



Council of State and Territorial  
Epidemiologists  
*Leaders in Applied Public Health Epidemiology*

# **2006 National Assessment of Epidemiologic Capacity: Findings and Recommendations**

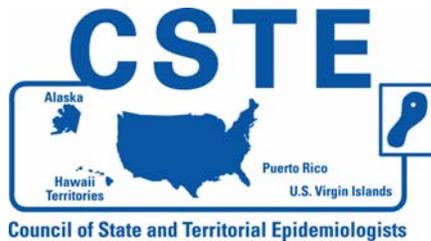
**Council of State and Territorial Epidemiologists**

## ACKNOWLEDGEMENTS

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For more than five decades, CSTE and CDC have worked together in partnership to improve the public's health by supporting the efforts of epidemiologists working at the state and local level by promoting the effective use of epidemiologic data to guide public health practice and improve health. CSTE and its members represent two of the four basic components of public health – epidemiology and surveillance.

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## **EXECUTIVE SUMMARY**

### **Background**

In November 2001, the Council of State and Territorial Epidemiologists (CSTE) assessed state and territorial health departments' epidemiologic capacity structured around the Ten Essential Services of Public Health. The assessment revealed inadequate capacity in all epidemiology programs except infectious diseases and chronic diseases and insufficient infrastructure to perform the four essential services of public health (ESPH) that most rely on epidemiology (1). After the distribution of nearly \$1 billion in federal bioterrorism (BT) funds during fiscal year 2002, CSTE conducted a follow-up assessment in 2004. That assessment found an overall increase in the number of epidemiologists working in state health departments but also revealed lower capacity in several epidemiology programs than was found to the 2001 assessment (2). The findings from both reports prompted CSTE to focus its workforce priorities and activities on strengthening the public health system. The four priority areas (3) are

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

The 2006 assessment aimed to measure the current status of core epidemiologic capacity, competence-specific training needs, and barriers to recruitment and retention of epidemiologists in the United States and territories. In addition, this report summarizes the 2006 data and compares 2006 data with data from the 2001 and 2004 Epidemiology Capacity Assessments (ECAs) for the 40 health agencies that participated in all three assessments.

### **Methods**

The 2006 assessment used core questions from the 2001 and 2004 ECAs to measure changes in epidemiologic and surveillance capacity in state health departments over time. These questions focused on enumerating and describing the public health epidemiology workforce, funding, training, and ability to provide ESPH to support the community. After pilot testing the 2006 assessment in seven states, CSTE distributed it online to all 50 states, the District of Columbia, and eight U.S. territories, outlying areas and freely associated states in May 2006. State Epidemiologists or their delegates completed the assessment online before August 2006. The final results comprise responses from all 50 states, the District of Columbia, and four territories and jurisdictions (American Samoa, Northern Mariana Islands, Puerto Rico, and U.S. Virgin Islands) (N=55) with a response rate of 93%.

### **Results and Discussion**

The changing environment and the focus of public health toward emergency response and preparedness for intentional release of biologic agents, naturally occurring outbreaks, and behavior-related health issues brings new challenges to the U.S. public health system. These challenges require a durable public health system and a well-rounded workforce. Key measures of public health workforce capacity include both the number of people working in specific

programs and their level of education and competence to effectively address these emerging health threats.

In 2006, state respondents identified a total of 2502 epidemiologists working in state and territorial health departments, compared with 2580 epidemiologists in 2004. This finding can be compared with significant changes in the number of epidemiologists during 2001–2004, when emergency response and preparedness funds fueled rapid growth in the number of new and replacement epidemiologists in the public health workforce. An estimated 34% more epidemiologists than are currently employed are needed to carry out essential functions.

Assignments to infectious diseases (1060 epidemiologists), BT/emergency response programs (339), and chronic diseases (333) accounted for the majority of epidemiologists (69% [1732/2502]) in the epidemiology workforce. The lowest proportion (3% combined) was employed in occupational health (49 epidemiologists) and oral health (29 epidemiologists).

Health departments reported a funding level in 2006 similar to that of 2004, with nearly 75% of funding for epidemiologic activities from federal sources and less than 25% from state funds. The trend from 2001 indicates more reliance on federal funds to perform public health duties at the state level.

The proportion of epidemiologists with degrees in epidemiology increased from 51% in 2004 to 54% in 2006, whereas the number of epidemiologists with only on-the-job training decreased from 25% to 13%. As in the previous two assessments, epidemiologists with a master's degree were the most prevalent (47%) in 2006. Specifically in infectious diseases, BT/emergency response, chronic diseases, injury, maternal and child health, and occupational health, more than 50% of the workforce had formal training in epidemiology. The lowest proportions with academic epidemiology training—less than 50%—were in environmental health and oral health.

The steady improvement in epidemiology training from the 2001 to the 2006 ECA may be attributable partially to increasing training resources. In the 2006 assessment, 90% of states reported funding training, with almost 80% supporting extramural training or education for their staff, and 81% providing on-site training. Most states used diverse external training venues. Trend data document steady improvement in national epidemiology workforce training with accompanying state support.

For two of the four ESPH that rely principally on epidemiologic functions—monitoring health status to identify and solve community health problems; and diagnosing and investigating health problems and health hazards in the community—78% and 67% of responding agencies, respectively, indicated substantial to full capacity. This is higher than that reported in 2004 and suggests general improvement in the ability of states to carry out these two key functions. In contrast, fewer respondents reported substantial to full capacity in their ability to address the other two essential services—evaluate effectiveness, accessibility and quality of personal and population-based health service; and conduct research to gain new insights and innovative solutions to health problems—at 38% and 17% of respondents, respectively.

The many challenges in retaining and recruiting epidemiologists are complex. Most health departments cited low salary scales (62% of respondents), poor opportunity for promotion

(60%), restrictions of merit raises (58%), and loss to private or government sector (51%) as major problems in retention. The low proportion of states (25%) that have initiated formal succession planning to maintain senior epidemiology management also reflect retention difficulties. Most health departments cited primary barriers of recruitment as low salary scales (72%), restrictions on offering competitive pay (70%), not enough qualified applicants (62%), hiring restrictions (60%), and opportunity for promotion (58%).

## **Recommendations**

### **➤ Building Workforce Capacity**

- State and federal agencies should work to increase the number of Epidemic Intelligence Service, CSTE, and state-based epidemiology training program positions to begin to fill the critical gap in needed epidemiologists (estimated at more than 1200 nationwide).
- Federal grant programs and state programs should increase their investment in epidemiologists, particularly in lower-capacity noninfectious diseases areas, such as chronic disease, environmental health, injury, maternal and child health, and occupational health.
- Because salary scale and restrictions on offering competitive pay were the two primary barriers to recruiting epidemiologists and an important barrier to retaining epidemiologists, state programs must reevaluate salary structure within their state health agencies. This reevaluation should provide pay competitive with that of other public health positions to attract well-qualified professionals to boost and then sustain epidemiology capacity at the state and local levels.

