciences in epidemiologic practice	22 (9)	56 (22)	122 (48)	53 (21)
Ensure preparation of written and oral reports and presentations to professional and nonprofessional audiences, and ensure basic principles of risk communication are followed	29 (11)	47 (19)	131 (52)	46 (18)
Enforce policies that address security, privacy, and legal considerations when communicating epidemiologic information	35 (14)	44 (17)	130 (51)	44 (17)
Promote collaborations, strong partnerships, and team-building to accomplish epidemiology program objectives	35 (14)	60 (24)	115 (45)	43 (17)
Evaluate analysis of data from an epidemiologic investigation or study	41 (16)	69 (27)	99 (39)	44 (17)
Ensure investigation of acute and chronic conditions or other adverse outcomes in the population	32 (13)	61 (24)	115 (45)	15 (18)
Use management skills	52 (21)	62 (25)	97 (38)	42 (17)
Model interpersonal skills in communication with agency personnel, colleagues, and the public	38 (15)	55 (22)	115 (45)	45 (18)
Ensure study design and data collection, dissemination, and of use ethical and legal principles	50 (20)	55 (22)	102 (40)	46 (18)
Determine evidence-based interventions and control measures in response to epidemiologic findings	43 (17)	66 (26)	99 (39)	45 (18)
Promote the epidemiologic perspective in the agency strategic planning process	43 (17)	67 (26)	99 (39)	44 (17)
Bring epidemiologic perspective in the development and analysis of public health policies	55 (22)	69 (27)	86 (34)	43 (17)
Ensure the application of understanding of human and environmental biology and behavioral sciences and principles to determine biological mechanisms of disease	47 (19)	58 (23)	102 (40)	46 (18)
Ensure application of principles of informatics, including data collection, processing, and analysis in support of epidemiologic practice	65 (26)	69 (27)	80 (32)	39 (15)
Ensure evaluation of programs	66 (26)	69 (27)	77 (30)	41 (16)
Practice culturally sensitive epidemiologic activities	48 (19)	61 (24)	101 (40)	43 (17)
Use performance measures to evaluate and improve program effectiveness	51 (20)	66 (26)	95 (38)	41 (16)
Ensure professional development of epidemiology workforce	56 (22)	68 (27)	86 (34)	43 (17)
Lead the creation of the epidemiologic program's vision in the context of the agency's plan	46 (18)	71 (28)	93 (37)	43 (17)
Ensure the use of laboratory resources to support epidemiologic activities	50 (20)	55 (22)	102 (40)	46 (18)
Create operational and financial plans for future epidemiologic activities	73 (29)	54 (21)	89 (35)	37 (15)
Develop and manage information systems to improve effectiveness of surveillance, investigation, and other epidemiologic practices	79 (31)	67 (26)	63 (25)	44 (17)
Formulate a fiscally sound budget that will support the activities defined in the operational plan and is consistent with the financial rules of the agency	66 (26)	61 (24)	85 (34)	41 (16)
Oversee implementation of operational and financial plans	58 (23)	58 (23)	89 (35)	48 (19)
Develop requests for extramural funding to support additional epidemiologic activities and special projects	69 (27)	61 (24)	75 (30)	48 (19)
Lead epidemiology unit in preparing for emergency response	62 (25)	57 (23)	87 (34)	47 (19)
Lead community public health planning processes	62 (25)	68 (27)	83 (33)	40 (16)

Table 13.	Senior scientist/subject matter expert epidemiologists' self-assessment of competence in the Tier 3b Applied Epidemiology Competencies and additional training need—2009 Epidemiology Capacity Assessment (N = 226)

TIER 3B COMPETENCIES	STAFF ARE *COMPETENT* IN THIS AREA			
	AGREE	NEUTRAL	DISAGREE	DON'T KNOW
	No. (%)	No. (%)	No. (%)	No. (%)
Use basic public health sciences in epidemiologic practice	213 (94)	5 (2)	2 (1)	6 (3)
Evaluate results of data analysis, and interpret conclusions	213 (94)	7 (3)	0 (0)	6 (3)
Evaluate data from an epidemiologic investigation or study	209 (92)	11 (5)	0 (0)	6 (3)
Organize preparation of written and oral presentations that communicate necessary information to professional audiences, policymakers, and the general public	208 (92)	12 (5)	3 (1)	3 (1)
Organize surveillance	206 (91)	14 (6)	2 (1)	4 (2)
Validate identification of public health problems pertinent to the population	203 (90)	16 (7)	1 (0)	6 (3)
Manage data from surveillance, investigations, or other sources	200 (88)	17 (8)	0 (0)	9 (4)
Design investigation of acute and chronic conditions or other adverse outcomes in the population	191 (85)	26 (12)	7 (3)	2 (1)
Promote ethical conduct in the epidemiology practice	190 (84)	18 (8)	8 (4)	10 (4)
Model interpersonal skills in communications with agency personnel, colleagues, and the public	187 (83)	26 (12)	6 (3)	7 (3)
Synthesize principles of good ethical/legal practice for application to study design and data collections, dissemination, and use	179 (79)	30 (13)	9 (4)	8 (4)
Use skills that foster collaborations, strong partnerships, and team-building to accomplish epidemiology program objectives	177 (78)	33 (15)	10 (4)	6 (3)
Formulate new interventions on the basis of evidence, when available, and control measures in response to epidemiologic findings	170 (75)	41 (18)	11 (5)	4 (2)
Apply principles of informatics, including data collection, processing, and analysis, in support of epidemiologic practice	166 (73)	40 (18)	14 (6)	6 (3)
Ensure application of understanding of human and environmental biology and behavioral sciences and principles to determine biological mechanisms of disease	162 (72)	41 (18)	15 (7)	8 (4)
Bring epidemiologic perspective in the development and analysis of public health policies	160 (71)	36 (16)	21 (9)	9 (4)
Use performance measures to evaluate and improve program effectiveness	155 (69)	39 (17)	27 (12)	5 (2)
Promote the epidemiologic perspective in the agency strategic planning process	154 (68)	41 (18)	23 (10)	8 (4)
Practice culturally sensitive epidemiologic activities	152 (67)	49 (22)	20 (9)	5 (2)
Promote the organization's vision in all epidemiologic program activities	150 (66)	47 (21)	23 (10)	6 (3)
Conduct epidemiologic activities within the financial and operational plan of the agency	149 (66)	42 (19)	29 (13)	6 (3)
Promote epidemiology workforce development	139 (62)	49 (22)	33 (15)	5 (2)
Evaluate programs	138 (61)	53 (23)	28 (12)	7 (3)
Develop as-needed policies that address security, privacy, and legal considerations when communicating epidemiologic information	130 (58)	64 (28)	25 (11)	7 (3)
Prepare proposals for extramural funding for review and input from mangers	125 (55)	51 (23)	45 (20)	5 (2)
Prepare for emergency response	124 (55)	58 (26)	41 (18)	3 (1)
Develop processes for using laboratory resources to support epidemiologic activities	121 (54)	47 (21)	47 (21)	11 (5)
Implement operational and financial plans for assigned projects	94 (42)	61 (27)	63 (28)	8 (4)
Lead community public health planning processes	91 (40)	79 (35)	49 (22)	7 (3)
Describe financial and budgetary processes of the agency	70 (31)	66 (29)	83 (37)	7 (3)

	Table 13. *Continued*	Senior scientist/subject matter expert epidemiologists' self-assessment of competence in the Tier 3b Applied Epidemiology Competencies and additional training need—2009 Epidemiology Capacity Assessment (N = 226)

TIER 3B COMPETENCIES	*ADDITIONAL TRAINING* IS NEEDED			
	AGREE	NEUTRAL	DISAGREE	DON'T KNOW
	No. (%)	No. (%)	No. (%)	No. (%)
Use basic public health sciences in epidemiologic practice	16 (7)	40 (18)	117 (52)	53 (23)
Evaluate results of data analysis, and interpret conclusions	20 (9)	41 (18)	115 (51)	50 (22)
Evaluate data from an epidemiologic investigation or study	27 (12)	41 (18)	100 (44)	
Organize preparation of written and oral presentations that communicate necessary information to professional audiences, policymakers, and the general public	25 (11)	42 (19)	114 (50)	45 (20)
Organize surveillance	19 (8)	48 (21)	109 (48)	50 (22)
Validate identification of public health problems pertinent to the population	15 (7)	46 (20)	108 (48)	57 (25)
Manage data from surveillance, investigations, or other sources	22 (10)	37 (16)	116 (51)	51 (23)
Design investigation of acute and chronic conditions or other adverse outcomes in the population	29 (13)	44 (19)	106 (47)	47 (21)
Promote ethical conduct in the epidemiology practice	26 (12)	42 (19)	107 (47)	51 (23)
Model interpersonal skills in communications with agency personnel, colleagues, and the public	35 (15)	49 (22)	96 (42)	46 (20)
Synthesize principles of good ethical/legal practice for application to study design and data collections, dissemination, and use	30 (13)	55 (24)	96 (42)	45 (20)
Use skills that foster collaborations, strong partnerships, and team-building to accomplish epidemiology program objectives	37 (16)	47 (21)	94 (42)	48 (21)
Formulate new interventions on the basis of evidence, when available, and control measures in response to epidemiologic findings	36 (16)	55 (24)	84 (37)	51 (23)
Apply principles of informatics, including data collection, processing, and analysis, in support of epidemiologic practice	65 (29)	46 (20)	76 (34)	39 (17)
Ensure application of understanding of human and environmental biology and behavioral sciences and principles to determine biological mechanisms of disease	43 (19)	49 (22)	87 (38)	47 (21)
Bring epidemiologic perspective in the development and analysis of public health policies	49 (22)	49 (22)	79 (35)	49 (22)
Use performance measures to evaluate and improve program effectiveness	51 (23)	49 (22)	78 (35)	48 (21)
Promote the epidemiologic perspective in the agency strategic planning process	49 (22)	45 (20)	85 (38)	47 (21)
Practice culturally sensitive epidemiologic activities	46 (20)	47 (21)	88 (39)	45 (20)
Promote the organization's vision in all epidemiologic program activities	35 (15)	49 (22)	93 (41)	49 (22)
Conduct epidemiologic activities within the financial and operational plan of the agency	49 (22)	44 (19)	87 (38)	46 (20)
Promote epidemiology workforce development	56 (25)	41 (18)	81 (36)	48 (21)
Evaluate programs	69 (31)	51 (23)	64 (28)	42 (19)
Develop as-needed policies that address security, privacy, and legal considerations when communicating epidemiologic information	55 (24)	61 (27)	67 (30)	43 (19)
Prepare proposals for extramural funding for review and input from mangers	59 (26)	54 (24)	67 (30)	46 (20)
Prepare for emergency response	50 (22)	55 (24)	75 (33)	46 (20)
Develop processes for using laboratory resources to support epidemiologic activities	48 (21)	50 (22)	71 (31)	57 (25)
Implement operational and financial plans for assigned projects	63 (28)	65 (29)	55 (24)	43 (19)
Lead community public health planning processes	73 (32)	48 (21)	62 (27)	43 (19)
Describe financial and budgetary processes of the agency	73 (32)	54 (24)	59 (26)	40 (18)

TIER	NO. COMPETENCIES	AGREE THAT ARE COMPETENT		AGREE THAT NEED TRAINING	
		MEAN, %	RANGE, %	MEAN, %	RANGE, %
1	30	35	14–58	33	16–44
2	30	63	34–3	25	16–40
3a	31	72	45–4	19	8–31
3b	30	71	31–94	19	7–32

Table 14. Mean* and range in competency percentages and training needs of epidemiologists, by epidemiologist tier—2009 Epidemiology Capacity Assessment

The average from adding the percentages who agree they are competent from each individual competency (columns 2 and 6 in Tables 10–13) divided by the number of competencies. The range shows the lowest and highest percentage who agreed they were competent or needed training among the 30 or 31 competencies.

State Health Department Involvement in Epidemiology Training

The 2009 ECA asked state health departments several questions related to their involvement in training in epidemiology. A high percentage provided on-site training in epidemiology to staff (86%) and training and education to local-level epidemiologists (80%). Only 22% required continuing education in epidemiology and surveillance (Table 15). Departments providing training did so in collaboration with many partners, the most common being CDC (86%) and schools of public health (80%) (Table 16).

Table 15. Number and percentage of state health departments providing continuing training in epidemiology to epidemiology staff—2009 Epidemiology Capacity Assessment, 50 states and District of Columbia

TRAINING IN EPIDEMIOLOGY	YES		NO	
	NO.	%	NO.	%
Provide on-site trainings (epidemiology seminars, etc)	44	86	7	14
Provide epidemiology training or education to epidemiologists at the local level	41	80	10	20
Pay for formal training or education outside your organization (conferences or seminars)	38	75	13	25
Include education and training objectives in performance review	30	59	21	41
Have staff position(s) responsible for internal training	22	43	29	57
Require continuing education in epidemiology and surveillance	11	22	40	78

Table 16. State health department training partners—2009 Epidemiology Capacity Assessment, 50 states and District of Columbia

TRAINING PARTNERS	STATES COLLABORATING WITH TRAINING PARTNER		
	YES	NO	UNKNOWN
	No. (%)	No. (%)	No. (%)
Centers for Disease Control and Prevention	44 (86)	7 (14)	0 (0)
Schools of public health	41 (80)	10 (20)	0 (0)
Other healthcare providers	39 (76)	9 (18)	3 (6)
Other academic institutions	36 (71)	13 (25)	2 (4)
Other federal/governmental agencies	35 (69)	15 (29)	1 (2)
Centers for Public Health Preparedness	34 (67)	15 (29)	2 (4)
Public safety first responders	34 (67)	14 (27)	3 (6)
Other healthcare organizations	32 (63)	14 (27)	5 (10)
Schools of veterinary medicine	25 (49)	25 (49)	1 (2)
HRSA* training centers	18 (35)	26 (51)	7 (14)
Other[†]	4 (8)	N/A	N/A

*HRSA: Health Resources and Services Administration.
†Other external partners (1 each): Association of Infection Control Practitioners, CSTE, state departments of education, local health departments.

RESULTS

Staff Turnover, Retirement and Retention

The assessment contained several measures of staff turnover (Table 17). Overall, 164 (8%) of an estimated 2028 staff with masters or doctoral degrees left State Employment during 2008. Of 1544 epidemiologists who completed the individual worksheet, 267 (17%) said they planned to retire or change careers out of epidemiology within the next 5 years.

Table 17.	Turnover of epidemiology workforce in 2008 and projected in next 5 years—2009 Epidemiology Capacity Assessment	
MEASURE	**TOTAL**	**NO. (%) LEAVING OR PLANNING TO LEAVE**
Epidemiologist with masters or doctoral degree who left during 2008	2028*	164 (8.1)
Epidemiologists planning to retire or change careers in next 5 years, by degree		
MD, DO, DDS	172	32 (18.6)
DVM	50	8 (16.0)
PhD, DrPH, other doctoral	262	39 (14.9)
MPH, MSPH, other master's	836	129 (15.4)
RN, other nursing	18	4 (22.2)
BA, BS, other bachelor's	184	39 (21.2)
Associate or no post-high school degree	22	6 (27.3)
TOTAL	1544	267 (17.3)

* Estimate based on the following: 85% of all 1544 respondents to the individual worksheet has masters or doctoral degrees. Application of this percentage to the 2193 total epidemiologists (including those who did not complete the individual worksheet) yields an estimate of 1864 epidemiologists with master's level or higher academic training in 2009 plus the 164 who left in 2008 = 2028.