### **➤ Training Standards of Public Health Epidemiologists**

- Federal, state, and local public health agencies should aggressively promote the development and implementation of standards for applied epidemiology training using a competence-based model.
- CSTE, along with leaders in public health, including the Centers for Disease Control and Prevention (CDC), should evaluate the current availability of training programs that address the largest training gaps described in this report. CSTE should identify funding partners to develop training programs that will meet the essential needs in epidemiology workforce competence.
- CDC should develop training modules that states can deploy to specifically address high-priority training needs of the existing workforce, including surveillance system evaluation, risk communication, communication of epidemiologic findings to nonprofessional audiences, and creation of an analysis plan and data analysis.
- State health departments should develop partnerships with schools of public health to address unmet needs, including research to gain insights and innovative solutions to public health problems and to develop a workforce with skills necessary to better evaluate the effectiveness of public health services.
- State health departments and schools of public health need to support the full integration of the newly developed applied epidemiology competencies for public health epidemiologists.

- State health departments should map training currently offered internally and externally to applied epidemiology competencies to assess gaps in training.
- **Credentialing**
  - States should encourage a move toward credentialing public health epidemiologists to support a highly competent workforce and to strengthen the professionalism of public health epidemiology practice.
- **Funding**
  - State health departments should work to sustain the increase in epidemiologists under the broader subject of all-hazard preparedness.
  - State health departments should reverse the trend of increased reliance on federal funds and provide a larger proportion and investment of funding to promote long-term stability of the epidemiology workforce.

## BACKGROUND

In 1988 and again in 2002, the Institute of Medicine 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 (4,5). Given the changing environment and the focus of public health toward emergency response and preparedness for intentional release of hazardous agents, naturally occurring outbreaks, and behavior-related health issues, the U.S. public health system faces new challenges. These challenges require a resilient public health system and a well-prepared workforce. Epidemiologists in state and territorial health departments play a central role in this response capacity.

In November 2001, CSTE conducted the first comprehensive nationwide assessment of core epidemiology capacity in state and territorial health departments. This assessment also was designed to address Healthy People 2010 Objective 23-14: “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 (6).

The timing of the 2001 assessment marked the status of epidemiologic capacity in the United States and its territories 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, states reported employing 1366 epidemiologists, of whom 47.7% worked in infectious diseases (1).

In 2004, CSTE revised and again administered the Epidemiology Capacity Assessment (ECA). It focused on the infrastructure of public health surveillance programs, core epidemiology capacity, and training opportunities for epidemiologists in health departments. On the basis of responses for this question from the same 39 respondents for both assessments, the 2004 assessment revealed a 20% increase from 2001 in the overall number of epidemiologists working in state and territorial health departments. Capacity increased in two programs (BT/emergency response; maternal and child health) and decreased or did not change for six other programs (infectious diseases, chronic diseases, environmental health, injury, occupational health, and oral health). Results also revealed that 28.5% of epidemiologists lacked any formal training or academic coursework in epidemiology (2).

The findings from both reports prompted CSTE to focus its workforce priorities and activities on helping strengthen the public health system (3). The four priority areas are

1. Measuring epidemiology capacity and filling the need for trained epidemiologists within public health system;
2. Establishing public health competencies and addressing the training gap;
3. Identifying unique barriers to recruiting and retaining applied epidemiologists; and
4. Addressing funding gaps and leadership issues.

CSTE has worked closely with the Centers for Disease Control and Prevention (CDC) to develop applied competencies for epidemiologists, building epidemiology workforce capacity through the CDC/CSTE Applied Epidemiology Fellowship program, convened the ECA workgroup to revise

the epidemiologic assessment tool for 2006 to measure the training gap, and supported a team assigned to the National Public Health Leadership Institute to address barriers to recruitment and retention.

The goal of the 2006 assessment was to complete the periodic enumeration and description of epidemiologists nationwide and to measure the current status of core epidemiologic capacity, competence-specific training needs, and barriers to recruiting and retaining epidemiologists in the United States and territories. This report summarizes the 2006 data and compares 2006 data with data from the 2001 and 2004 ECAs for the 40 states that participated in all three ECAs.

## **METHODS**

### **Instrument Development and Distribution**

In December 2003, an advisory group was organized under the charge of the CSTE Executive Committee to begin revising the 2004 ECA tool. The advisory group comprised individuals from federal and national organizations such as CDC and the Association of State and Territorial Health Officials, and the National Association of County and City Health Officials. Also included in the review process were individuals from academia and state health departments.

After receiving feedback from seven pilot states (California, Georgia, Nebraska, New York, North Carolina, South Carolina, and Tennessee), CSTE again revised the ECA and finalized it. The 2006 assessment was shorter than the earlier versions but included expanded sections on competence, recruitment, and retention. Part I focused on core capacity in epidemiology within state and territorial health departments, and Part II addressed capacity for training, retention, and recruitment of epidemiologists within the state health department. The 2006 ECA eliminated information about salary ranges and data on local health department epidemiologists that had appeared in the earlier versions.

On May 18, 2006, CSTE distributed electronic and paper-based versions of the assessment (Appendix A) to all 50 state health departments, the District of Columbia and eight U.S. territories, outlying areas and freely associated states (American Samoa, Federated States of Micronesia, Guam, Marshall Islands, Northern Mariana Islands, Palau, Puerto Rico, and the U.S. Virgin Islands). The assessment packet included the 2006 ECA, three worksheets that could be distributed throughout health departments to aid in data collection (Appendix B), the 2004 ECA report for each state and territory to use for comparison, and instruction sheets for all materials. State epidemiologists and/or their delegates and, when appropriate, other health department epidemiologists answered the questionnaire.

To access the secure website, each health department was provided a unique user name and password and asked to complete the online assessment by July 28, 2006. CSTE provided conference call help sessions during June 2006. 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 e-mailed each state reminding it of deadlines, websites, state login and passwords, and dates and times of conference call help

sessions. In mid-June, CSTE staff telephoned each respondent who had not completed the ECA to offer assistance and reminders of help sessions and the approaching deadline. Each respondent state was given the opportunity to view its results and complete or revise its online submission until the data-collection period ended.

The final results comprise responses from all 50 states, the District of Columbia, and four territories and jurisdictions including American Samoa, Northern Mariana Islands, Puerto Rico, and U.S. Virgin Islands (N=55) with a response rate of 93%. The number of responding agencies varies by question.

### **Statistical Analysis**

Data were analyzed using SAS version 8 and MS Excel software and were tabulated for all responses nationally (including the District of Columbia and four other jurisdictions).

### **Additional Assessment Information and Instructions:**

Questions referred to the state or other jurisdictional health department. The 2006 assessment included an example of who was considered a state health department epidemiologist.