Recruitment and Retention Issues

State Epidemiologists reported restrictions on offering competitive pay (49%) as the leading barrier to recruiting epidemiologists, although no respondent considered actual salary range a problem. Other leading problems were restrictions on hiring quickly enough (41%) and lack of enough qualified applicants (37%) (Table 18). Interestingly, none of the barriers were as problematic in 2009 as they were in 2006 (see Trends).

Respondents identified a number of useful recruiting methods. The most useful methods were state and local government websites (90%), universities and schools of public health (86%), professional organizations (84%), federal programs (80%), and public health career websites (76%) (Table 19).

Table 18. Barriers to recruiting epidemiologists—2009 Epidemiology Capacity Assessment, 50 states and District of Columbia

BARRIER*	A PROBLEM		NEUTRAL/NOT A PROBLEM	
	No.	%	No.	%
Restrictions on offering competitive pay	25	49	26	51
Restrictions on hiring quickly enough	21	41	30	59
Enough qualified applicants	19	37	32	63
Opportunities for promotion	17	33	34	67
Personnel policies and procedures	15	29	36	71
Job location	8	16	43	84
Layoffs from budget restrictions	8	16	43	84
Limitations recruiting outside your organization	6	12	44	88
Restrictions on choosing best candidate	5	10	46	90
Opportunities for training	4	8	47	92
Job security	4	8	47	92
Job benefits	3	6	48	94
Travel permitted	3	6	48	94
Job interests fulfillment	2	4	49	96
Hiring freezes	0	0	51	0
Travel required	0	0	51	0
Salary scale	0	0	51	0%

*Other factors reported as problems: availability of funds, available job classifications, not having an epidemiologist series, belief that epidemiology education is not necessary to fill many positions, equity requirements hold pay offer down to lower part of range, importance of epidemiologists not fully recognized, lack of full-time equivalents, and limitations in available funding.

Table 19. Useful methods for recruiting epidemiologists for state health departments —2009 Epidemiology Capacity Assessment, 50 states and District of Columbia

RECRUITMENT SETTING	YES		NO		DON'T KNOW	
	No.	%	No.	%	No.	%
State or local government websites	46	90	5	10	0	0
Universities or schools of public health	44	86	7	14	0	0
Professional organizations (e.g., CSTE, APHA, ASPH, ACE)*	43	84	8	16	0	0
Federal programs (e.g., EIS, PHPS, CEFO)*	41	80	10	20	0	0
Public health career websites (e.g., Emory Public Health Employment Connection)	39	76	12	24	0	0
Other health agencies within state	26	51	22	43	3	6
Epidemiology Monitor or periodic epidemiology newsletter	26	51	25	49	0	0
Local media	23	45	27	53	1	2
Recruitment job fairs	16	31	33	65	2	4

* APHA: American Public Health Association; ASPH: Association of Schools of Public Health; ACE: American College of Epidemiology; EIS: Epidemic Intelligence Service; PHPS: Public Health Prevention Service; CEFO: Career Epidemiology Field Officer.

The most commonly reported barrier to retaining epidemiologists was restrictions on merit raises (35%). Again, no respondent reported salary range as a problem (Table 20). Layoffs were a problem for only 16% of states.

| Table 20. | Barriers to retaining epidemiologists—2009 Epidemiology Capacity Assessment, 50 states and District of Columbia |

BARRIER*	A PROBLEM		NEUTRAL	
	No.	%	No.	%
Restrictions on merit raises	18	35	33	65
Opportunities for promotion	14	27	37	73
Loss to private or government sector	12	24	39	76
Personnel policies and procedures	9	18	42	82
Layoffs from budget restrictions	8	16	43	84
Restrictions on travel outside jurisdiction	7	14	44	86
Travel permitted	5	10	46	90
Job location	3	6	48	94
Opportunities for training	3	6	48	94
Job security	2	4	49	96
Job benefits	2	4	49	96
Job interests fulfillment	1	2	50	98
Travel required	0	0	51	100
Salary scale	0	0	51	100

**Other factors identified included reduced funding and administrative load.*

Miscellaneous: State Epidemiologist, Program Leadership, Job Series, and Salary Ranges

The 2009 ECA gathered information to better describe State Epidemiologists' domain and length of time in the position, to determine whether states had a designated lead epidemiologist in each program area and a specific epidemiologist job series, and to assess salary range by type of epidemiologist position.

State Epidemiologist

Conceptually, the State Epidemiologist is the named liaison with CDC for matters relating to disease surveillance, investigation, and control. The State Epidemiologist is also the official state representative to CSTE for voting purposes when CSTE votes by state on resolutions (e.g., about National Notifiable Diseases) and for its Executive Board membership. Responses to the questions on the 2009 ECA demonstrated that only rarely is the State Epidemiologist a position mandated by state statute or regulation (4%) and that only a minority of states has a job classification called the State Epidemiologist (37%). Rather, the position is most often a designated position (47%), with a domain that usually includes infectious diseases (78%) and, less often, other program areas (e.g., 33% BT/ER, 22% environmental health, 20% chronic disease) (Table 16). The 47 responding State Epidemiologists had been in their current positions a median of 3 years (range 0.5–31 years).

| Table 21. | Nature and domain of State Epidemiologist—2009 Epidemiology Capacity Assessment, 50 states and District of Columbia |

CHARACTERISTICS OF STATE EPIDEMIOLOGIST POSITION	YES		NO		UNKNOWN	
	No.	%	No.	%	No.	%
Formally mandated by state statute or regulation	2	4	46	90	3	6
Specific position called the State Epidemiologist with its own job qualification in the state personnel system	19	37	32	63	0	0
Appointed or designated position (rather than hired through civil service)	24	47	26	51	1	2
STATE EPIDEMIOLOGIST OVERSEES EPIDEMIOLOGISTS IN THE FOLLOWING PROGRAM AREAS:						
Infectious diseases	40	78	11	22	0	0
Bioterrorism/Emergency response	17	33	34	67	0	0
Environmental health	11	22	40	78	0	0
Chronic diseases	10	20	41	80	0	0
Occupational health	8	16	43	84	0	0
Injury	8	16	43	84	0	0
Vital statistics	6	12	44	86	1	2
Maternal and child health	5	10	46	90	0	0
Substance abuse	2	4	48	94	1	2
Oral health	1	2	50	98	0	0
Other*	16	31	31	61	4	8

*Includes Career Epidemiology Field Officer position, tumor registry, community health information, Emerging Infections Program, human immunodeficiency virus/sexually transmitted diseases/tuberculosis, surveillance/ program design and evaluation, healthcare-associated infections, immunization, prescription pain management, environmental sanitation, radiologic health.

Lead Epidemiologist

The 2009 ECA asked whether states had a formal lead epidemiologist for each program area, which could include the State Epidemiologist. Program areas in which at least 50% of states reported a lead epidemiologist were infectious diseases, chronic diseases, MCH, BT/ER, environmental health and injury (Figure 8). States that had a designated lead program area epidemiologist were more likely than states without one to have substantial to full epidemiology/surveillance capacity in that area (Figure 9).

Figure 8. | Lead epidemiologist oversight, by program area*—2009 Epidemiology Capacity Assessment, 50 states and District of Columbia

*ID: infectious diseases; CD: chronic diseases; MCH: maternal and child health; BT/ER: bioterrorism/emergency response; EH: environmental health; IJ: injury; OccH: occupational health; OrH: oral health; SA: substance abuse.
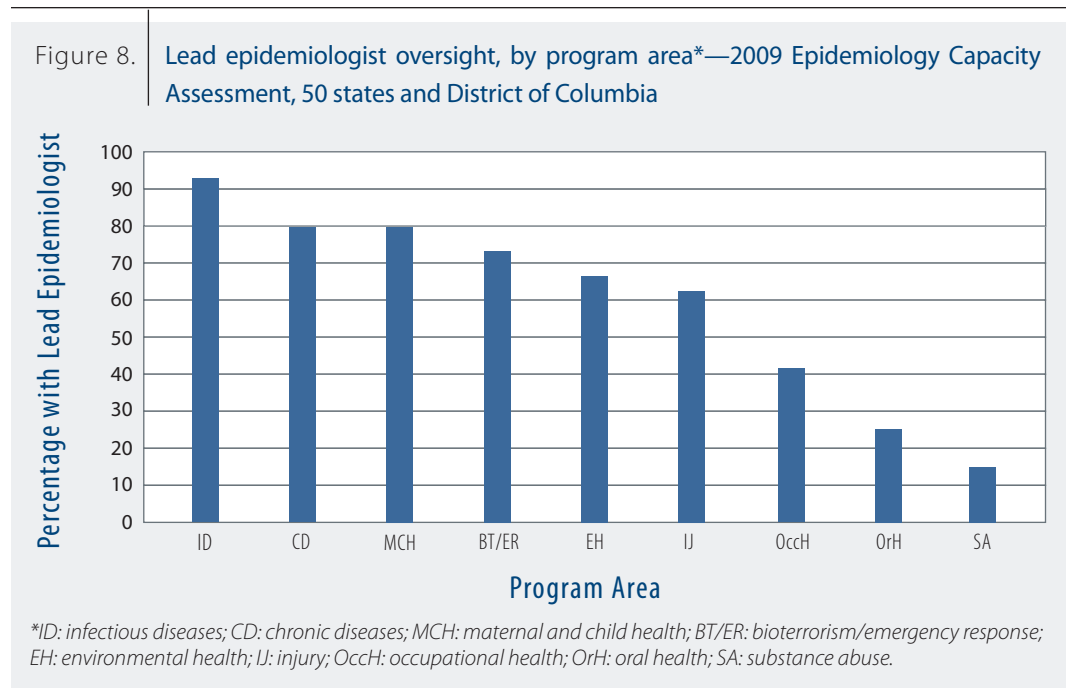
Figure 9. Percentage of states with substantial to full epidemiology and surveillance capacity, by program area* and presence of a lead program area epidemiologist—2009 Epidemiology Capacity Assessment, 50 states and District of Columbia
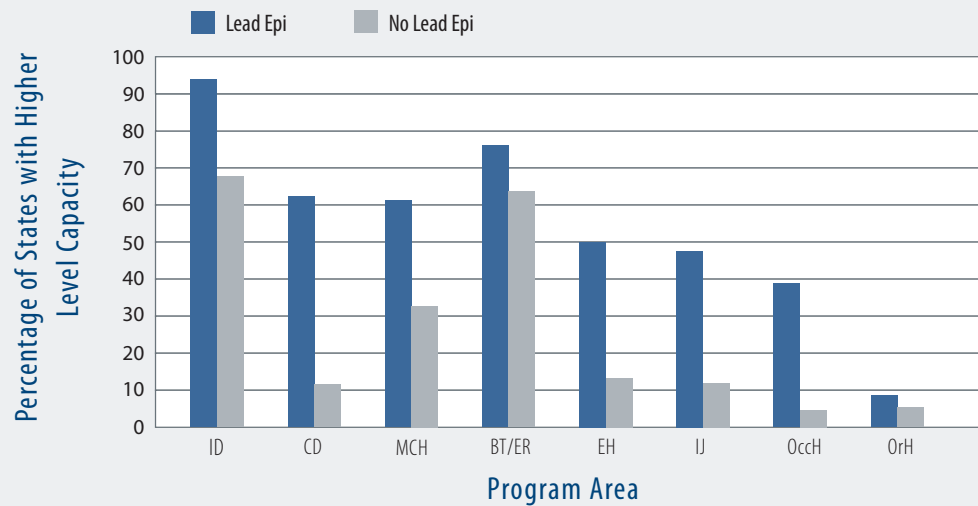
* ID: infectious diseases; CD: chronic disease; MCH: maternal and child health; BT/ER: bioterrorism/emergency response; EH: environmental health; IJ: injury; OccH: occupational health; SA: substance abuse; OrH: oral health.

Job Series

The personnel systems of 80% of states had a specific epidemiologist job classification (Table 22). Most (85%) had a multilevel system (median of 3 levels).

Table 22. Number and nature of specific epidemiologist job series

TYPE OF JOB SERIES	NO. RESPONDENTS	YES		NO	
		No.	%	No.	%
Specific epidemiologist position in state personnel system	51	41	80.4	10	19.6
Series with ≥1 level of epidemiologist	41	35	85.4	6	14.6
2 levels	33	7	21.2	–	–
3 levels	33	11	33.3	–	–
4 levels	33	8	24.2	–	–
5 levels	33	4	12.1	–	–
≥6 levels	33	3	9.1	–	–

RESULTS

Salary Ranges

Salary ranges were reported by functional job classification (Table 23) and by training level (Table 24). By state size (data not shown), there was little association of salaries for any given functional job classification.

Table 23. | Salary range, by functional job classification and regions

SALARY RANGE: STATE EPIDEMIOLOGIST	N	RANGE	MEAN	MEDIAN
Nationally	46	Lower Limit	$101,480	$95,000
		Upper Limit	$141,420	$137,299
Midwest	12	Lower Limit	$89,393	$90,000
		Upper Limit	$137,664	$131,679
Northeast	8	Lower Limit	$99,963	$92,831
		Upper Limit	$126,123	$125,601
South	15	Lower Limit	$116,189	$120,000
		Upper Limit	$146,101	$143,688
West	11	Lower Limit	$95,714	$95,000
		Upper Limit	$150,261	$150,000

SALARY RANGE: DEPUTY STATE EPIDEMIOLOGIST	N	RANGE	MEAN	MEDIAN
Nationally	18	Lower Limit	$91,609	$90,000
		Upper Limit	$122,735	$120,372
Midwest	7	Lower Limit	$78,760	$87,000
		Upper Limit	$128,939	$110,000
Northeast	4	Lower Limit	$101,108	$100,000
		Upper Limit	$123,936	$122,872
South	3	Lower Limit	$125,000	$135,000
		Upper Limit	$126,333	$135,000
West	4	Lower Limit	$79,554	$79,107
		Upper Limit	$107,979	$110,000

Continued on following page

Table 23. *Continued* | Salary range, by functional job classification and regions

SALARY RANGE: SENIOR LEVEL EPIDEMIOLOGIST	N	RANGE	MEAN	MEDIAN
Nationally	47	Lower Limit	$59,197	$55,000
		Upper Limit	$87,679	$85,000
Midwest	12	Lower Limit	$53,482	$52,078
		Upper Limit	$82,773	$77,500
Northeast	8	Lower Limit	$69,010	$65,500
		Upper Limit	$94,023	$87,500
South	17	Lower Limit	$56,177	$55,000
		Upper Limit	$87,173	$88,393
West	10	Lower Limit	$63,343	$51,000
		Upper Limit	$89,353	$81,890

SALARY RANGE: MID LEVEL EPIDEMIOLOGIST	N	RANGE	MEAN	MEDIAN
Nationally	44	Lower Limit	$47,341	$46,918
		Upper Limit	$69,422	$67,352
Midwest	12	Lower Limit	$46,573	$49,939
		Upper Limit	$68,314	$65,000
Northeast	7	Lower Limit	$53,890	$57,000
		Upper Limit	$73,115	$65,000
South	16	Lower Limit	$46,952	$46,118
		Upper Limit	$70,024	$70,000
West	9	Lower Limit	$43,967	$46,836
		Upper Limit	$66,962	$68,436

SALARY RANGE: ENTRY LEVEL EPIDEMIOLOGIST	N	RANGE	MEAN	MEDIAN
Nationally	44	Lower Limit	$39,845	$40,000
		Upper Limit	$69,719	$59,500
Midwest	11	Lower Limit	$39,225	$40,000
		Upper Limit	$54,487	$53,292
Northeast	8	Lower Limit	$44,531	$45,904
		Upper Limit	$59,531	$60,572
South	16	Lower Limit	$39,769	$40,300
		Upper Limit	$57,648	$58,070
West	9	Lower Limit	$36,579	$40,000
		Upper Limit	$59,851	$60,000

RESULTS

Table 24.	Salary range, by level of professional training—2009 Epidemiology Capacity Assessment, 50 states and District of Columbia

TRAINING	No. RESPONDING STATES	RANGE
MD, DO	43	$97,927–$147,313
DDS	12	$81,273–$119,773
DVM	33	$68,501–$97,760
PhD, DrPH, other doctoral	45	$59,821–$92,134
MPH, MSPH, other master's	47	$45,408–$74,103
BA, BS, BSN, other bachelor's	47	$39,062–$64,774
Associate or no post-high school degrees	11	$25,747–$41,260

Varying numbers of agencies responded to each of the four ECAs. The 2001 ECA had the lowest response rate (39 states [78%]). However, for the 2004, 2006, and 2009 ECAs, all states and the District of Columbia (DC) responded. Contributions from territories have varied but constitute a small percentage of the total.

The following trend analyses use data from previous ECA reports or publications. For functional and numeric epidemiology capacity, data from the 2006 ECA are limited to the 50 states and DC to allow direct comparison with 2009. Where exact comparisons are not possible, the underlying assumption is that that the responding states (and territories) are similar to those that did not respond.

Functional Epidemiology Capacity

Overall Epidemiology Capacity to Address the Essential Services of Public Health

In all four assessments, agencies were asked about their ability to provide the four epidemiology-related ESPH.

ESPH 1. Monitor health status to identify and solve community health problems.
The percentage of health departments that could provide substantial to full epidemiology capacity for ESPH 1 increased 60% from 2001 to 2006 but dropped 19% from 2006 to 2009. In each assessment, several states reported minimal to no capacity to meet ESPH 1, increasing from 2006 to 2009 (Figure 10).

Figure 10. State health departments' ability to provide Essential Service of Public Health 1*—2001, 2004, 2006, and 2009 Epidemiology Capacity Assessments[†]
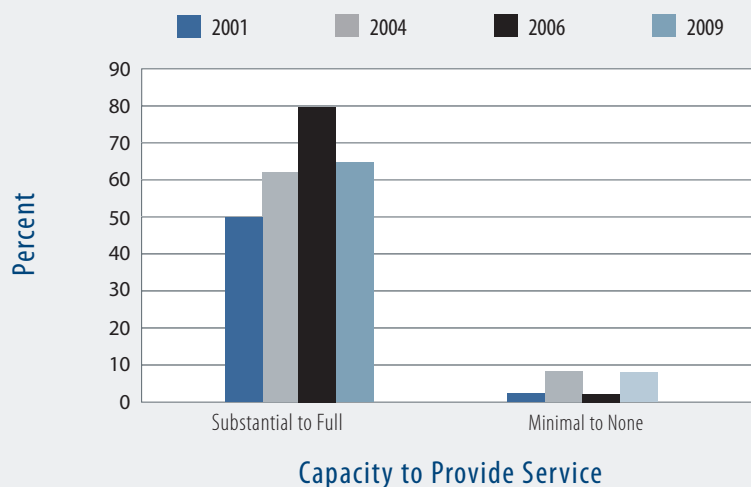
* Monitor health status to identify and solve community health problems.
[†] N = 39 agencies in 2001, 50 in 2004, 51 in 2006, and 51 in 2009.

ESPH 2. Diagnose and investigate health problems and health hazards in the community.
The percentage of health departments that could provide substantial to full epidemiology capacity in this area has fluctuated, but the range has remained stable at 58%–67%. However, the percentage with minimal to no capacity increased to 10% in 2009, the highest level measured (Figure 11).

Figure 11.	State health departments' ability to provide Essential Service of Public Health 2*—2001, 2004, 2006, and 2009 Epidemiology Capacity Assessments[†]

■ 2001   ■ 2004   ■ 2006   ■ 2009

Capacity to Provide Service
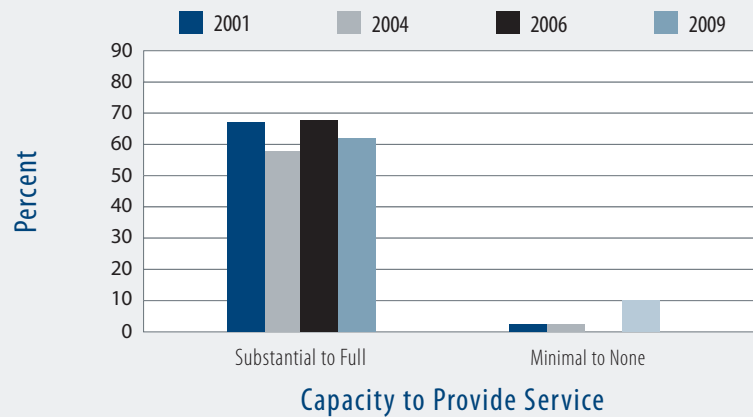
Diagnose and investigate health problems and health hazards in the community.
[†]N = 39 agencies in 2001, 50 in 2004, 51 in 2006, and 51 in 2009.

ESPH 9. Evaluate effectiveness, accessibility, and quality of personal and population-based health services.
The percentage of health departments that could provide substantial to full epidemiology capacity in this area increased from 22% in 2004 to 39% in 2006 but dropped to 14% in 2009, its lowest measured level since the ECAs began. In concert with the decrease in states with substantial to full capacity, the percentage of those with minimal to no capacity increased to 31%, its highest level thus far (Figure 12).

Figure 12.	State health departments' ability to provide Essential Service of Public Health 9*—2001, 2004, 2006, and 2009 Epidemiology Capacity Assessments[†]
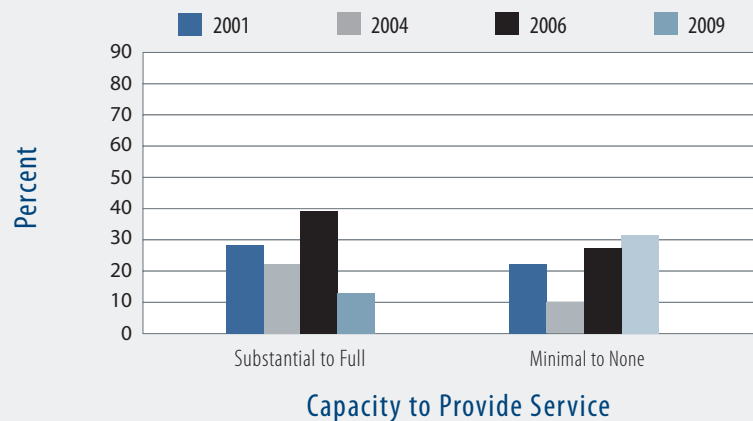
■ 2001   ■ 2004   ■ 2006   ■ 2009

Capacity to Provide Service

Evaluate effectivness, accessibility, and quality of personal and population-based health services.
[†] N = 39 agencies in 2001, 50 in 2004, 51 in 2006, and 51 in 2009.

ESPH 10. Research for new insights and innovative solutions to health problems.
Only a small percentage of health departments have had substantial to full capacity for ESPH 10. However, ESPH 10 was the one bright spot for capacity to provide ESPH. Capacity has increased progressively from 7% in 2001 to 18% in 2009. Although a high percentage of states had minimal to no capacity for ESPH 10, this percentage decreased from 54% in 2006 to 43% in 2009 (Figure 13).

Figure 13. | State health departments' ability to provide Essential Service of Public Health 10*—2001, 2004, 2006, and 2009 Epidemiology Capacity Assessments[†]
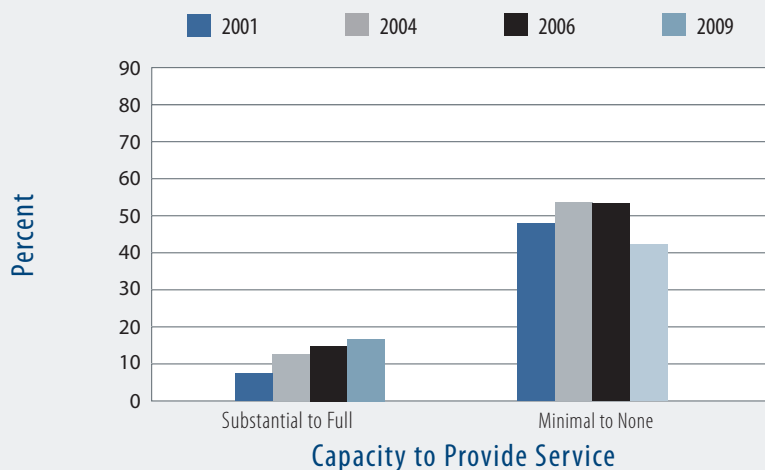
* Research for new insights and innovative solutions to health problems.
[†]N = 39 agencies in 2001, 50 in 2004, 51 in 2006, and 51 in 2009.

Program-Level Epidemiology and Surveillance Capacity

Surveillance and epidemiology capacity has fluctuated in most program areas during the past 9 years (Table 25). Comparing 2001 with 2009, the percentage of states with substantial to full capacity increased at least 5 percentage points in three program areas—BT/ER (46% to 72%), injury (23% to 34%), and MCH (35% to 55%)—and did not decrease by five percentage points or more in any program area (Figure 14). From 2006 to 2009, the percentage of states with substantial to full capacity increased at least five percentage points in two program areas—injury (25% to 34%) and MCH (47% to 55%); however, it also decreased more than five percentage points in two program areas—chronic diseases (64% to 55%) and oral health (14% to 6%). Notably, the percentage of states with substantial to full epidemiology and surveillance capacity in BT/ER decreased four percentage points for the second consecutive assessment (76% to 72%); whereas MCH capacity has steadily increased through all four assessments.

| Table 25. | Epidemiology and surveillance capacity in eight key program areas in state health departments—2001, 2004, 2006, and 2009 Epidemiology Capacity Assessments |

PROGRAM	YEAR	No. AGENCIES	NONE OR MINIMAL (%)	PARTIAL (%)	SUBSTANTIAL TO FULL (%)
Bioterrorism/ Emergency response	2009	51	8	20	72
	2006	51	6	18	76
	2004	54	6	15	80
	2001	40	5	50	46
Chronic diseases	2009	51	18	30	53
	2006	51	15	21	64
	2004	52	15	37	49
	2001	38	8	42	50
Environmental health	2009	51	35	27	38
	2006	51	46	21	34
	2004	54	43	10	27
	2001	38	29	37	34
Infectious diseases	2009	51	2	6	92
	2006	51	0	4	96
	2004	53	2	9	89
	2001	40	0	5	95
Injury	2009	51	32	35	34
	2006	51	43	33	25
	2004	54	50	32	18
	2001	39	18	59	23
Maternal and child health	2009	51	12	33	55
	2006	51	23	30	47
	2004	52	25	33	43
	2001	37	5	60	35
Occupational health	2009	51	68	14	18
	2006	51	82	5	14
	2004	53	77	13	10
	2001	39	56	25	20
Oral health	2009	51	61	33	6
	2006	51	77	9	14
	2004	53	75	17	8
	2001	39	64	28	8

Figure 14. Surveillance and epidemiology capacity, by program area*—2001, 2004, 2006, and 2009 Epidemiology Capacity Assessments[†]
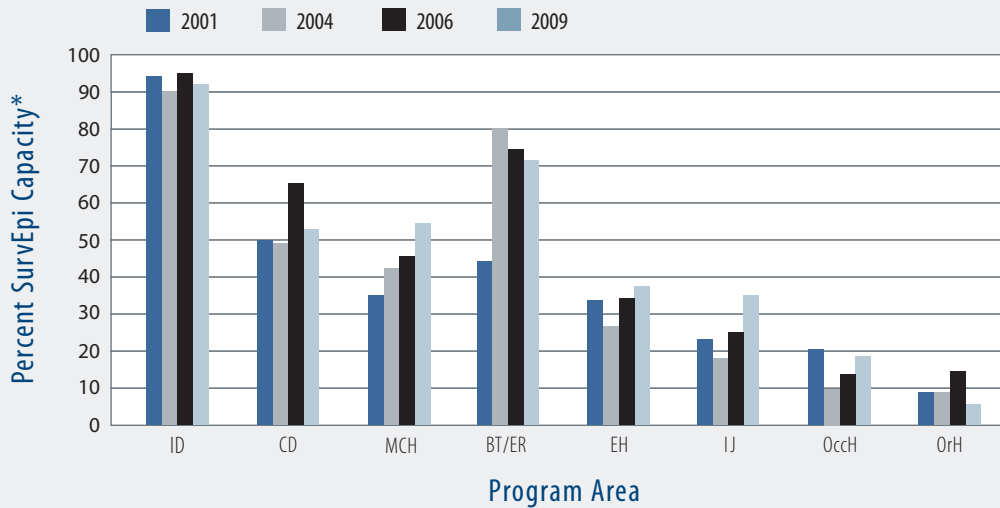
* ID: infectious diseases; CD: chronic disease; MCH: maternal and child health; BT/ER: bioterrorism/emergency response; EH: environmental health; IJ: injury; OccH: occupational health; OrH: oral health.
[†] N = 40 agencies in 2001; 54 agencies in 2004; 54 agencies in 2006; and 51 agencies in 2009

Numeric Epidemiology Capacity

The total number of epidemiologists and the number of epidemiologists per 100,000 population have decreased with each ECA since 2004 (Table 26). The decreased total and number per 100,000 from 2006 to 2009 were 10% and 12%, respectively, following smaller respective reductions of 2.5% and 3.5% from 2004 to 2006. Estimated additional need was greatest in 2009, consistent with the lower actual number of epidemiologists employed at the time of the 2009 ECA than at the time of the 2004 and 2006 ECAs.

Table 26. Number of epidemiologists, additional number needed and optimal[†] number— 2004, 2006, and 2009 Epidemiology Capacity Assessments, 50 states and District of Columbia

YEAR	No. AGENCIES	No. EPIDEMIOLOGISTS	No. EPIDEMIOLOGISTS PER 100,000*	ESTIMATED ADDITIONAL NEED	OPTIMAL No. EPIDEMIOLOGISTS[†]	OPTIMAL No. PER 100,000
2004	51	2498	0.85	1172	3670	1.25
2006	51	2436	0.82	736	3172	1.06
2009	51	2193	0.72	1490	3683	1.21

* Based on US Census national population estimates for July 1, 2004, 2006, and 2008.
[†] Optimal = sum of number of epidemiologists plus estimated additional need.

Funding

In 2009, federal funding makes up an average of 75% of resources for epidemiology activities in states. After a 13 percentage point increase from 60% to 73% from the 2001 to the 2004 ECA in association with the initial appropriation of BT/ER funding, federal funding increased only slightly but progressively from 73% to 75% from the 2004 to the 2009 ECA (Figure 15).

Figure 15.