#### **Who should be counted as a STATE Health Department (HD) Epidemiologist?**

Epidemiologists employed or contracted by the STATE HD. For example, epidemiologists who work at the LOCAL or STATE level that are employed or contracted by the state are considered STATE epidemiologists.

The definition of an epidemiologist (7) and who should be counted as an epidemiologist did not change from the previous version.

#### **What is an Epidemiologist?**

According to Last (*A Dictionary of Epidemiology, 4<sup>th</sup> Ed. , 2001*), 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, observation, 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 preventative 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 told 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:** Less than 25% (but more than 0%) of the activity, knowledge, or resources described within the question.

**Partial:** 25% or more (but less than 50%) of the activity, knowledge or resources described within the question.

**Substantial:** 50% or more (but less than 75%) of the activity, knowledge, or resources described within the question.

**Almost Full:** 75% or more (but less than 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 indicated.
- Describe half-time employees as  $\frac{1}{2}$  (i.e., 0.5).
- Enter “0” if your response to a question is 0 (zero)—Please do not leave the field blank.

## RESULTS

### Part I. Summary of 2006 Data

#### *Epidemiology Capacity for Addressing Essential Services of Public Health*

In fall 1994, the American Public Health Association adopted the Ten Essential Services of Public Health as the national standard for public health (8) (see Box). This assessment examined the four 10 ESPH that rely heavily on epidemiologic functions. For two of those four, most respondents indicated substantial to full capacity for monitoring health status to identify and solve community health problems (78%) and diagnosing and investigating health problems and health hazards in the community (67%) (Table 1 and Figure 1). In contrast, only 38% of respondents indicated substantial to full capacity in evaluating effectiveness, accessibility, and quality of personal and population-based health services, and 17% indicated substantial to full capacity for researching for new insights and innovative solutions to health.

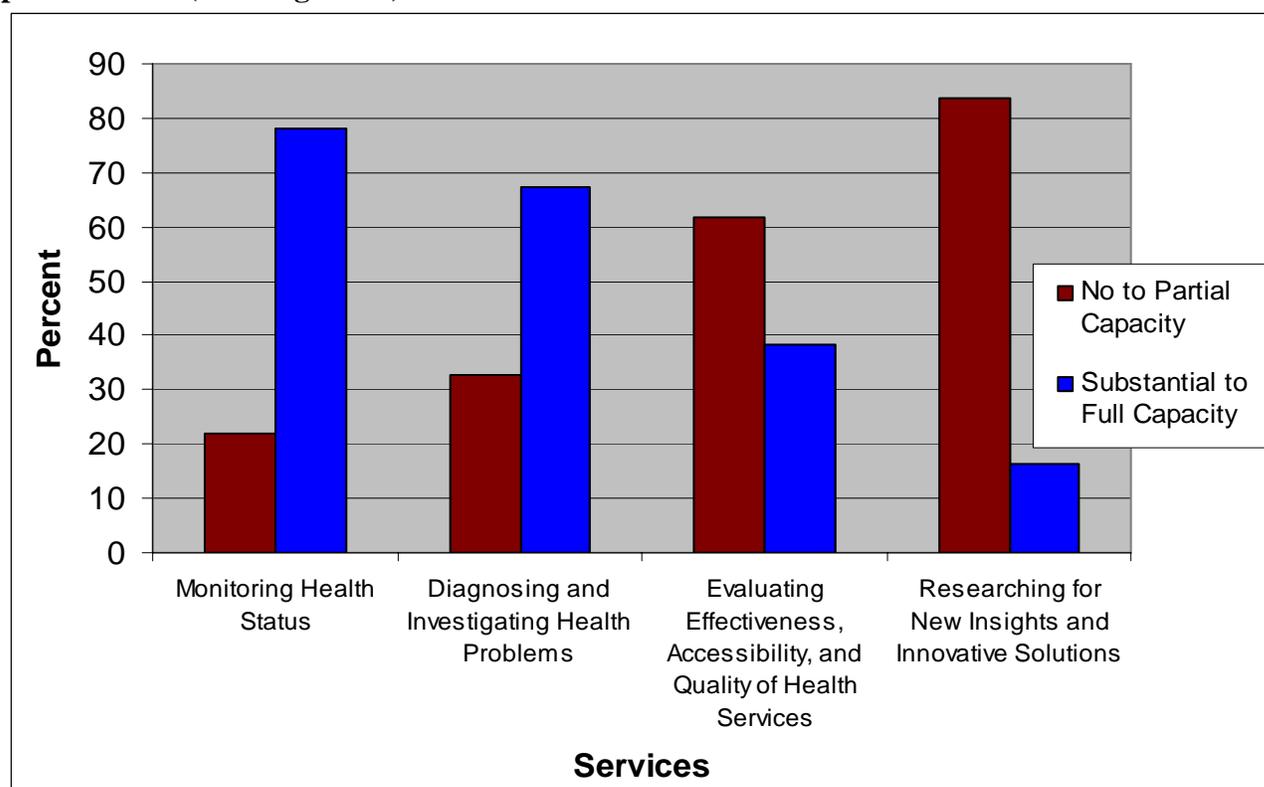
#### **The Ten Essential Services of Public Health**

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 health care 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.

**Table 1. Epidemiologic capacity to perform the epidemiology-related essential services of public health (N=55 agencies)**

Essential Services	None		Minimal		Partial		Substantial		Almost Full		Full	
	n	%	n	%	n	%	n	%	n	%	n	%
Monitor health status to identify and solve community health problems	0	0%	1	2%	11	20%	31	56%	11	20%	1	2%
Diagnose and investigate health problems and health hazards in the community	0	0%	0	0%	18	33%	25	45%	10	18%	2	4%
Evaluate effectiveness, accessibility, and quality of personal and population-based health services	0	0%	15	27%	19	35%	21	38%	0	0%	0	0%
Research for new insights and innovative solutions to health problems	4	7%	26	47%	16	29%	8	15%	1	2%	0	0%