Percentages of funding sources for all epidemiology activities in state health departments - 2001, 2004, 2006, and 2009 Epidemiology Capacity Assessments
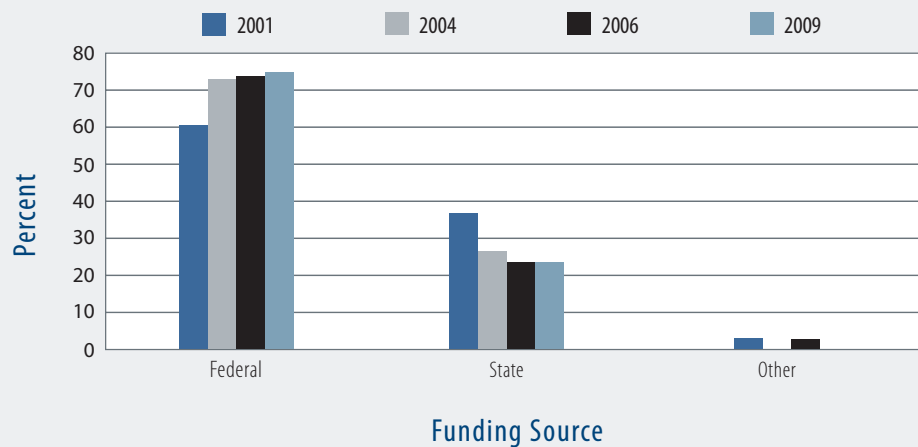
Workforce Makeup and Competency

The 2004, 2006, and 2009 ECAs asked identical questions about workforce makeup by level of academic achievement. The 2006 and 2009 ECAs asked identical questions about workforce competency, training needs, and state involvement in training and collaboration with training partners. The 2004 and 2009 ECAs asked the same questions about salary levels.

Epidemiologists with Academic Training in Epidemiology

The ECA data suggest that the epidemiology workforce is becoming increasingly well trained (Table 27). The percentage of epidemiologists who had master's-level or doctoral-level training in epidemiology progressively increased from 49.5% in 2004 to 56.4% in 2009, and the percentage who had no formal training or had only on-the-job training decreased from 28.6% to 13.4%.

| Table 27. | Makeup of epidemiology workforce, by level of academic training in epidemiology—2004, 2006, and 2009 Epidemiology Capacity Assessments,* 50 states, District of Columbia, and varying number of territories in 2004 and 2006 |

LEVEL OF EPIDEMIOLOGY TRAINING	2004 N = 1897	2006 N = 2339.5	2009 N = 1544
1. PhD, DrPH, other doctoral degree in Epidemiology	7.0%	8.5%	7.8%
2. Professional background (e.g. MD, DO, DVM, DDS) with a dual degree in Epidemiology	8.2%	8.7%	10.6%
3. MPH, MSPH, other master's degree in Epidemiology	34.3%	38.0%	38.0%
4. BA, BS, other bachelor's degree in Epidemiology	2.5%	2.2%	0.9%
5. Completed formal training program in Epidemiology (e.g., EIS†)	5.4%	6.7%	6.7%
6. Completed some coursework in Epidemiology	14.0%	19.1%	22.6%
7. Received on-the-job training in Epidemiology	24.5%	14.1%	11.5%
8. No formal training in Epidemiology (i.e., epidemiologist does not fit in any of the above categories)	4.1%	2.7%	1.9%

* Data on 74% of epidemiologists in 2004, 94% in 2006, and 70% in 2009.
†EIS: Epidemic Intelligence Service.

Competency

State Epidemiologists' responses in the 2006 ECA were compared to responses in the 2009 ECA for 15 key staff competencies. Examination of the percentage of State Epidemiologists who agreed their staff are competent in any given competency showed few striking changes. For only three competencies did the assessment change by five percentage points or more (Table 28). All three improved: a) conduct evaluation of surveillance systems (39% to 55%); b) use knowledge of environmental and behavioral sciences in epidemiologic practice (35% to 43%); and c) convene and provide appropriate data for communicating planning processes (39% to 47%).

Table 28.	Applied Epidemiology Competencies for which State Epidemiologists agreed their staff are competent—2006 and 2009 Epidemiology Capacity Assessments, 50 states and District of Columbia

COMPETENCY	AGREE STAFF ARE COMPETENT	
	2006	2009
Apply privacy laws to protect confidentiality, including HIPAA	82%	86%
Collaborate with others to identify problems and form recommendations	80%	84%
Follow ethics guidelines/principles in studies, research, and data use	80%	84%
Create and manage a database	82%	82%
Apply understanding of causes of diseases in practicing epidemiology	78%	78%
Utilize scientific evidence to support actions or interventions	77%	78%
Communicate epidemiologic findings orally and in writing to nonprofessional audiences	73%	71%
Create analysis plan, and conduct analysis of data	69%	69%
Employ appropriate statistical and communication software	64%	67%
Demonstrate the skills and principles of risk communication	55%	55%
Conduct evaluation of surveillance systems	39%	55%
Use leadership and systems thinking in epidemiologic planning and policy development	51%	47%
Convene and provide appropriate data for community planning processes	39%	47%
Use knowledge of environmental and behavioral sciences in epidemiologic practice	35%	43%
Develop program logic models and theories of action	29%	25%

Training Needs

The percentage of State Epidemiologists who agreed their staff need additional training for each of the same 15 competencies were compared for the 2006 and 2009 ECAs. From 2006 to 2009, the need for additional training decreased by at least five percentage points for nine competencies and increased by at least five percentage points for one competency ("apply understanding of causes of diseases in practicing epidemiology") (Table 29).

Table 29. Applied Epidemiology Competencies for which training needs increased ≥5 percentage points from 2006 to 2009—Epidemiology Capacity Assessment

COMPETENCY	ADDITIONAL TRAINING NEEDED	
	2006 N = 54 AGENCIES	2009 N = 51 AGENCIES
Demonstrate the skills and principles of risk communication	54%	49%
Apply understanding of causes of diseases in practicing epidemiology	37%	43%
Employ appropriate statistical and communication software	52%	41%
Create analysis plan, and conduct analysis of data	53%	39%
Conduct evaluation of surveillance systems	59%	39%
Use knowledge of environmental and behavioral sciences in epidemiologic practice	59%	35%
Create and manage a database	45%	29%
Follow ethics guidelines/principles in studies, research, and data use	37%	24%
Collaborate with others to identify problems and form recommendations	31%	24%
Apply privacy laws to protect confidentiality, including HIPAA*	31%	18%

HIPAA: Health Insurance Portability and Accountability Act.

Training Involvement and Collaboration

From 2006 to 2009, the percentage of state health departments' involvement in training and in working with collaborators to provide training increased by at least five percentage points in many areas (Table 30) and decreased by at least five percentage points in none. Notably, the percentage of states requiring continuing education in epidemiology and surveillance increased from 6% to 22%.

Table 30.	Increases of ≥5 percentage points in state health department training involvement and collaboration from 2006 to 2009—Epidemiology Capacity Assessment

	PERCENTAGE RESPONDING YES	
TRAINING IN EPIDEMIOLOGY	2006 N = 55 AGENCIES	2009 N = 51 AGENCIES
Require continuing education in epidemiology and surveillance	6%	22%
Pay for formal training or education outside your organization (conferences or seminars)	90%	75%
Provide on-site training (epidemiology seminars, etc)	81%	86%
Provide epidemiology training or education to epidemiologists at the local level	75%	80%
PROVIDE TRAINING IN COLLABORATION WITH ANY OF THE FOLLOWING ORGANIZATIONS/GROUPS:		
Centers for Disease Control and Prevention	81%	86%
Schools of public health	75%	80%
Other healthcare providers	37%	76%
Other academic institutions	45%	71%
Other federal/governmental agencies	55%	69%
Centers for Public Health Preparedness	60%	67%
Public safety/First responders	53%	67%
Other healthcare organizations	38%	63%
Schools of veterinary medicine	26%	49%
HRSA* training centers	11%	35%

HRSA: Health Resources and Services Administration.

Barriers to Recruitment and Retention

Both the 2006 and the 2009 ECAs asked a series of questions about barriers to recruitment and retention (Tables 19 and 20). Because a five-point scale was used in 2006 but a four-point scale was used in 2009, responses are not strictly comparable. However, the rank of the barriers in recruitment and retention can be compared. In 2006, salary scale was the leading recruitment problem, rated a problem by 72% of the 53 responding agencies. In 2009, none of 51 responding agencies rated it a problem. Otherwise, the rank order was almost identical.

Similarly, in 2006, the leading barrier to retention was salary range, rated a problem by 62% of respondents. In 2009, no responding agency rated it a problem. Otherwise, the rank order again was approximately the same.

Trends in Salaries

The 2004 and 2009 ECAs asked about salary ranges for five functional levels of epidemiologist positions. For all five levels, average lower and upper limit salaries increased, usually more than the 13% inflation that occurred during this period (Table 31).

Table 31. Increases in epidemiologist salary levels from 2004 to 2009—Epidemiology Capacity Assessment

EPIDEMIOLOGIST LEVEL	RANGE	2004 MEAN	2009 MEAN	PERCENTAGE INCREASE FROM 2006 TO 2009
State Epidemiologist	Lower Limit	$85,454	$101,480	19%
	Upper Limit	$129,702	$141,420	9%
Deputy State Epidemiologist	Lower Limit	$71,553	$91,609	28%
	Upper Limit	$98,944	$122,735	24%
Senior level	Lower Limit	$49,190	$59,197	20%
	Upper Limit	$73,263	$87,679	20%
Mid-level	Lower Limit	$41,772	$47,341	13%
	Upper Limit	$59,574	$69,422	17%
Entry level	Lower Limit	$36,798	$39,845	8%
	Upper Limit	$51,902	$69,719	34%

DISCUSSION

The 2009 ECA identified erosion of national epidemiology capacity since 2006, the first decrease in both numbers of epidemiologists and state-reported functional capacity since standardized assessments began in 2001. The total number of epidemiologists enumerated decreased 10% (243 fewer epidemiologists), and the number per 100,000 population decreased 12% (from 0.82 to 0.70 per 100,000). Just as important, the self-reported capacity of state health departments to carry out three of the four ESPH that depend on epidemiology (Box 1) decreased. The percentage of states reporting at least substantial capacity for ESPH 1 dropped from 80% to 65%; for ESPH 2, from 67% to 63%; and for ESPH 9, from 39% to 14%. Correspondingly, for each of these ESPH, the percentage reporting minimal to no capacity increased from 4% to 10%.

Erosion in epidemiology capacity may have started between 2004 and 2006, when the number of epidemiologists decreased 2.5%. However, the 2009 ECA could not fully elucidate the reasons for the accelerated decline in number of epidemiologists from 2006 to 2009. Two factors most likely contributed to erosion since 2006: reductions in federal public health preparedness funding beginning in 2006 and the national recession beginning in September 2008. Evidence supporting the former is the 8% decrease in program-specific epidemiology capacity in BT/ER since 2004 and the successive decreases only in BT/ER during that time. BT/ER and state capacity overall benefited greatly from the $1 billion in federal funds put into public health preparedness in 2002. However, the reduction to <70% of the original allotment now may be taking a toll. The current fiscal crisis, in which greatly reduced revenues in most states forced reductions in overall fiscal year 2009 state budgets, has resulted in hiring freezes, elimination of vacated positions, incentive early retirement programs, and layoffs. Given that many states are drastically cutting budgets in fiscal year 2010 in anticipation of even larger budget shortfalls during the next few years, state-supported epidemiology capacity is likely to continue to fall for the next several years.

The 2009 ECA also documented continued major gaps in the ability to carry out several core public health functions in many program areas and in use of technology advances to move surveillance methods into the 21st century. A large percentage of states had minimal to no capacity in important areas. For ESPH 9, 31% of states reported minimal to no capacity, and only 14% reported at least substantial capacity. For ESPH 10, 43% of states reported minimal to no capacity, and only 18% reported at least substantial capacity. In addition, four program areas continue to have >30% of states with minimal to no surveillance and epidemiology capacity: injury, 32%; environmental health, 35%; oral health, 61%; and occupational health, 68%. Substance abuse epidemiology, assessed for the first time, had minimal to no capacity in 76% of states, which contrasts with infectious diseases, BT/ER, and MCH, for which 2%, 8%, and 12% of states, respectively reported minimal to no capacity.

Many states still do not have the technology capacity needed to propel their conduct of surveillance into the 21st century—a preparedness and public health vulnerability. They lack automated ELR, Web-based provider reporting, and use of cluster-detection software, resulting in less timely and less complete reporting, reduced ability to rapidly detect outbreaks, continued unnecessary drainage of limited resources into reporting, and reduced ability to expand surveillance to conditions with large numbers of affected persons. As public health seeks to better describe and address health disparities, most states do not routinely geocode health event address data and thus cannot routinely examine the nature of the neighborhood of residence as a demographic factor to describe and respond to disparities in disease and health. ELR is operable in only 53% of states, Web-based

provider reporting in 41%, and cluster-detection software in 24%. Routine geocoding is done in <50% of states: 39% geocode births; 41%, deaths; and 29% all reportable disease data.

These findings combined with the current economic situation, suggest a looming crisis in the ability of the United States to collect epidemiologic and surveillance data, investigate community health problems, and respond innovatively and effectively to problems. This crisis is occurring just when we have the technology and the experience with newer program areas to move public health forward. Clearly, a national vision for epidemiology capacity and involvement in surveillance and epidemiology in newer, underserved program areas is needed.

In regard to development of a vision and strategy, the 2009 ECA produced some potentially important information. States estimated that an optimally sized state-level epidemiology workforce to enable full surveillance and epidemiology capacity in all program areas should be approximately 3680 epidemiologists, or about 1.2 epidemiologists per 100,000 population. This is approximately 1500 more state-level epidemiologists than currently exist in the United States. However, the need is not equal by program area or by state size. To lift the four weakest program areas from a low percentage of states with at least substantial surveillance and epidemiology capacity to full capacity in all states requires <400 additional epidemiologists. Importantly, the size of the state is critical in determining the number of state-level epidemiologists needed, with the largest states (>6 million population) needing fewer than half the number of epidemiologists per capita as the smallest states (<2.5 million population). This latter finding may reflect in part the fact that many smaller states without strong county health departments do much of the amount of additional data collection and disease control work that in large states is done by county health departments. In addition, some base level most likely exists that all states need, regardless of size—and probably some upper level as well—after which more epidemiologists do not add substantially. Another helpful piece of information from the 2009 ECA is that a much higher percentage of states that have a lead epidemiologist assigned to a program area have substantial surveillance and epidemiology capacity compared with states with no lead epidemiologist in that program area. Having a lead epidemiologist to take responsibility appears to be an important factor in establishing higher-level capacity.

Beginning in 2004, CSTE and CDC made a concerted effort to address workforce competency and training (5,10–13). Combined with enhanced funding for public health training through public health preparedness cooperative agreements with states and with academic centers for public health preparedness, substantial progress appears to have been made already. A higher percentage of the workforce than in previous assessments has formal training in epidemiology, a steady trend since 2004. A total of 56.4% are trained at the master's level or higher and 86.6% have at least some formal epidemiology training. The state epidemiology workforce has generally higher competency ratings than in 2006. Almost all state health departments collaborate with academic and health professional organizations to provide educational opportunities to employees and the developing workforce, with more reporting collaborations with each possible partner in 2009 than in 2006.

Despite the good news in this area, the 2009 ECA has some important implications for future workforce development. At least 30% of states expressed a need for additional training for 23 of 27 competencies assessed. Among different levels of epidemiologists, training needs were highest for entry- and mid-level epidemiologists, those who will make up much of the future workforce. More

than 8% of the workforce with masters or doctoral degrees left the workforce in 2008. Substantial (17%) turnover in the workforce is anticipated in the next 5 years. New surveillance technologies may demand new competencies. Increasingly, the ability to collect, manage, and manipulate the electronic data stream is a needed skill. As electronic medical records become more common, epidemiologists will need the skills to manage large extracts of information from them rather than depend on completion of simple report forms. Clearly, the current level of investment needs to be sustained. Workforce development is a constantly moving target.