**Figure 1. Epidemiologic capacity to perform epidemiology-related essential services of public health (N=55 agencies)**



### *Epidemiology and Surveillance Capacity*

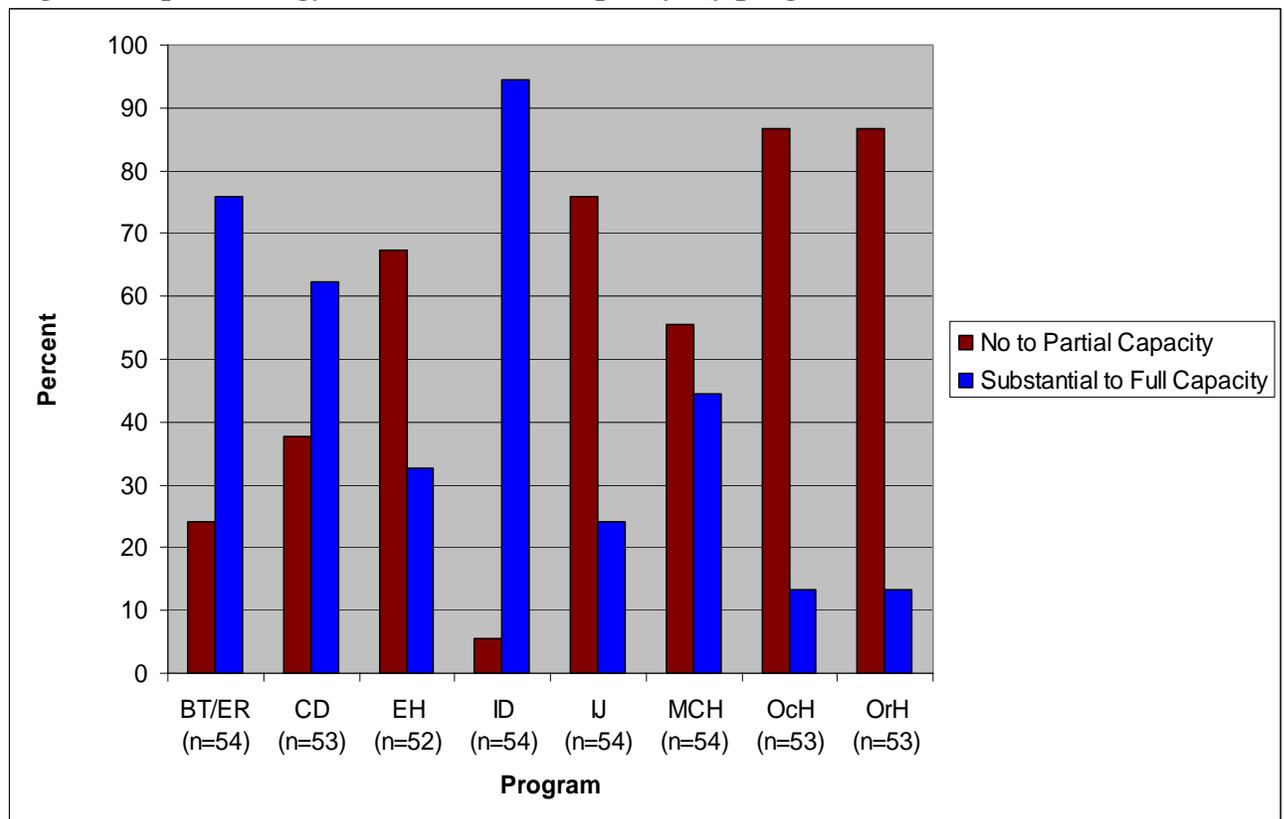
The extent of the health departments' capacity to provide the four epidemiology-related ESPH varied by program. In three programs (BT/emergency response, chronic diseases, and infectious

diseases), most respondents indicated substantial to full capacity (Table 2 and Figure 2). For two of these areas (BT/emergency response and infectious diseases), more than 75% of respondents indicated substantial to full capacity. One-fourth or less of respondents indicated substantial to full capacity for injury, occupational health, and oral health.

**Table 2. Epidemiology capacity, by program**

Program (No. agencies responding)	None		Minimal		Partial		Substantial		Almost Full		Full	
	n	%	n	%	n	%	n	%	n	%	n	%
Bioterrorism/Emergency response (54)	1	2%	2	4%	10	19%	21	39%	17	31%	3	6%
Chronic diseases (53)	1	2%	7	13%	12	23%	21	40%	9	17%	3	6%
Environmental health (52)	8	15%	16	31%	11	21%	13	25%	4	8%	0	0%
Infectious diseases (54)	0	0%	0	0%	3	6%	21	39%	18	33%	12	22%
Injury (54)	10	19%	13	24%	18	33%	9	17%	3	6%	1	2%
Maternal and child health (54)	2	4%	10	19%	18	33%	18	33%	5	9%	1	2%
Occupational health (53)	22	42%	21	40%	3	6%	5	9%	2	4%	0	0%
Oral health (53)	26	49%	15	28%	5	9%	6	11%	1	2%	0	0%

**Figure 2. Epidemiology and surveillance capacity, by program\***



\*BT/ER: bioterrorism/emergency response; CD: chronic diseases; EH: environmental health; ID: infectious diseases; IJ: injury; MCH: maternal and child health; OcH: occupational health; OrH: oral health.

As a follow-up, respondents who reported no capacity in a particular program were asked whether their states planned to increase epidemiology capacity in that program. For chronic diseases, environmental health, injury, maternal and child health, occupational health and oral health, 75% or more indicated their states did not plan to increase epidemiology and surveillance capacity in those programs. Participants who indicated none for BT/emergency response reported a planned increase in capacity in this area.

### ***Epidemiology Funding Sources***

Most (94%) respondents received state and federal funds to support epidemiology activities within the state health department. Six respondents (12%) indicated also receiving funding from nonfederal and non state sources. On average, each state or territorial health department received 74% of its epidemiologic program funding from the federal government and 24% from the state, with a median of 80% and 20%, respectively (Table 3).

**Table 3. Funding sources for epidemiology activities in state health departments (N=52 agencies)**

Funding Source	2006					
	Min	Max	Median	Mean	Yes	No
Federal	15%	100%	80%	74%	100%	0%
State	0%	85%	20%	24%	94%	6%
Other	0%	27%	0%	2%	12%	89%

### ***Epidemiology Health Department Organization***

Nearly half (47%) of the 55 respondents indicated their health agencies were decentralized (public health system with autonomous local health departments). In contrast, 36% of respondents indicated their health agencies were centralized (state-operated public health system). The remaining health agencies (17%) indicated an “other” organizational structure.

Thirteen percent of states indicated their epidemiology department was organized as a bureau, division, office, section, or unit; 40% indicated that epidemiology within the health agency functioned within specific programs, such as chronic diseases or infectious diseases. Forty-seven percent indicated epidemiology activities were organized as a combination between epidemiologists in separate bureaus, divisions, office sections, or units and epidemiologists of program-specific areas. In states or territories that indicated a combination organization, an average of 41% of epidemiologists within each health agency was located within specific programs.

### ***Epidemiologist Workforce***

This assessment identified 2502 epidemiologists working in state and territorial health departments. Master’s-level epidemiologists (47%) were more prevalent in the epidemiology workforce than were epidemiologists with any other degree (Table 4). Physicians and Ph.D.-level epidemiologists comprised 11% (282 epidemiologists) and 14% (353) of the workforce, respectively; other doctoral-level (e.g., DVM and DDS) epidemiologists combined for 3% (87)

of epidemiologists in state and territorial health departments. Finally, bachelor's-level epidemiologists accounted for 19% (464), and associate or no post-high school degree, for 3% (65).

**Table 4. Total number of persons working in state health departments as epidemiologists and estimated need, by degree (N=55 agencies)**

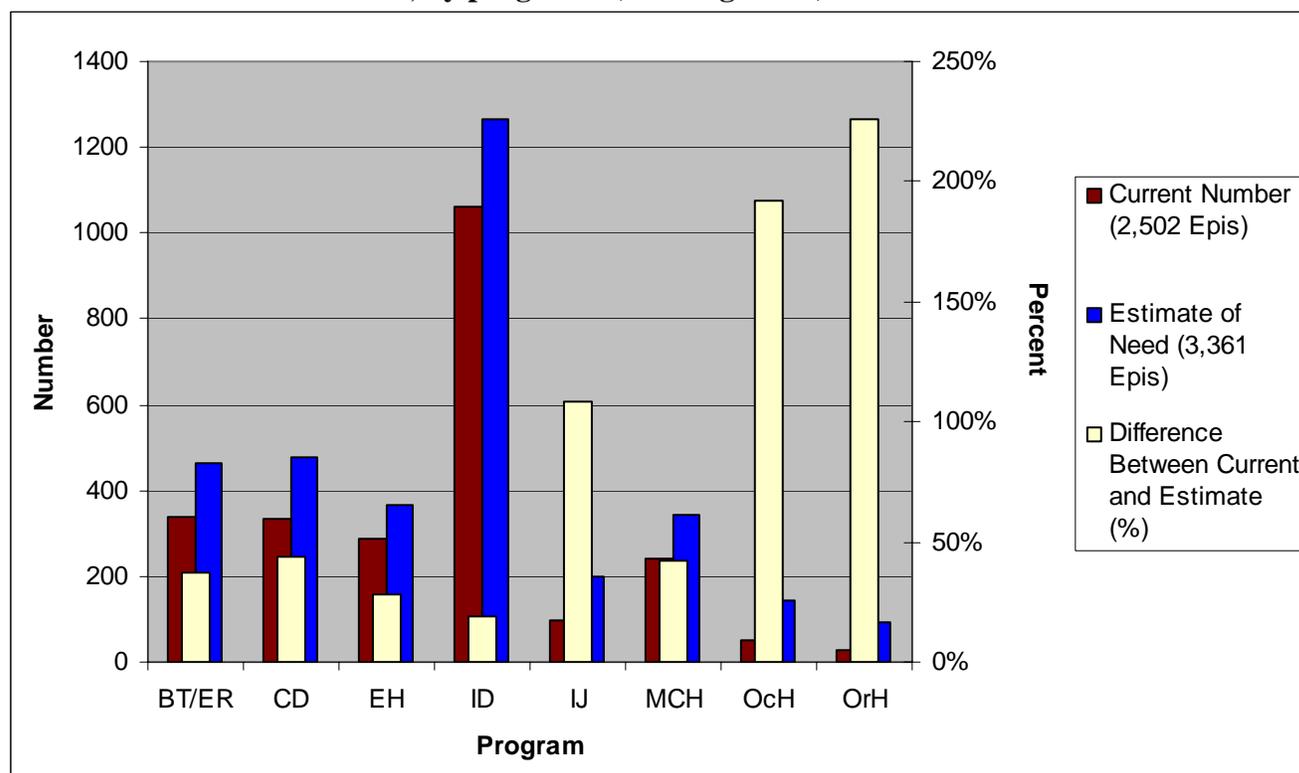
Academic Degree	Total		Total	
	Current	%	Estimated Need	%
MD, DO	282.3	11%	381.6	11%
DDS	10.5	0%	31.8	1%
DVM	76.4	3%	108.8	3%
PhD, DrPH, other doctoral	352.7	14%	519.7	16%
MPH, MSPH, other master	1185.6	47%	1622.9	48%
BA, BS, BSN, other bachelor	464.2	19%	592.5	18%
Associate or no post-high school degree	64.9	3%	104.3	3%
Unknown	65*	3%	N/A	N/A
<b>Total</b>	<b>2502</b>	<b>100%</b>	<b>3361</b>	<b>100%</b>

\*Question 6 of the 2006 ECA (Appendix A) collected information about the number of epidemiologists within eight programs. A follow-up question (question 11) was asked to determine the number of epidemiologists in programs not included in question 6. Detailed information, including degrees and epidemiology training, were not collected for the 65 epidemiologists ascertained in question 11. However, these 65 epidemiologists are included in the total number of epidemiologists (2502)

By program, most epidemiologists (42%) were located within infectious diseases (Figure 3). Remaining epidemiologists were nearly evenly distributed within BT/emergency response (14%), chronic diseases (13%), environmental health (12%), and maternal and child health (10%). Fewer epidemiologists were located within injury (4%), occupational health (2%), and oral health (1%). An additional 65 epidemiologists from other areas within the health department (e.g., vital statistics) accounted for 3% of the total.

Respondents estimated the number of epidemiologists needed in their health departments to address the epidemiology-related ESPH. The total estimate of need was 3361 epidemiologists—34% higher than current capacity.

**Figure 3. Number of epidemiologists employed by state and territorial health departments and estimated number needed, by program\* (N=55 agencies)**



\*BT/ER: bioterrorism/emergency response; CD: chronic diseases; EH: environmental health; ID: infectious diseases; IJ: injury; MCH: maternal and child health; OcH: occupational health; OrH: oral health.

### *Number of Epidemiologists Paid with Bioterrorism Funds*

Of the 531 epidemiologists paid with BT funds, 55% (291 epidemiologists) were assigned to BT/emergency response programs, and 37% (199) worked in infectious diseases programs (Table 5). The remaining 41 (8%) epidemiologists paid with BT funds were distributed among the other programs, with environmental health receiving most of the remainder (4%).

**Table 5. Program distribution of persons working as epidemiologists paid with bioterrorism funds, 2006 (N=531 epidemiologists)**

Program	No. Agencies	No. Epidemiologists Paid with BT Funds	% of Total
Bioterrorism/Emergency response	52	291	55%
Infectious diseases	52	199	37%
Environmental health	48	21	4%
Maternal and child health	51	10	2%
Chronic diseases	50	5	1%
Injury	49	4	1%
Oral health	45	1	0%
Occupational Health	46	0	0%
<b>TOTAL</b>	<b>N/A</b>	<b>531</b>	<b>100%</b>

Of the 326 epidemiologists working in BT/emergency response, most (89%) were paid by BT funds while other programs had a much smaller proportion (Table 6). Twenty percent of infectious diseases epidemiologists (20%) were paid with BT funds.