This ECA explored epidemiology capacity in several new ways. It used number of publications as an index of capacity. Having published in peer reviewed literature and having produced technical reports each correlated well with having substantial or higher levels of "surveillance and epidemiology capacity" across most program areas except BT/ER. Why publishing in this latter area is less common than in other areas, given its generally high epidemiology capacity, is not clear. Possibly, it could reflect an emphasis on detection and monitoring of emerging situations that when published are counted as infectious diseases or environmental health publications. However, it also could reflect a less critical examination of this area and indicate a need for more critical evaluation. State population size was also examined as a determinant of epidemiology capacity, and the main findings were commented upon above. Additional analysis of the impact of state size on the correlation between number of epidemiologists and epidemiology capacity is needed for program area–specific capacity. The 2009 ECA was not structured well to enable this, but the 2006 ECA was, and a recent analysis correlated epidemiology capacity with number of epidemiologists for some smaller program areas (14). Finally, the differences between states reporting substantial to full epidemiology capacity for any given ESPH and for any given program area and states with minimal to no capacity have not been well characterized. Characterization of these differences is needed so states without capacity can receive more specific guidance about what they gain by obtaining capacity.

The information described in this report is subject to several limitations. First, as in past ECAs, information collected about perceived capacity, strengths, and barriers is self-assessed data. Methods used by respondents to estimate this information most likely varied. Second, the response rate to the individual worksheets was only 70%, and respondents might have differed from non-respondents. Third, comparisons with past ECAs are not always exact. Although overall state-level response rates have been high, they were notably low for US territories on the 2009 ECA. Past ECAs have included territories in the data summaries despite inconsistencies in the number of participating territories. Thus, some differences in percentages of categorical results by "responding agencies" could be due in part to differences from including territories. However, limiting measures of epidemiology capacity in 2006 and in 2009 to the 50 states and DC minimized the impact of this potential effect. Finally, this assessment was solely of state epidemiology capacity; it did not include local (including county or big-city) health departments. The 2009 assessment clearly indicates that large-county and big-city health departments play an important role in national epidemiology capacity and in the capacity of the state in which they are located.

1. **Develop a strategy to achieve optimal epidemiology capacity.**
   - CDC and CSTE should collaborate on using data from the ECAs to establish a joint vision and numeric and structural goals for epidemiology capacity for state health departments in part on the basis of their size. The current fiscal crisis in most states is likely to result in further erosion of capacity. Standards are needed as targets for rebuilding when rebuilding becomes feasible.
   - As part of cooperative agreement funding, CDC should encourage all states to have a lead epidemiologist for each program area, including substance abuse.
   - To clarify the benefits of having at least substantial surveillance and epidemiology capacity in each program area, CSTE and CDC should develop documentation of the benefits of full capacity on the basis of the examples provided from states with a high level of capacity.
   - State and federal agencies involved in developing epidemiology capacity need to come together to discuss gaps in epidemiology capacity and ways to work together to overcome them.

2. **Assist states to achieve selected surveillance-related technology capacities.**
   - As part of public health preparedness funding, CDC should support states to achieve full functional technology capacity in the following areas: ELR; Web-based provider reporting; use of cluster-detection software for outbreaks; routine geocoding of vital statistics, reportable diseases, and any other surveillance data for which personal street/mail address information is collected (e.g., immunization registries).
   - CDC should actively encourage states to routinely match geocoded data with census data and to present descriptive epidemiologic data on selected characteristics of neighborhood of residence, such as the percentage of residents in the neighborhood living in poverty.

3. **Maintain efforts to establish training standards for applied public health epidemiologists and to provide training to enable a sustained, qualified public health epidemiology workforce.**
   - Federal, state, territorial, tribal, and local public health agencies should continue to aggressively promote the development and implementation of standards for applied epidemiology training using a competency-based model.
   - CSTE and CDC should maintain the current direction in defining, measuring, and refining competencies. As part of this, an effort should be made to examine whether informatics skills should be included in any epidemiology competencies to enable implementation and use of technology advances, including use of the electronic medical record.
   - State health departments and schools of public health need to continue to support the full integration of recently and newly developed applied epidemiology competencies for public health epidemiologists. They also need to provide or facilitate training for epidemiologists in the workforce around the Applied Epidemiology Competencies, particularly those that have been identified as highest need.

4. **Conduct future assessments.**
   - Given the findings in this assessment, future assessments should continue to monitor both functional and numeric epidemiology capacity. Accurately monitoring the number of epidemiologists and funding source by program area (including substance abuse), and overall, will be important.
   - Future assessments also should continue to monitor key technology capacities because they are essential for public health preparedness-related monitoring and to enable access to a broader range of information for public health action.

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ECA Core Assessment 2009

Part 1 - Core questionnaire

1. What are the funding sources for all epidemiology activities within the STATE HD?
   (Check all that apply)
   - ❏ Federal Funds   Specify Percentage:_____%
   - ❏ State Funds   Specify Percentage:_____%
   - ❏ Other, please specify below   Specify Percentage:_____%

   _____

2. Please check all that apply for your State Epidemiologist position:

   2a. Is the State Epidemiologist formally mandated by State statute or regulation (similar to the Commissioner of Health/Public Health)?

          ❏ Yes   ❏ No   ❏ Unknown

   2b. Is there a position specifically called the State Epidemiologist with its own job qualification in your State Personnel System?

          ❏ Yes   ❏ No   ❏ Unknown

   2c. Is the State Epidemiologist an appointed or designated position/title (e.g., appointed/designated by the Commissioner rather than hired through civil service hiring process)?

          ❏ Yes   ❏ No   ❏ Unknown

   2d. Which of the following program areas does the State Epidemiologist directly supervise?

I. Infectious Disease	❏ Yes	❏ No	❏ Unknown
II. Chronic Disease	❏ Yes	❏ No	❏ Unknown
III. Bioterrorism/Emergency Response	❏ Yes	❏ No	❏ Unknown
IV. Environmental Health	❏ Yes	❏ No	❏ Unknown
V. Injury	❏ Yes	❏ No	❏ Unknown
VI. Maternal Child Health	❏ Yes	❏ No	❏ Unknown
VII. Occupational Health	❏ Yes	❏ No	❏ Unknown
VIII. Vital Statisitics	❏ Yes	❏ No	❏ Unknown
IX. Oral Health	❏ Yes	❏ No	❏ Unknown
X. Substance Abuse	❏ Yes	❏ No	❏ Unknown
XI. Other, please specify below	❏ Yes	❏ No	❏ Unknown

   _____

   2e. How long has the State Epidemiologist been in his/her current position?

   _____ Years in current position (indicate half years in increments of 0.5)

3. Is there a formal LEAD epidemiologist for each program area below?
   Lead epidemiologist is a person who oversees all epidemiologic activities in that program area.

I. Infectious Disease	❏ Yes	❏ No	❏ Unknown
II. Chronic Disease	❏ Yes	❏ No	❏ Unknown
III. Bioterrorism/Emergency Response	❏ Yes	❏ No	❏ Unknown
IV. Environmental Health	❏ Yes	❏ No	❏ Unknown
V. Injury	❏ Yes	❏ No	❏ Unknown
VI. Maternal Child Health	❏ Yes	❏ No	❏ Unknown

VII. Occupational Health	❏ Yes	❏ No	❏ Unknown
VIII. Vital Statisitics	❏ Yes	❏ No	❏ Unknown
IX. Oral Health	❏ Yes	❏ No	❏ Unknown
X. Substance Abuse	❏ Yes	❏ No	❏ Unknown
XI. Other, please specify below	❏ Yes	❏ No	❏ Unknown

_____

4. Does the state personnel system have job descriptions for one or more epidemiology positions(s)?

❏ Yes ❏ No ❏ Unknown

4a. If yes, what best describes the personnel series (select the most appropriate)?

❏ One level for all epidemiologists

❏ Graded positions allowing for advancement

If graded, list the number of levels: _____

5. Does your STATE HD have adequate epidemiologic capacity to provide the following four essential public health services? *See below (Question 6) for a definition of the scale used in this question.*

ESPH #1	ESPH #2	ESPH #9	ESPH #10
Monitoring health statusto identify and solve community health problems	Diagnosing and investigating healthproblems and health hazards in the community	Evaluating effectiveness, accessibility and quality of personal and population-based health services	Research for new insights and innovative solutions to health problems
❏ None ❏ Minimal ❏ Partial ❏ Substantial ❏ Almost Fully ❏ Full	❏ None ❏ Minimal ❏ Partial ❏ Substantial ❏ Almost Fully ❏ Full	❏ None ❏ Minimal ❏ Partial ❏ Substantial ❏ Almost Fully ❏ Full	❏ None ❏ Minimal ❏ Partial ❏ Substantial ❏ Almost Fully ❏ Full

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 questions. *See below for a definition of the scale used in this question.*

NOT AT ALL, NONE	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% of 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.

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 questions. *Question continued from folloing page.*

BIOTERRORISM / EMERGENCY RESPONSE	CHRONIC DISEASE	ENVIRONMENTAL HEALTH
❏ None*	❏ None*	❏ None*
❏ Minimal	❏ Minimal	❏ Minimal
❏ Partial	❏ Partial	❏ Partial
❏ Substantial	❏ Substantial	❏ Substantial
❏ Almost Fully	❏ Almost Fully	❏ Almost Fully
❏ Full	❏ Full	❏ Full
If none, are you currently developing a program or have plans to implement one?	*If none, are you currently developing a program or have plans to implement one??*	*If none, are you currently developing a program or have plans to implement one?*
❏ Yes	❏ Yes	❏ Yes
❏ No	❏ No	❏ No
INFECTIOUS DISEASE	INJURY	MATERNAL AND CHILD HEA TH
❏ None*	❏ None*	❏ None*
❏ Minimal	❏ Minimal	❏ Minimal
❏ Partial	❏ Partial	❏ Partial
❏ Substantial	❏ Substantial	❏ Substantial
❏ Almost Fully	❏ Almost Fully	❏ Almost Fully
❏ Full	❏ Full	❏ Full
If none, are you currently developing a program or have plans to implement one?	*If none, are you currently developing a program or have plans to implement one?*	*If none, are you currently developing a program or have plans to implement one?*
❏ Yes	❏ Yes	❏ Yes
❏ No	❏ No	❏ No
OCCUPATIONAL HEALTH	SUBSTANCE ABUSE	ORAL HEALTH
❏ None*	❏ None*	❏ None*
❏ Minimal	❏ Minimal	❏ Minimal
❏ Partial	❏ Partial	❏ Partial
❏ Substantial	❏ Substantial	❏ Substantial
❏ Almost Fully	❏ Almost Fully	❏ Almost Fully
❏ Full	❏ Full	❏ Full
If none, are you currently developing a program or have plans to implement one?	*If none, are you currently developing a program or have plans to implement one?*	*If none, are you currently developing a program or have plans to implement one?*
❏ Yes	❏ Yes	❏ Yes
❏ No	❏ No	❏ No

7-12. The information below is being generated by the individual worksheets distributed to the epidemiologists at the state level. If you have not emailed this link to all epidemiologists in your State HD or to all epidemiologists in your state, please do so before final completion of the ECA using the tools provided in your Control Panel or following this link: http://www.cste.org/dnn/ECA2009/ECAWorksheet1State.aspx .

SOURCES OF FUNDING FOR Q7						
	Q7	Q8	Q9	Q10	Q11	Q12
-ENTER 0 FOR NONE -DESCRIBE HALF-TIME EMPLOYEES AS 1/2	Current Number *(include EIS officers, contract employees, university appoinments, Epi Fellows, etc.)*	No. Paid for with Federal BT/ Preparedness funds	No. Paid for with CDC funds other than BT/ Preparedness funds	No. Paid for with other Federal funds other than CDC	No. Paid for with State funds	No. Paid for with funds from other sources *(e.g., foundation grants)*
MD, DO						
DDS						
DVM						
PhD, DrPH, other doctoral						
MPH, MSPH, other master						
RN, Any other nursing						
BA, BS, BSN, other bachelor						
Associate or no post high school degree						

13-16. The information below is being generated by the individual worksheets distributed to the epiemiologists at the state level. If you have not email this link to all epidemiologists in your State HD or to all epidemiologists in your state, please do so before final completion of the ECA.

Question 16 (Column 5) should be completed manually using the fields provided. Data for questions 13-15 are populated by the epidemiologists completing the individual capacity worksheets

PROGRAM AREA: BIOTERRORISM/EMERGENCY RESPONSE				
	Q13	Q14	Q15	Q16
-Enter 0 for none -Describe half-time employees as 1/2	Number on Contract	Number planning to retire or change careers out of epidemiology in the next 5 years	Number with 5 or more years experience working as epidemiologist	Estimates of Ideal Additional Need (the number of epidemiologists in addition to Q7 regardless of resources)
MD, DO				
DDS				
DVM				
PhD, DrPH, other doctoral				
MPH, MSPH, other master				
RN, Any other nursing				
BA, BS, BSN, other bachelor				
Associate or no post high school degree				

PROGRAM AREA: CHRONIC DISEASE				
	Q13	Q14	Q15	Q16
-Enter 0 for none -Describe half-time employees as 1/2	Number on Contract	Number planning to retire or change careers out of epidemiology in the next 5 years	Number with 5 or more years experience working as epidemiologist	Estimates of Ideal Additional Need (the number of epidemiologists in addition to Q7 regardless of resources)
MD, DO				
DDS				
DVM				
PhD, DrPH, other doctoral				
MPH, MSPH, other master				
RN, Any other nursing				
BA, BS, BSN, other bachelor				
Associate or no post high school degree				

PROGRAM AREA: ENVIRONMENTAL HEALTH				
	Q13	Q14	Q15	Q16
-Enter 0 for none -Describe half-time employees as 1/2	Number on Contract	Number planning to retire or change careers out of epidemiology in the next 5 years	Number with 5 or more years experience working as epidemiologist	Estimates of Ideal Additional Need (the number of epidemiologists in addition to Q7 regardless of resources)
MD, DO				
DDS				
DVM				
PhD, DrPH, other doctoral				
MPH, MSPH, other master				
RN, Any other nursing				
BA, BS, BSN, other bachelor				
Associate or no post high school degree				

PROGRAM AREA: INFECTIOUS DISEASE				
	Q13	Q14	Q15	Q16
-Enter 0 for none -Describe half-time employees as 1/2	Number on Contract	Number planning to retire or change careers out of epidemiology in the next 5 years	Number with 5 or more years experience working as epidemiologist	Estimates of Ideal Additional Need (the number of epidemiologists in addition to Q7 regardless of resources)
MD, DO				
DDS				
DVM				
PhD, DrPH, other doctoral				
MPH, MSPH, other master				
RN, Any other nursing				
BA, BS, BSN, other bachelor				
Associate or no post high school degree				

PROGRAM AREA: INJURY				
	Q13	Q14	Q15	Q16
-Enter 0 for none -Describe half-time employees as 1/2	Number on Contract	Number planning to retire or change careers out of epidemiology in the next 5 years	Number with 5 or more years experience working as epidemiologist	Estimates of Ideal Additional Need (the number of epidemiologists in addition to Q7 regardless of resources)
MD, DO				
DDS				
DVM				
PhD, DrPH, other doctoral				
MPH, MSPH, other master				
RN, Any other nursing				
BA, BS, BSN, other bachelor				
Associate or no post high school degree				