**Table 6. Proportion of persons working as epidemiologists who are paid by bioterrorism funds, by program, 2006**

Program	No. Agencies	No. Epidemiologists Paid with Bioterrorism Funds	Total No. Epidemiologists	% Epidemiologists Paid with Bioterrorism Funds
Bioterrorism/Emergency response	52	291	326	89%
Infectious diseases	53	199	987	20%
Environmental health	49	21	237	9%
Injury	50	4	90	4%
Maternal and child Health	51	10	237	4%
Oral health	45	1	26	4%
Chronic diseases	51	5	319	2%
Occupational health	47	0	35	0%
<b>TOTAL</b>		<b>531</b>	<b>2257*</b>	<b>24%</b>

\*Includes only respondents who answered questions 6 (number of epidemiologists) and 8 (bioterrorism-funded epidemiologists), thus total epidemiologists does not equal 2502.

### *Epidemiologists with Academic Training in Epidemiology*

In environmental health and oral health, 42% and 44% of epidemiologists, respectively, had a degree in epidemiology. Twenty-five percent of occupational health epidemiologists had no formal training in epidemiology. In contrast, epidemiologists in BT/emergency response (62%), chronic diseases (61%), and injury (64%) had higher proportions of epidemiology degrees (Table 7). The most common epidemiology degree was a MPH, MSPH, or other master's degree. More than 90% of epidemiologists had received at least some epidemiology training. However, specific programs including occupational health (75% of epidemiologists with some epidemiology training) had significant educational deficiencies.

**Table 7. Epidemiology training of persons working as epidemiologists in state health departments, by program\* and level of epidemiology training (N=2502 epidemiologists)**

Level of epidemiology training	BT		CD		EH		ID		IJ	
	n = 50		n=49		n=46		n=52		n=46	
	Sum	%	Sum	%	Sum	%	Sum	%	Sum	%
1. PhD, DrPh, other doctoral degree in Epidemiology	26.0	8%	57.0	17%	25.4	9%	45.6	4%	8.0	8%
2. Professional background (e.g. MD, DO, DVM, DDS, etc.) with a dual degree in Epidemiology	36.5	11%	19.5	6%	7.0	2%	112.5	11%	2.0	2%
3. MPH, MSPH, other master degree in Epidemiology	138.2	41%	123.3	37%	86.3	30%	395.7	37%	48.6	51%
4. BA, BS, other bachelor degree in Epidemiology	7.9	2%	3.0	1%	2.0	1%	29.3	3%	3.0	3%
5. Completed formal training program in Epidemiology (e.g. EIS)	24.0	7%	5.0	1%	19.5	7%	93.2	9%	2.0	2%
6. Completed some coursework in Epidemiology	55.1	16%	66.9	20%	50.0	17%	184.4	17%	16.9	18%
7. Received on the job training in Epidemiology	39.8	12%	37.9	11%	61.0	21%	146.0	14%	11.3	12%
8. No formal training in Epidemiology (i.e. epidemiologist does not fit into any of the above categories)	5.8	2%	6.5	2%	7.0	2%	10.4	1%	3.0	3%
9. Unknown	6.0	2%	13.5	4%	30.0	10%	43.0	4%	1.0	1%
<b>TOTAL</b>	<b>339</b>	<b>100%</b>	<b>333</b>	<b>100%</b>	<b>288</b>	<b>100%</b>	<b>1060</b>	<b>100%</b>	<b>96</b>	<b>100%</b>
Level of epidemiology training	MCH		OchH		OrH		Other Areas		Combined Total	
	n=49		n=42		n=42		n=17			
	Sum	%	Sum	%	Sum	%	Sum	%	Sum	%
1. PhD, DrPh, other doctoral degree in Epidemiology	29.0	12%	6.5	13%	1.0	3%	N/A	N/A	<b>198.0</b>	<b>8%</b>
2. Professional background (e.g. MD, DO, DVM, DDS, etc.) with a dual degree in Epidemiology	20.8	9%	1.3	3%	3.0	10%	N/A	N/A	<b>203.0</b>	<b>8%</b>
3. MPH, MSPH, other master degree in Epidemiology	72.7	30%	16.9	34%	8.3	28%	N/A	N/A	<b>890.0</b>	<b>36%</b>
4. BA, BS, other bachelor degree in Epidemiology	4.0	2%	2.0	4%	1.0	3%	N/A	N/A	<b>52.0</b>	<b>2%</b>
5. Completed formal training program in Epidemiology (e.g. EIS)	10.9	4%	1.5	3%	0.0	0%	N/A	N/A	<b>156.0</b>	<b>6%</b>
6. Completed some coursework in Epidemiology	61.8	25%	4.5	9%	7.3	25%	N/A	N/A	<b>447.0</b>	<b>18%</b>
7. Received on the job training in Epidemiology	22.6	9%	4.0	8%	6.0	21%	N/A	N/A	<b>329.0</b>	<b>13%</b>
8. No formal training in Epidemiology (i.e. epidemiologist does not fit into any of the above categories)	18.8	8%	12.5	25%	0.5	2%	N/A	N/A	<b>64.0</b>	<b>3%</b>
9. Unknown	2.0	1%	0.0	0%	2.0	7%	65.0	100%	<b>162.5</b>	<b>6%</b>
<b>TOTAL</b>	<b>242</b>	<b>100%</b>	<b>49</b>	<b>100%</b>	<b>29</b>	<b>100%</b>	<b>65</b>	<b>100%</b>	<b>2502</b>	<b>100%</b>

\*BT/ER: bioterrorism/emergency response; CD: chronic diseases; EH: environmental health; ID: infectious diseases; IJ: injury; MCH: maternal and child health; OchH: occupational health; OrH: oral health.

### *Availability of Training*

Respondents were asked whether their health department provided continuing education for epidemiology staff. Twenty-three percent responded that provision of continuing training in their agency was a problem; 48% reported it was not a problem.

Most (79% [44/55]) respondents reported their state health department had supported training or education in the past 12 months to enhance the competence of epidemiologists in performing the ESPH. Nine states (17%) reported their state health department had not supported training; for two (4%), training support was unknown.

When asked about individual participation in training, 60% of respondents indicated more than half of their states' epidemiologists had received training provided by their state during the past 12 months to enhance their competence in performing the ESPH (Table 8).

**Table 8. Percentage of state health department epidemiologists who participated in training or education during the past 12 months (N=40 agencies)**

<b>Participated in Training or Education</b>	<b>n</b>	<b>%</b>
0%–25%	4	10%
26%–50%	5	13%
51%–75%	11	28%
76%–100%	13	33%
Don't know	7	18%

### *Workforce Competence*

State health departments characterized the adequacy of their staff according to a set of applied epidemiology competencies developed by CSTE and CDC (9). Staff members were most competent (82%) in creating and managing a database and in applying privacy laws to protect confidentiality (Table 9). Other areas of notable competence included collaborating with others to identify problems and form recommendations (80%); following ethics guidelines/principles in studies, research, and data use (80%); applying understanding of cause of disease in practicing epidemiology (78%); and utilizing scientific evidence to support actions or interventions (77%).

Staff members were least competent (39%) in development of program logic models and theories of action (Table 9). Other areas of poor competence included use of knowledge of environmental and behavioral sciences in epidemiology practice (26%), organization and provision of appropriate data for community planning processes (22%), evaluation of surveillance systems (20%), and use of leadership and systems thinking in epidemiology planning and policy development (20%).

**Table 9. Level of competence in the applied epidemiology competencies\* and additional need**

	Staff are competent in this area				Additional training is needed			
	Agree	Neutral	Disagree	Don't Know	Agree	Neutral	Disagree	Don't Know
<b>Epidemiology Capacities</b>	n (%)	n (%)	n (%)	n (%)	n (%)	n (%)	n (%)	n (%)
Apply privacy laws to protect confidentiality including HIPAA	42 (82)	7 (14)	1 (2)	1 (2)	15 (31)	11 (22)	21 (43)	2 (4)
Create and manage a database	42 (82)	8 (16)	1 (2)	0	22 (45)	8 (16)	18 (37)	1 (2)
Follow ethics guidelines/principles in studies, research, and data use	40 (80)	5 (10)	4 (8)	1 (2)	18 (37)	12 (25)	17 (35)	2 (4)
Collaborate with others to identify problems and form recommendations	41 (80)	8 (16)	2 (4)	0	15 (31)	14 (29)	19 (39)	1 (2)
Apply understanding of causes of disease in practicing epidemiology	40 (78)	8 (16)	2 (4)	1 (2)	18 (37)	12 (25)	18 (37)	1 (20)
Utilize scientific evidence to support actions or interventions	39 (77)	11 (22)	1 (2)	0	19 (39)	13 (27)	16 (33)	1 (2)
Communicate epidemiologic findings orally and in writing to nonprofessional audiences	37 (73)	11 (22)	3 (6)	0	26 (53)	6 (13)	17 (35)	0
Create analysis plan and conduct analysis of data	35 (69)	10 (20)	6 (12)	0	26 (53)	8 (16)	14 (29)	1 (2)
Employ appropriate statistical and communication software	32 (64)	13 (26)	5 (10)	0	25 (52)	10 (21)	11 (23)	2 (4)
Develop measurable and relevant goals and objectives	29 (57)	17 (33)	5 (10)	0	25 (51)	9 (18)	15 (31)	0
Demonstrate the skills and principles of risk communication	28 (55)	18 (35)	5 (10)	0	27 (54)	8 (16)	14 (28)	1 (2)
Use leadership and systems thinking in epidemiologic planning and policy development	26 (51)	13 (26)	10 (20)	2 (4)	27 (55)	8 (16.3)	12 (25)	2 (4)
Provide appropriate data for community planning processes	20 (39)	16 (31)	11 (22)	4 (8)	22 (45)	13 (27)	11 (22)	3 (6)
Conduct evaluation of surveillance systems	20 (39)	21 (41)	10 (20)	0	29 (59)	9 (18)	11 (22)	0
Use knowledge of environmental and behavioral sciences in epidemiology practice	18 (35)	19 (37)	13 (26)	1 (2)	29 (59)	9 (18)	11 (22)	0
Develop program logic models and theories of action	15 (29)	11 (22)	20 (39)	5 (10)	22 (45)	15 (31)	7 (14)	5 (10)

\*Tier 2 CDC/CSTE Applied Epidemiology Competencies were selected as a general level of assessment for all epidemiologists. This represents a portion of the measured competencies. The extended list of applied epidemiology competencies, developed by CSTE and CDC (9), is available in Appendix C. Total number of respondents (N) varies for each competence.

Respondents indicated a need for additional training for several epidemiology competencies related to surveillance, health assessment, data analysis, communication, application of environmental and behavioral sciences, and policy planning and development (Table 9). The greatest need for training (59%) was in evaluating surveillance systems and in using knowledge of environmental and behavioral sciences in epidemiology practice. More than half of respondents reported a need for further training in the following areas: use of leadership and systems thinking in epidemiology planning and policy development (55%), demonstration of the skills and principles of risk communication (54%), communication of epidemiology findings orally and in writing to nonprofessional audiences (53%), creation of an analysis plan and conduct of data analysis (53%), employment of appropriate statistical and communication software (52%), and development of measurable and relevant goals and objectives (51%).

### ***Training in Epidemiology***

Most (94%) state health departments did not require epidemiology staff to participate in continuing education for epidemiology or surveillance (Table 10). Almost all, however, provided access to distance learning or Internet/Web-based courses (90%) or paid for formal training or education, such as conferences or seminars (90%). Eighty-one percent of state health departments provided on-site training opportunities and 75% offered education or training opportunities to epidemiologists at the local level. More than half (60%) of health departments evaluated their epidemiologists' education and training objectives in performance reviews.

**Table 10. Number and percentage of state health departments providing continuing training in epidemiology to epidemiology staff (N=52 agencies)**

<b>Epidemiology Training</b>	<b>Yes</b>		<b>No</b>		<b>Unknown</b>	
	<b>n</b>	<b>%</b>	<b>n</b>	<b>%</b>	<b>n</b>	<b>%</b>
Provide access to distance learning or Internet/Web-based courses	47	90%	4	8%	1	2%
Pay for formal training or education outside your organization (conferences or seminars)	47	90%	4	8%	1	2%
Provide on-site trainings (e.g., epidemiology seminars)	42	81%	10	19%	0	0%
Provide training or education to epidemiologists at the local level	39	75%	12	23%	1	2%
Include education and training objectives in performance review	31	60%	17	33%	4	8%
Have staff position(s) responsible for internal training	24	46%	27	52%	1	2%
Require continuing education in epidemiology and surveillance	3	6%	49	94%	0	0%

### *Training Partners*

The most common partners reported were CDC (81%), schools of public health (76%), centers of public health preparedness (60%), and other federal/government agencies (55%) (Table 11).

**Table 11. State and territorial health department training partners**

Training Partners	No. Agencies Responding (N)	No. Agencies Using Training (n)	% Using Partner	% Unsure
Centers for Disease Control and Prevention	53	43	81%	0%
Schools of public health	53	40	75%	0%
Centers for public health preparedness	53	32	60%	6%
Other federal/Government agencies	53	29	55%	11%
Public safety/First responders	53	28	53%	8%
Schools of medicine	53	27	51%	0%
Other academic institutions	53	24	45%	9%
Other health-care organizations	53	20	38%	13%
Other health-care providers	52	19	37%	12%
Schools of veterinary medicine	53	14	26%	2%
Health Resources and Services Administration training centers	53	6	11%	25%
Other*	10	1	10%	20%

\*Other external partners not listed above.