PROGRAM AREA: MATERNAL AND CHILD HEALTH				
	Q13	Q14	Q15	Q16
-Enter 0 for none -Describe half-time employees as 1/2	Number on Contract	Number planning to retire or change careers out of epidemiology in the next 5 years	Number with 5 or more years experience working as epidemiologist	Estimates of Ideal Additional Need (the number of epidemiologists in addition to Q7 regardless of resources)
MD, DO				
DDS				
DVM				
PhD, DrPH, other doctoral				
MPH, MSPH, other master				
RN, Any other nursing				
BA, BS, BSN, other bachelor				
Associate or no post high school degree				

PROGRAM AREA: OCCUPATIONAL HEALTH				
	Q13	Q14	Q15	Q16
-Enter 0 for none -Describe half-time employees as 1/2	Number on Contract	Number planning to retire or change careers out of epidemiology in the next 5 years	Number with 5 or more years experience working as epidemiologist	Estimates of Ideal Additional Need (the number of epidemiologists in addition to Q7 regardless of resources)
MD, DO				
DDS				
DVM				
PhD, DrPH, other doctoral				
MPH, MSPH, other master				
RN, Any other nursing				
BA, BS, BSN, other bachelor				
Associate or no post high school degree				

PROGRAM AREA: ORAL HEALTH				
	Q13	Q14	Q15	Q16
-Enter 0 for none -Describe half-time employees as 1/2	Number on Contract	Number planning to retire or change careers out of epidemiology in the next 5 years	Number with 5 or more years experience working as epidemiologist	Estimates of Ideal Additional Need (the number of epidemiologists in addition to Q7 regardless of resources)
MD, DO				
DDS				
DVM				
PhD, DrPH, other doctoral				
MPH, MSPH, other master				
RN, Any other nursing				
BA, BS, BSN, other bachelor				
Associate or no post high school degree				

PROGRAM AREA: SUBSTANCE ABUSE EPIDEMIOLOGY				
	Q13	Q14	Q15	Q16
-Enter 0 for none -Describe half-time employees as 1/2	Number on Contract	Number planning to retire or change careers out of epidemiology in the next 5 years	Number with 5 or more years experience working as epidemiologist	Estimates of Ideal Additional Need (the number of epidemiologists in addition to Q7 regardless of resources)
MD, DO				
DDS				
DVM				
PhD, DrPH, other doctoral				
MPH, MSPH, other master				
RN, Any other nursing				
BA, BS, BSN, other bachelor				
Associate or no post high school degree				

PROGRAM AREA: OTHER				
	Q13	Q14	Q15	Q16
-Enter 0 for none -Describe half-time employees as 1/2	Number on Contract	Number planning to retire or change careers out of epidemiology in the next 5 years	Number with 5 or more years experience working as epidemiologist	Estimates of Ideal Additional Need (the number of epidemiologists in addition to Q7 regardless of resources)
MD, DO				
DDS				
DVM				
PhD, DrPH, other doctoral				
MPH, MSPH, other master				
RN, Any other nursing				
BA, BS, BSN, other bachelor				
Associate or no post high school degree				

(Questions 17 and 18 are populated from individual worksheet results.)

17. What number of your epidemiology staff as enumerated in Q7: 1) are a Full-time CDC employed epidemiologist (i.e., CEFO, EIS, PHPS, etc.); 2) are a part-time CDC employed epidemiologist or consultant; 3) are a CDC-CSTE Applied Epidemiology Fellow.
    _____Full-time CDC employed epidemiologist (e.g., CEFO, EIC, PHPS, etc.)
    _____Part-time CDC employed epidemiologist or consultant
    _____CDC-CSTE Applied Epidemiologic Fellow

18. What number of your epidemiology staff as enumerated in Q7 have an appointment at a university, academic center, related institution (i.e., non-profit)?
    _____Have an appointment at a university, academic center, or related institution.
    18a. How many of those enumerated in Q7 are:
        _____Employed by the state health department and have an unpaid appointment at a university, academic center, or related institution.

19. For epidemiology/surveillance staff at the Master's degree and above level, please estimate the number of staff resigning, retiring or released during the calendar year of 2008.
    An annual turnover rate will be calculated based on the number you provide below and the numbers enter in Question 7.
        _____Number of epidemiology staff with a Master degree or higher that resigned, retired or were released during calendar year 2008 within the 8 program areas.

20. Describe the official annual salary range for epidemiologists working in your STATE HD by degree.

Example:

- If an entry level epidemiologist with an MD makes $75,000 to $100,000 and a senior level epidemiologist with an MD makes $125,000 to $150,000 the salary scale is $75,000-150,000

TRAINING	SALARY SCALE	CHECK IF POSITION DOESN'T EXIST
MD, DO	From $_____to $_____	❑
DDS	From $_____to $_____	❑
DVM	From $_____to $_____	❑
PhD, DrPH, other doctoral	From $_____to $_____	❑
MPH, MSPH, other Master	From $_____to $_____	❑
BS, BS, BSN, other bachelor	From $_____to $_____	❑
Associate or no post high school degree	From $_____to $_____	❑

21. Describe the official annual salary range of epidemiologists working in your STATE HD by career level.

If you have more than one position in a given career level below, please use the low end of the lowest position in that level to the high end of the highest position in that level.

CAREER LEVEL	SALARY SCALE	CHECK IF POSITION DOESN'T EXIST
State Epidemiologist	From $_____to $_____	❑
Deputy State Epidemiologist	From $_____to $_____	❑
Senior Level Epidemiologist	From $_____to $_____	❑
Mid Level Epidemiologist	From $_____to $_____	❑
Entry Level Epidemiologist	From $_____to $_____	❑

22. How many of the currently employed epidemiologists in the STATE HD listed in question 7 have formal academic training in epidemiology?

FORMAL ACADEMIC TRAINING IN EPIDEMIOLOGY	BIOTERRORISM EMERGENCY RESPONSE	CHRONIC DISEASE	ENVIRONMENTAL HEALTH	INFECTIOUS DISEASE	INJURY	MATERNAL AND CHILD HEALTH	OCCUPATIONAL HEALTH	ORAL HEALTH	SUBSTANCE ABUSE	OTHER
1. PhD, DrPh, other doctoral degree in Epidemiology										
2. Professional background (e.g., MD, DO, DVM, DDS, etc) with a dual degress in Epidemiology										
3. MPH, MSPH, other master degree in Epidemiologi										
4. BA, BS, other bachelor dgree in Epidemiology										
5. Completed formal training program in Epidemiology (e.g., EIS)										
6. Completed some coursework in Epidemiology										
7. Received on the job training in Epidemiology										
8. No formal training in Epidemiology (i.e, epidemiologist does not fit into any of the above categories)										
9. Unknown										

ECA CORE ASSESSMENT 2009

Part 2: Workforce Competency, Recruitment, and Retention

Part 2 - Workforce Competency, Recruitment, and Retention

Important: Please consult other HD program epidemiologists for questions pertaining to domains not under your area of responsibility. Please click HERE for a definition of a STATE epidemiologist. If you have any questions, pleast contact ECA@cste.org

Part A - Workforce Competency

1.

EPIDEMIOLOGY COMPETENCIES: Please describe the competence and training need in the following selected areas of your epidemiology staff:	CURRENT STAFF COMPETENCY No Training Competent/Expert Don't Know	ADDITIONAL TRAINING NEEDED Less More Don't Know
Use critical thinking to determine existence of public health problem	1❏ 2❏ 3❏ 4❏ 5❏	❏	1❏ 2❏ 3❏ 4❏ 5❏	❏
Articulate need for investigation from literature review and data assessment	1❏ 2❏ 3❏ 4❏ 5❏	❏	1❏ 2❏ 3❏ 4❏ 5❏	❏
Collaborate with others to identify problems and form recommendations	1❏ 2❏ 3❏ 4❏ 5❏	❏	1❏ 2❏ 3❏ 4❏ 5❏	❏
Design surveillance for public health issue & identify key surveillance findings	1❏ 2❏ 3❏ 4❏ 5❏	❏	1❏ 2❏ 3❏ 4❏ 5❏	❏
Conduct evaluation of surveillance systems	1❏ 2❏ 3❏ 4❏ 5❏	❏	1❏ 2❏ 3❏ 4❏ 5❏	❏
Conduct a community health status assessment and prioritize identified issues	1❏ 2❏ 3❏ 4❏ 5❏	❏	1❏ 2❏ 3❏ 4❏ 5❏	❏
Assist in design of investigation, including hypothesis generation	1❏ 2❏ 3❏ 4❏ 5❏	❏	1❏ 2❏ 3❏ 4❏ 5❏	❏
Follow ethics guidelines/principles in studies, research, and date use	1❏ 2❏ 3❏ 4❏ 5❏	❏	1❏ 2❏ 3❏ 4❏ 5❏	❏
Describe differences between public health practice and research	1❏ 2❏ 3❏ 4❏ 5❏	❏	1❏ 2❏ 3❏ 4❏ 5❏	❏
Describe human subjects' research & apply IRB processes	1❏ 2❏ 3❏ 4❏ 5❏	❏	1❏ 2❏ 3❏ 4❏ 5❏	❏
Apply privacy laws to protect confidentiality including HIPAA	1❏ 2❏ 3❏ 4❏ 5❏	❏	1❏ 2❏ 3❏ 4❏ 5❏	❏
Create and manage a database	1❏ 2❏ 3❏ 4❏ 5❏	❏	1❏ 2❏ 3❏ 4❏ 5❏	❏
Create analysis plan and conduct analysis of data	1❏ 2❏ 3❏ 4❏ 5❏	❏	1❏ 2❏ 3❏ 4❏ 5❏	❏
Apply epidemiologic principles to make recommendations on data validity	1❏ 2❏ 3❏ 4❏ 5❏	❏	1❏ 2❏ 3❏ 4❏ 5❏	❏
Assess the limitations of a study's results	1❏ 2❏ 3❏ 4❏ 5❏	❏	1❏ 2❏ 3❏ 4❏ 5❏	❏

Question continued from folloing page.

EPIDEMIOLOGY COMPETENCIES: Please describe the competence and training need in the following selected areas of your epidemiology staff:	CURRENT STAFF COMPETENCY No Training Competent/Expert	ADDITIONAL TRAINING NEEDED Less More
Establish cultural/social/political basis for recommendations/interventions	1❑ 2❑ 3❑ 4❑ 5❑	1❑ 2❑ 3❑ 4❑ 5❑
Utilize scientific evidence to support actions or interventions	1❑ 2❑ 3❑ 4❑ 5❑	1❑ 2❑ 3❑ 4❑ 5❑
Develop program logic models and theories of action	1❑ 2❑ 3❑ 4❑ 5❑	1❑ 2❑ 3❑ 4❑ 5❑
Apply understanding of causes of disease in practicing epidemiology	1❑ 2❑ 3❑ 4❑ 5❑	1❑ 2❑ 3❑ 4❑ 5❑
Use knowledge of environmental and behavioral sciences in epidemiologic practice	1❑ 2❑ 3❑ 4❑ 5❑	1❑ 2❑ 3❑ 4❑ 5❑
Employ appropriate statistical and communication software	1❑ 2❑ 3❑ 4❑ 5❑	1❑ 2❑ 3❑ 4❑ 5❑
Communicate epi findings orally and in writing to non-professional audiences	1❑ 2❑ 3❑ 4❑ 5❑	1❑ 2❑ 3❑ 4❑ 5❑
Demonstrate the skills and principles of risk communication	1❑ 2❑ 3❑ 4❑ 5❑	1❑ 2❑ 3❑ 4❑ 5❑
Convene and provide appropriate data for community planning processes	1❑ 2❑ 3❑ 4❑ 5❑	1❑ 2❑ 3❑ 4❑ 5❑
Practice culturally appropriate epidemiological activities	1❑ 2❑ 3❑ 4❑ 5❑	1❑ 2❑ 3❑ 4❑ 5❑
Apply appropriate fiscal and administrative guidelines to epidemiology practice	1❑ 2❑ 3❑ 4❑ 5❑	1❑ 2❑ 3❑ 4❑ 5❑
Use leadership, systems thinking in epi planning and policy development	1❑ 2❑ 3❑ 4❑ 5❑	1❑ 2❑ 3❑ 4❑ 5❑

2. Does your public health agency do the following in order to provide access to training in epidemiology?

Training in Epidemiology

Require continuing education in epidemiology and surveillance
❑ Yes   ❑ No   ❑ Unknown

Include education and training objectives in performance review
❑ Yes   ❑ No   ❑ Unknown

Pay for formal training or education outside your organization (conferences or seminars)
❑ Yes   ❑ No   ❑ Unknown

Question continued on following page.

Question continued from folloing page.

Provide on-site trainings (epidemiology seminars, etc)

❑ Yes   ❑ No   ❑ Unknown

Provide epidemiology training or education to epidemiologists at the local level

❑ Yes   ❑ No   ❑ Unknown

Has staff position(s) responsible for internal training

❑ Yes   ❑ No   ❑ Unknown

Provide training in collaboration with any of the following organizations/groups:

Centers for Disease Control and Prevention (CDC)	❑ Yes	❑ No	❑ Unknown
Schools of Public Health	❑ Yes	❑ No	❑ Unknown
Schools of Veterinary Medicine	❑ Yes	❑ No	❑ Unknown
Other Academic Institutions	❑ Yes	❑ No	❑ Unknown
Centers for Public Health Preparedness	❑ Yes	❑ No	❑ Unknown
HRSA Training Centers	❑ Yes	❑ No	❑ Unknown
Other Healthcare Organizations	❑ Yes	❑ No	❑ Unknown
Other Federal/Governmental Agencies	❑ Yes	❑ No	❑ Unknown
Public Safety/First Responders	❑ Yes	❑ No	❑ Unknown
Other Healthcare Providers	❑ Yes	❑ No	❑ Unknown
Other (Specify)_____	❑ Yes	❑ No	❑ Unknown

Part B. This section is intended to focus on existing practices, incentives, and barriers aimed at strengthening the epidemiology workforce as the state and local level. All questions within this section should be based on the perspective of the State Epidemiologist or a senior level health official within this agency.

1a. To what extent is each of these factors a problem in recruiting epidemiologists?

Not a problem (0-3) Major problem

_____ Salary scale

_____ Enough qualified applicants

_____ Personnel policies and procedures

_____ Job benefits

_____ Job security

_____ Job location

_____ Opportunity for promotion

_____ Travel required

_____ Travel permitted

_____ Job interests/fulfillment

_____ Opportunities for training

_____ Limitations recruiting outside your organization

_____ Restrictions on choosing best candidate

_____ Restrictions on hiring quickly enough

_____ Restrictions on offering competitive pay

_____ Hiring freezes

_____ Other factor? (Specify) _____

1b. To what extent is each of these factors a problem in retaining epidemiologists?

Not a problem (0-3) Major problem

_____ Salary scale

_____ Personnel policies and procedures

_____ Job benefits

_____ Job security

_____ Job location

_____ Opportunity for promotion

_____ Travel required

_____ Travel permitted

_____ Job interests/fulfillment

_____ Opportunities for training

_____ Loss to private or government sector

_____ Restrictions on merit raises

_____ Restrictions on travel outside jurisdiction

_____ Layoffs from budget restrictions

_____ Other factor? (Specify)_____

2. The following are useful recruitment settings or activities implemented by our organization:

Epidemiology Capacities

Universities/Schools of Public Health	❑ Yes	❑ No	❑ Unknown
Recruitment job fairs	❑ Yes	❑ No	❑ Unknown
Professional organizations (CSTE, APHA, ASPH, ACE)	❑ Yes	❑ No	❑ Unknown
Federal programs (EIS, PHPS, CEFO)	❑ Yes	❑ No	❑ Unknown
Other health agencies within the state	❑ Yes	❑ No	❑ Unknown
Local media	❑ Yes	❑ No	❑ Unknown
Epi Monitor or periodic epidemiology newsletter	❑ Yes	❑ No	❑ Unknown
State and/or local government websites	❑ Yes	❑ No	❑ Unknown
Public Health career websites (Emory Public Health Employment Connection)	❑ Yes	❑ No	❑ Unknown
Other (Specify) _____	❑ Yes	❑ No	❑ Unknown

3. How many formal articles about an epidemiology area were publish in 2008 that included any of the epidemiologists (as any author) listed in Question 7, in each program area?

"Other reports" are approved by a state process and published electronically, on paper, and/or posted on a website for public consumption.

PROGRAM AREA	NO. OF PEER REVIEWED PUBLISHED ARTICLES IN 2008	NO. OF ABSTRACTS ACCEPTED FOR PRESENTATION AT NATIONAL CONFERENCES HELD IN 2008	NO. OF "OTHER REPORTS" IN 2008 AS DEFINED ABOVE
Bioterrorism/Emergency Response			
Chronic Disease			
Environmental Health			
Infectious Disease			
Injury			
Maternal and Child Health			
Occupational Health			
Oral Health			
Substance Abuse			

Part 3. Technical Epidemiology Capacity

This section is intended to collect information regarding the electronic capacity of your STATE HD.

1. Automated electronic laboratory reporting (ELR) capacity

   Does your state have FULLY functional automated ELR* (See below for definition)

   ❏ Yes   ❏ No

          a. If responded "Yes" to above question, have you expanded the number of conditions for which you currently receive information because you have ELR?

            ❏ Yes   ❏ No

          b. If responded "No" to above question, when do you expect to have full ELR capacity?

            _____ ("MM/YYYY")   ❏ Unknown

   *Automated ELR: a system that automatically scans laboratory data at the lab each day to detect reportable lab finding information, packages it in a form that can be received by the state and automatically entered into the reportable disease database. Such a system eliminates most of the work of reporting at laboratories and data entry at the state, and enables reporting of large volume laboratory findings that might not otherwise be able to be collected because of the labor involved with completing forms and entering data. A fully functional automated ELR system would include reporting from at least one private laboratory.

2. Web-based provider reporting capacity

   Does your state have a formal web-based provider disease reporting system in which providers complete a case report form on line and the data is automatically entered into the reportable disease database without re-entering the data?

   ❏ Yes   ❏ No

          a. If responded "Yes" to above question, how long has this system been in place?

            ❏ Less than 1 Year

            ❏ 1-3 years

            ❏ 4-6 years

            ❏ Greater than 6 years

            ❏ Unknown

          b. If responded "No" to above question, when do you expect to have full web-based provider reporting?

            _____ ("MM/YYYY")   ❏ Unknown

3. NEDSS database status

   Do your reports input into a NEDSS compliance disease database?

   ❏ Yes   ❏ No   ❏ Unknown

          a. If responded "No" to above question, when do you expect to have a NEDSS compliant reportable database?

            _____ ("MM/YYYY")   ❏ Unknown

4. Use of automated cluster detection software on reportable disease data

Does your state routinely use automated cluster detection software on reportable disease and laboratory finding case report data (not synromic surveillance data) to look for disease clusters?

❏ Yes ❏ No ❏ Unknown

      a. If responded "No" to above question, when do you expect to implement automated cluster detection software on your reportable disease and laboratory finding database?

        _____ ("MM/YYYY") ❏ Unknown

The next few questions ask about the extent of routine geocoding of selected data

5. Does your state routinely geocode all births?

❏ Yes ❏ No ❏ Unknown

6. Does your state routinely geocode all deaths?

❏ Yes ❏ No ❏ Unknown

7. Does your state routinely geocode all case report data from reportable disease and laboratory findings?

❏ Yes ❏ No ❏ Unknown

      a. If responded "No" to above question, does your state routinely geocode all reported cases of selected diseases?

        ❏ Yes ❏ No ❏ Unknown

      b. If responded "No" to Question 7a, when do you expect to implement routine geocoding on at least some reportable diseases?

        _____ ("MM/YYYY") ❏ Unknown

8. Involvement in work to make the Electronic medical report a source of reportable disease data in the future

Is your state actively involved in work with local medical groups to collaborate on making electronic medical records useful for public health purposes (e.g., working on automated reporting from them; working to get publich health messages inserted whenever a keyword is entered)?

❏ Yes ❏ No ❏ Unknown

9. Preparedness: Do you utilize an Outbreak Management System?

An outbreak management system supports the initial characterization, investigation, response, and containment of outbreaks through the collection and alaysis of data

❏ Yes ❏ No ❏ Unknown

2009 INDIVIDUAL EPIDEMIOLOGY CAPACITY WORKSHEET

2009 Individual Epidemiology Capacity Assessment Worksheet

Instructions:

The information you provide below is in an effort to enumerate the epidemiology workforce nationwide. CSTE appreciates your participation in this important assessment. Note that CSTE's policy is that assessment results are shared as aggregate data only; personal information will not be specifically identified. Identifiers will only be used to avoid duplicative entries. The assessment is brief and should take less than 10 minutes to complete. If you have already completed this worksheet, please do not enter your information again. If you have any questions, please contact Lisa Ferland at lferland@cste.org.

First Name: _____

Last Name: _____

Email address: _____

1. What state (2 letter abbreviation): __ __

2. What program area do you work? *Please indicate the percentage of time you spend working in each program area.*

    _____ % - Bioterrorism/Emergency Response
    _____ % - Environmental Health
    _____ % - Injury
    _____ % - Occupational Health
    _____ % - Substance Abuse
    _____ % - Chronic Disease
    _____ % - Infectious Disease
    _____ % - Maternal and Child Health
    _____ % - Oral Health
    _____ % - Other
    _____ Total (Must equal 100%)

3. Are you a full time employee?
   ❑ Yes ❑ No

4. What is the highest degree you have obtained? (Choose ONE)

❑ MD, DO
❑ DDS
❑ DVM
❑ PhD, DrPH, other doctoral
❑ MPH, MSPH, other master
❑ RN, any other nursing
❑ BA, BS, BSN, other bachelor
❑ Associate/No post high school degree

4a. What is the highest level of epidemiology training you have received? (Choose ONE)

Examples: If you are:

- An MD with a MPH or higher degree (e.g. DrPH) in epidemiology should be classified as **#2**.
- An MD with no MPH but some formal training in epidemiology should be classified as **#5**. However, if the individual has no other background in epidemiology other than on the job training, the individual should be classified as **#7**.
- An individual with no degree and some academic coursework of equivalent training (e.g. CDC's Epi in Action course) in epidemiology should be classified as **#6**.
- An individual with a MPH or higher degree in a public health field other than epidemiology (e.g. Maternal and Child Health, Biostatistics, etc.) should NOT be classified as **#3**.
- An individual with no coursework in epidemiology with on the job training in epidemiology should be classified as **#7**.
- An individual with no training in epidemiology should be classified as **#8**.

❑ 1. PhD, DrPH, other doctoral degree in Epidemiology
❑ 2. Professional background(e.g. MD) with a dual degree in Epidemiology
❑ 3. MPH, MSPH, other master degree in Epidemiology
❑ 4. BA, BS, other bachelor degree in Epidemiology
❑ 5. Completed formal training program in Epidemiology (e.g. EIS)
❑ 6. Completed some coursework in Epidemiology
❑ 7. Received on the job training in Epidemiology
❑ 8. No formal training in Epidemiology (i.e. epidemiologist does not fit into any of the above categories)

5. Is your position paid for with the following funding sources?

a. Federal Bioterrorism Funds	❑ Yes	❑ No	❑ Don't know
b. CDC funds other than BT/Preparedness funds	❑ Yes	❑ No	❑ Don't know
c. other Federal funds other than CDC	❑ Yes	❑ No	❑ Don't know
d. State Funds	❑ Yes	❑ No	❑ Don't know
e. Other sources (e.g., foundational grants)	❑ Yes	❑ No	❑ Don't know

6. If <u>YES to 5a</u>, what percentage (1-100%) of your position is paid for
   with Federal Bioterrorism Funds? ____%

7. Are you a contract employee?
   • A contract employee is an epidemiologist who works at the local or state level that is contracted
     by the state or local health department.
   ❑ Yes   ❑ No

8. Do you plan to retire or change careers out of epidemiology within the next five years?
   ❑ Yes   ❑ No

9. Do you have at least five years experience as an epidemiologist?
   ❑ Yes   ❑ No

10. Please check the category that best fits your status with CDC (if applicable):
    ❑ Full-time CDC employed epidemiologist (e.g., CEFO, EIS, PHPS etc.)
    ❑ Part-Time CDC employed epidemiologist or consultant
    ❑ CDC-CSTE Applied Epidemiology Fellow

If you are affiliated with a university, academic centers, or related institution, please answer the following questions:

11. If applicable, please check the box if you have an appointment at a university, academic center
    or related institution.

    11a. Please choose the category that best describes your appointment (select only one)
         ❑ Employed by the local health department and also have an unpaid appointment at a
           university, academic center, or related institution
         ❑ Employed by the local health department and have a paid appointment at a university,
           academic center, or related institution
         ❑ Employed by a university, academic center, or related institution but under contract to the
           local health department

Competencies:

Use this form to evaluate your level of understanding and ability to perform each of the following competencies. Again, this information is confidential and will be shared in aggregate form only.

Please select the best Tier level for your experience in epidemiology using the definitions below:
For more information on the tiers, please click here.
Tier 1: Entry-level or basic epidemiologist
Tier 2: Mid-level epidemiologist
Tier 3 a & b: Senior-level epidemiologist supervisor/manager or senior scientist

Drop down box: Tier 1 Epidemiologist/Tier 2 Epidemiologist/Tier 3 Epidemiologist
(Different competencies for Tiers 2 and 3 that will be generated when Tier is selected.)

Training and Competency:
1 = Awareness: You have no training or experience.
2 = Basic: You have received basic training.
3 = Intermediate: You have repeated successful experiences.
4 = Advanced: You can perform the actions associated with this skill without assistance.
5 = Expert: You are known inside or outside the organization as an expert.

TIER 1 EPIDEMIOLOGIST
Check the appropriate level of competency for each skill domain:

SKILL DOMAIN	EPIDEMIOLOGY COMPETENCIES: The competency statements below are abbreviated from the comprehensive competency statements in the AEC document	NO TRAINING ← COMPETENT/ EXPERT →						ADDITIONAL TRAINING NEEDED					
		1	2	3	4	5	?	1	2	3	4	5	?
1, A-1	Recognize the existence of a public health problem												
1, A-3	Collaborate with others inside and outside the agency to identify the problem												
1, B-2	Identify surveillance data needs												
1, B-3,4	Implement new or revise existing surveillance systems and report key surveillance findings												
1, B-5	Support evaluation of surveillance systems												
1, C-1,3	Assist in conducting a community health status assessment and characterizing investigative processes												
1, C-4,5	Assist in design of investigation, including creating hypothesis												
1, D-1	Follow ethics guidelines and principles when planning studies; conducting research; and collecting, disseminating, and using data												
1, D-4,5	Describe human subjects research and apply Institutional Review Board (IRB) processes, as directed												
1, D-7	Apply knowledge of privacy laws to protect confidentiality, including Health Insurance Portability and Accountability Act (HIPAA) and applicable state and local privacy laws												
1, E-2	Maintain databases												
1, F-1,2	Use analysis plans and analyze data												
1, G-3	Identify key findings from the study												
1, H-1	Define cultural/social/political framework for recommended interventions												
1, I	Assist in evaluation of programs												

TIER 1 EPIDEMIOLOGIST
Check the appropriate level of competency for each skill domain:

Continued from following page

SKILL DOMAIN	EPIDEMIOLOGY COMPETENCIES: The competency statements below are abbreviated from the comprehensive competency statements in the AEC document	NO TRAINING COMPETENT/ EXPERT						ADDITIONAL TRAINING NEEDED					
		1	2	3	4	5	?	1	2	3	4	5	?
2, A	Apply understanding of human and environmental biology and behavioral sciences and principles to determine potential biological mechanisms of disease												
2, A-2	Use knowledge of human and environmental biology and behavioral sciences and principles to determine potential biological mechanisms of disease												
2, B	Identify the role of laboratory resources in epidemiologic activities												
2, C	Use identified informatics tools in support of epidemiologic practice												
3, A	Prepare written and oral reports and presentations that communicate necessary information to agency staff												
3, B	Recognize the basic principles of risk communication												
3, C-1	Demonstrate ability to listen effectively when epidemiologic finding are presented or discussed												
3,D	Use effective communication technologies												
4	Provide epidemiologic input for community planning processes												
5	Practice culturally sensitive epidemiologic activities												
6	Apply appropriate fiscal and administrative guidelines to epidemiology practice												
7, B	Support the organization's vision in all programs and activities												
7, D	Promote ethical conduct in epidemiologic practice												
7, E	Practice professional development												
8, A-1	Describe how policy decisions are made within the agency												

TIER 2 EPIDEMIOLOGIST
Check the appropriate level of competency for each skill domain:

SKILL DOMAIN	EPIDEMIOLOGY COMPETENCIES: The competency statements below are abbreviated from the comprehensive competency statements in the AEC document	NO TRAINING		COMPETENT/ EXPERT			ADDITIONAL TRAINING NEEDED					
		1	2	3	4	5	?	1	2	3	4	5	?
1, A-1	Use critical thinking to determine whether a public health problem exists												
1, A-2	Articulate the need for further investigation or other public health action from literature review and assessment of current data												
1, A-3	Collaborate with others inside and outside the agency to identify the problem and form recommendations												
1, B-1,2	Design surveillance for a public health issue and identify surveillance data needs												
1, B-3,4	Implement new or revise existing surveillance system and identify key surveillance findings												
1, B-5	Conduct evaluation of surveillance systems												
1, C-1,2	Conduct a community health assessment and recommend priorities of potential public health problems to be addressed												
1, C-4,5	Assist in design of an investigation, including hypothesis generation												
1, D-1	Follow ethics guidelines and principles when planning studies; conducting research; and collecting, disseminating, and using data												
1, D-3	Describe differences between public health practice and public health research												
1, D-4,5	Describe human subjects research, and apply Institutional Review Board (IRB) processes, as necessary												
1, D-7	Apply knowledge of privacy laws to protect confidentiality, including Health Insurance Portability and Accountability Act (HIPAA) and applicable state and local privacy laws												
1, E-1,2	Define database requirements, and manage a database												
1, F-1,2	Create analysis plans and conduct analysis of data												
1, G-1	Apply knowledge of epidemiologic principles and methods to make recommendations regarding the validity of epidemiologic data												

TIER 2 EPIDEMIOLOGIST
Check the appropriate level of competency for each skill domain:

Continued from following page

SKILL DOMAIN	EPIDEMIOLOGY COMPETENCIES: The competency statements below are abbreviated from the comprehensive competency statements in the AEC document	NO TRAINING COMPETENT/ EXPERT						ADDITIONAL TRAINING NEEDED					
		1	2	3	4	5	?	1	2	3	4	5	?
1, G-2	Assess the need for special analyses												
1, H-1	Establish cultural/social/political framework for recommendations or interventions												
1, H-2	Use scientific evidence in preparing recommendations for action or interventions												
1, I-1	Assist in the development of measurable and relevant goals and objectives												
1, I-2	Assist in the development of program logic models and theories of action												
2, A	Use current knowledge of causes of disease to guide epidemiologic practice												
2, A-2	Apply understanding of human and environmental biology and behavioral sciences and principles to determine potential biological mechanisms of disease												
2, B	Use laboratory resources to support epidemiologic activities												
3, A-3	Communicate epidemiologic information through giving oral presentations or contributing to the development of written documents to nonprofessional audiences												
3, B	Demonstrate the basic principles of risk communication												
3, D	Use effective communication technologies												
4	Provide epidemiologic input for community planning processes												
5	Practice culturally sensitive epidemiologic activities												
6	Apply appropriate fiscal and administrative guidelines to epidemiology practice												
7, D	Promote ethical conduct in epidemiologic practice												
7 & 8	Use leadership and systems thinking in epidemiologic planning and policy development												

TIER 3a EPIDEMIOLOGIST
Check the appropriate level of competency for each skill domain:

SKILL DOMAIN	EPIDEMIOLOGY COMPETENCIES: The competency statements below are abbreviated from the comprehensive competency statements in the AEC document	NO TRAINING ← → COMPETENT/ EXPERT						ADDITIONAL TRAINING NEEDED					
		1	2	3	4	5	?	1	2	3	4	5	?
1, A	Ensure identification of public health problems pertinent to the population												
1, B	Oversee surveillance activities												
1, C	Ensure investigation of acute and chronic conditions or other adverse outcomes in the population												
1, D	Ensure study design and data collection, dissemination, and of use ethical and legal principles												
1, E	Ensure management of data from surveillance, investigations, or other sources												
1, F	Evaluate analysis of data from an epidemiologic investigation or study												
1, G	Evaluate conclusions and interpretations from investigations												
1, H	Determine evidence-based interventions and control measures in response to epidemiologic findings												
1, I	Ensure evaluation of programs												
2	Use basic public health sciences in epidemiologic practice												
2, A-2	Ensure the application of understanding of human and environmental biology and behavioral sciences and principles to determine biological mechanisms of disease												
2, B	Ensure the use of laboratory resources to support epidemiologic activities												
2, C	Ensure application of principles of informatics, including data collection, processing, and analysis, in support of epidemiologic practice												
2, D	Develop and manage information systems to improve effectiveness of surveillance, investigation, and other epidemiologic practices												
3, A, B	Ensure preparation of written and oral reports and presentations to professional and nonprofessional audiences and ensure basic principles of risk communications are followed												
3, C	Model interpersonal skills in communication with agency personnel, colleagues, and the public												

TIER 3a EPIDEMIOLOGIST
Check the appropriate level of competency for each skill domain:

Continued from following page

SKILL DOMAIN	EPIDEMIOLOGY COMPETENCIES: The competency statements below are abbreviated from the comprehensive competency statements in the AEC document	NO TRAINING			COMPETENT/ EXPERT			ADDITIONAL TRAINING NEEDED					
		1	2	3	4	5	?	1	2	3	4	5	?
3, D-2	Enforce policies that address security, privacy, and legal considerations when communicating epidemiologic information												
4	Lead community public health planning processes												
5	Practice culturally sensitive epidemiologic activities												
6, A	Create operational and financial plans for future epidemiologic activities												
6, B	Formulate a fiscally sound budget that will support the activities defined in the operational plan and is consistent with the financial rules of the agency												
6, C	Oversee implementation of operational and financial plans												
6, D	Develop requests for extramural funding to support additional epidemiologic activities and special projects												
6, E	Use management skills												
6, F	Promote collaborations, strong partnerships, and team-building to accomplish epidemiology program objectives												
7, A	Promote the epidemiologic perspective in the agency strategic planning process												
7, B	Lead the creation of the epidemiologic program's vision in the context of the agency's plan												
7, C	Use performance measures to evaluate and improve program effectiveness												
7, D	Promote ethical conduct in epidemiology practice												
7, E	Ensure professional development of epidemiology workforce												
7, F	Lead epidemiology unit in preparing for emergency response												
8, A	Bring epidemiologic perspective in the development and analysis of public health policies												

TIER 3b EPIDEMIOLOGIST
Check the appropriate level of competency for each skill domain:

SKILL DOMAIN	EPIDEMIOLOGY COMPETENCIES: The competency statements below are abbreviated from the comprehensive competency statements in the AEC document	NO TRAINING	COMPETENT/ EXPERT					ADDITIONAL TRAINING NEEDED					
		1	2	3	4	5	?	1	2	3	4	5	?
1, A	Validate identification of public health problems pertinent to the population												
1, B	Organize surveillance												
1, C	Design investigation of acute and chronic conditions or other adverse outcomes in the population												
1, D	Synthesize principles of good ethical/ legal practice for application to study design and data collection, dissemination, and use												
1, E	Manage data from surveillance, investigations, or other sources												
1, F	Evaluate data from an epidemiologic investigation or study												
1, G	Evaluate results of data analysis and interpret conclusions												
1, H	Formulate new interventions on the basis of evidence, when available, and control measures in response to epidemiologic findings												
1, I	Evaluate programs												
2	Use basic public health sciences in epidemiologic practice												
2, A-2	Ensure application of understanding of human and environmental biology and behavioral sciences and principles to determine biological mechanisms of disease												
2, B	Develop processes for using laboratory resources to support epidemiologic activities												
2, C	Apply principles of informatics, including data collection, processing, and analysis, in support of epidmiologic practice												
3, A	Organize preparation of written and oral presentations that communicate necessary information to professional audiences, policymakers, and the general public												

Continued on following page.

TIER 3b EPIDEMIOLOGIST
Check the appropriate level of competency for each skill domain:

Continued from following page

SKILL DOMAIN	EPIDEMIOLOGY COMPETENCIES: The competency statements below are abbreviated from the comprehensive competency statements in the AEC document	NO TRAINING		COMPETENT/ EXPERT				ADDITIONAL TRAINING NEEDED					
		1	2	3	4	5	?	1	2	3	4	5	?
3, C	Model interpersonal skills in communications with agency personnel, colleagues, and the public												
3, D-2	Develop as-needed policies that address security, privacy, and legal considerations when communicating epidemiologic information												
4	Lead community public health planning processes												
5	Practice culturally sensitive epidemiologic activities												
6, A	Conduct epidemiologic activities within the financial and operational plan of the agency												
6, B	Describe financial and budgetary processes of the agency												
6, C	Implement operational and financial plans for assigned projects												
6, D	Prepare proposals for extramural funding for review and input from managers												
6, F	Use skills that foster collaborations, strong partnerships, and team-building to accomplish epidemiology program objectives												
7, A	Promote the epidemiologic perspective in the agency strategic planning process												
7, B	Promote the organization's vision in all epidemiologic program activities												
7, C	Promote the organization's vision in all epidemiologic program activities												
7, D	Promote ethical conduct in the epidemiology practice												
7, E	Promote epidemiology workforce development												
7, F	Prepare for emergency response												
8, A	Bring epidemiologic perspective in the development and analysis of public health policies												

ADDITIONAL RESULTS

National Perspective of Salary Ranges for Epidemiologists, by Region and Degree, 2004 and 2009 (Question 20)

SALARY RANGE BY DEGREE: NATIONAL (N=53)	RANGE	2004			2009		
		n	MEAN	MEDIAN	n	MEAN	MEDIAN
MD, DO	Lower Limit	38	$85,809	$87,500	43	$97,927	$95,000
	Upper Limit		$139,814	$130,637		$147,313	$140,000
DDS	Lower Limit	15	$65,997	$63,020	12	$81,273	$79,499
	Upper Limit		$103,064	$103,000		$119,773	$111,222
DVM	Lower Limit	29	$55,814	$51,300	33	$68,501	$70,000
	Upper Limit		$85,624	$84,960		$97,760	$90,000
PhD, DrPH, other doctoral	Lower Limit	33	$48,871	$48,114	45	$59,822	$55,000
	Upper Limit		$79,046	$79,052		$92,134	$90,000
MPH, MSPH, other Master	Lower Limit	38	$39,164	$39,004	47	$45,408	$45,000
	Upper Limit		$63,202	$60,000		$74,103	$70,000
BA, BS, BN, other Bachelor	Lower Limit	27	$35,252	$35,000	33	$39,062	$38,594
	Upper Limit		$53,810	$54,000		$64,774	$62,692
Associate or no post high school degree	Lower Limit	11	$24,386	$24,325	11	$25,747	$22,000
	Upper Limit		$37,057	$36,000		$41,260	$40,000

SALARY RANGE BY DEGREE: NORTHEAST (N=9)	RANGE	2004			2009		
		n	MEAN	MEDIAN	n	MEAN	MEDIAN
MD, DO	Lower Limit	7	$85,594	$85,000	9	$92,610	$90,000
	Upper Limit		$124,340	$122,000		$116,390	$120,000
DDS	Lower Limit	1	Not Enough Respondents		4	$84,694	$80,000
	Upper Limit					$113,621	$110,000
DVM	Lower Limit	4	$65,500	$65,500	6	$76,388	$74,717
	Upper Limit		$99,250	$96,500		$102,416	$93,500
PhD, DrPH, other doctoral	Lower Limit	6	$60,500	$57,000	9	$63,362	$60,000
	Upper Limit		$88,500	$85,500		$92,175	$87,000
MPH, MSPH, other Master	Lower Limit	7	$44,953	$41,000	9	$49,597	$50,000
	Upper Limit		$72,901	$72,000		$72,431	$65,000
BA, BS, BN, other Bachelor	Lower Limit	5	$36,205	$35,027	7	$41,775	$45,000
	Upper Limit		$54,668	$56,000		$65,298	$70,000
Associate or no post high school degree	Lower Limit	4	$30,750	$30,500	4	$23,504	$19,000
	Upper Limit		$47,000	$48,000		$41,835	$37,500

National Perspective of Salary Ranges for Epidemiologists, by Region and Degree, 2004 and 2009

SALARY RANGE BY DEGREE: MIDWEST (N=12)	RANGE	2004			2009		
		N	MEAN	MEDIAN	N	MEAN	MEDIAN
MD, DO	Lower Limit	9	$93,688	$90,000	8	$96,668	$90,000
	Upper Limit		$163,575	$150,000		$158,047	$145,000
DDS	Lower Limit	6	$70,611	$68,730	3	$88,666	$78,998
	Upper Limit		$113,424	$113,000		$135,815	$112,444
DVM	Lower Limit	8	$52,027	$49,057	9	$59,130	$52,166
	Upper Limit		$91,606	$92,393		$90,888	$85,000
PhD, DrPH, other doctoral	Lower Limit	9	$45,801	$45,000	10	$57,853	$52,687
	Upper Limit		$84,316	$81,000		$94,862	$90,310
MPH, MSPH, other Master	Lower Limit	10	$39,123	$40,000	11	$41,797	$41,712
	Upper Limit		$64,144	$60,000		$74,310	$75,000
BA, BS, BN, other Bachelor	Lower Limit	9	$35,673	$36,000	6	$37,725	$38,648
	Upper Limit		$57,878	$44,000		$61,347	$53,146
Associate or no post high school degree	Lower Limit	2	$20,000	$20,000	3	$26,199	$28,596
	Upper Limit		$35,000	$35,000		$36,737	$40,212

SALARY RANGE BY DEGREE: SOUTH (N=17)	RANGE	2004			2009		
		N	MEAN	MEDIAN	N	MEAN	MEDIAN
MD, DO	Lower Limit	11	$82,015	$85,000	15	$106,586	$110,000
	Upper Limit		$154,719	$148,681		$158,147	$145,000
DDS	Lower Limit	4	$55,509	$54,409	4	$72,298	$66,467
	Upper Limit		$101,791	$102,682		$118,741	$110,206
DVM	Lower Limit	9	$51,445	$45,000	10	$71,579	$72,500
	Upper Limit		$85,137	$81,322		$98,173	$95,000
PhD, DrPH, other doctoral	Lower Limit	9	$45,728	$44,000	15	$56,960	$54,000
	Upper Limit		$77,346	$81,000		$92,286	$92,000
MPH, MSPH, other Master	Lower Limit	10	$35,586	$36,500	16	$42,410	$41,037
	Upper Limit		$66,181	$66,387		$75,782	$74,863
BA, BS, BN, other Bachelor	Lower Limit	6	$35,143	$34,330	12	$37,718	$38,297
	Upper Limit		$54,091	$55,000		$68,116	$73,863
Associate or no post high school degree	Lower Limit	1	$19,400	$19,400	1	$28,000	$28,000
	Upper Limit		$36,000	$36,000		$36,000	$36,000

National Perspective of Salary Ranges for Epidemiologists, by Region and Degree, 2004 and 2009

SALARY RANGE BY DEGREE: WEST (N=12)	RANGE	2004			2009		
		N	MEAN	MEDIAN	N	MEAN	MEDIAN
MD, DO	Lower Limit	10	$86,623	$90,974	11	$91,385	$82,668
	Upper Limit		$116,948	$116,130		$150,036	$150,000
DDS	Lower Limit	4	$65,562	$57,650	2	$83,000	$83,000
	Upper Limit		$88,815	$86,500		$107,000	$107,000
DVM	Lower Limit	8	$59,674	$58,150	8	$69,280	$65,500
	Upper Limit		$73,376	$69,000		$101,481	$90,510
PhD, DrPH, other doctoral	Lower Limit	8	$45,748	$47,500	11	$62,618	$50,000
	Upper Limit		$68,070	$64,000		$89,415	$90,000
MPH, MSPH, other Master	Lower Limit	9	$39,051	$36,720	11	$49,951	$44,814
	Upper Limit		$54,237	$53,904		$72,822	$69,000
BA, BS, BN, other Bachelor	Lower Limit	7	$34,122	$35,000	8	$39,707	$39,084
	Upper Limit		$47,726	$50,000		$61,872	$61,346
Associate or no post high school degree	Lower Limit	4	$21,461	$22,163	3	$27,533	$22,000
	Upper Limit		$28,408	$27,539		$46,770	$54,309

Number of epidemiologists with appointments to CDC, university, academic center or related institutions – 2009 Epidemiology Capacity Assessment, 50 states and District of Columbia (Question 17 – 18)

NUMBER OF EPIDEMIOLOGY STAFF:	TOTAL FREQUENCY (%) (N=2193)	MEAN	MEDIAN
Full-time CDC employed epidemiologist (e.g., CEFO, EIC, PHPS, etc)	55 (2.5)	1.1	1
Part-time CDC employed epidemiologist or consultant	5 (0.2)	0.1	0
CDC-CSTE Applied Epidemiologist Fellow	15 (0.7)	0.3	0
Number with appointment in academia	187 (8.5)	3.7	2
Employed by state health department and have **unpaid** appointment in university, academic center or related institution	193 (8.8)	3.8	2
Employed by state health department and have **paid** appointment in university, academic center or related institution	43 (2.0)	0.8	1
Employed by university, academic center but under contract to state health department	41.5 (1.9)	0.8	0

Number of epidemiologists with appointments to CDC, university, academic center or related institutions – 2009 Epidemiology Capacity Assessment, 50 states and District of Columbia

CSTE

Council of State and Territorial Epidemiologists
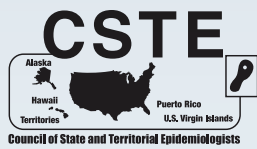
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