### *Retirement*

Of 2068 epidemiologists, 11% plan to retire or change careers in the next 5 years (Table 12). Oral health (17%) and infectious diseases (12%) accounted for the highest percentage of prospective retirees; injury (6%), the lowest.

**Table 12. Number of epidemiologists planning to retire or change careers in the next 5 years, by program\***

Program	No. Agencies	No. Epidemiologists	Plan to Retire	% of Total
Bioterrorism/Emergency response	49	305	30	10%
Chronic diseases	49	293	26	9%
Environmental health	47	229	19	8%
Infectious diseases	50	893	111	12%
Injury	47	82	5	6%
Maternal and child health	48	215	22	10%
Occupational health	44	27	3	11%
Oral health	44	24	4	17%
<b>All programs</b>		<b>2068</b>	<b>220</b>	<b>11%</b>

\*Analysis includes only participants who responded to the number of epidemiologists and the number of epidemiologists planning to retire in each program.

Epidemiologists with a DVM degree (15%) accounted for the highest proportion in each program planning to retire or change careers in the next 5 years, followed by epidemiologists with an associate (13%), DDS (13%), bachelor's (12%), or MD/DO (11%) degree (Table 13).

**Table 13. Number of epidemiologists planning to retire or change careers in the next 5 years, by academic degree\***

Academic degree	Total Epidemiologists	Retire	% of Total
MD, DO	241	27	11%
DDS	8	1	13%
DVM	67	10	15%
PhD, DrPH, other doctoral	298	31	10%
MPH, MSPH, other master	993	95	10%
BA, BS, BSN, other bachelor	408	49	12%
Associate or no post-high school degree	53	7	13%
<b>TOTAL</b>	<b>2068</b>	<b>220</b>	<b>11%</b>

\*Analysis includes only participants who responded to the number of epidemiologists and the number of epidemiologists planning to retire in each program.

### ***Recruitment***

Respondents reported financial constraints as the primary barrier to recruiting epidemiologists at the state level. Seventy-two percent of state health departments reported salary scale as a major problem in recruiting epidemiologists (Table 14). Restrictions on offering competitive pay (70%), access to enough qualified applicants (62%), personnel policies and procedures (60%), and opportunity for promotion (58%) were other common recruiting problems.

**Table 14. Barriers in recruiting epidemiologists (N=53 agencies)**

Barriers* to recruiting epidemiologists	A problem		Neutral		Not a problem	
	n	%	n	%	n	%
Salary scale	38	72%	10	19%	5	9%
Restrictions on offering competitive pay	37	70%	10	19%	6	11%
Enough qualified applicants	33	62%	14	26%	6	11%
Personnel policies and procedures (e.g., hiring)	31	60%	13	25%	8	15%
Opportunity for promotion	31	58%	13	25%	9	17%
Restrictions on hiring quickly enough	28	53%	7	13%	18	34%
Hiring freezes	23	43%	12	23%	18	34%
Job location	15	28%	11	21%	27	51%
Job security	10	19%	12	23%	31	58%
Limitations recruiting outside your organization	9	17%	5	9%	39	74%
Restrictions on choosing best candidate	9	17%	8	15%	36	68%
Travel permitted	9	17%	14	26%	30	57%
Job benefits (e.g., health, retirement)	7	13%	13	25%	33	62%
Opportunities for training	7	13%	20	38%	26	49%
Job interests/Fulfillment	6	11%	21	40%	26	49%
Travel required	1	2%	10	19%	42	79%

\*Other barriers reported by four agencies as “a problem” and by two agencies as “neutral”: 24/7 availability, bureaucratic delay, positions grant-dependent.

### *Useful Recruitment Methods*

Despite recruitment challenges, state health departments identified several useful recruiting methods. The most useful method was directly from universities/schools of public health (89%) (Table 15). Professional organizations (77%), federal programs (75%), and state and/or local health department websites (75%) also were successful mechanisms for recruiting epidemiologists.

**Table 15. Useful methods for recruiting epidemiologists for state health departments (N=53 agencies)**

Recruitment Methods	Yes		No		Don't Know	
	n	%	n	%	n	%
Universities/Schools of public health	47	89%	3	6%	3	6%
Professional organizations (e.g., CSTE, APHA, ASPH, ACE)*	41	77%	8	15%	4	8%
Federal programs (e.g., EIS, PPHS, CEFO)	40	75%	10	19%	3	6%
State and/or local government websites	40	75%	8	15%	5	9%
Public health career websites (e.g., Emory Public Health Employment Connection) †	31	60%	16	31%	5	10%
Other health agencies within the state †	23	44%	25	48%	4	8%
Local media	21	40%	27	51%	5	9%
<i>Epi Monitor</i> or periodic epidemiology newsletter	20	38%	25	47%	8	15%
Recruitment job fairs	5	9%	41	77%	7	13%

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

†n=52

### ***Retention***

Fifty-two percent of the current workforce of 2502 epidemiologists had more than 5 years' experience as an epidemiologist. Master's (44%), doctorate or equivalent degree (19%), bachelor's (18%), and medical degree (14%) accounted for the highest proportion of epidemiologists with more than 5 years' experience. Associate or no post-high school degree (2%) and DDS degree (0.5%) accounted for the fewest epidemiologists with more than 5 years' experience (Table 16).

**Table 16. Number of persons with 5 or more years' experience as an epidemiologist, by program\* (N=1303 epidemiologists)**

Academic Degree	BT	CD	EH	ID	IJ	MCH	OcH	OrH	Total	%
	n=50†	n=51†	n=47†	n=51†	n=47†	n=49†	n=45†	n=45†		
	Sum									
MD, DO	30	20	8	99	3	17	1	0	178	14%
DDS	1	0	0	0	0	0	0	6	7	1%
DVM	9	1	3	33	0	3	0	0	49	4%
PhD, DrPH, other doctoral	23	56	43	58	12	42	9	1	244	19%
MPH, MSPH, other master	60	83	63	240	38	63	16	7	570	44%
BA, BS, BSN, other bachelor	30	11	32	139	3	13	1	3	232	18%
Associated or no post high school degree	4	0	0	14	1	2	1	1	23	2%
<b>TOTAL</b>	<b>157</b>	<b>171</b>	<b>149</b>	<b>583</b>	<b>57</b>	<b>140</b>	<b>28</b>	<b>18</b>	<b>1303</b>	<b>100%</b>

\*BT/ER: bioterrorism/emergency response; CD: chronic diseases; EH: environmental health; ID: infectious diseases; IJ: injury; MCH: maternal and child health; OcH: occupational health; OrH: oral health.

†Number of Responding Agencies

State health departments cited several factors as barriers to retaining epidemiologists. Sixty-two percent of respondents reported salary scale as the greatest barrier to retaining epidemiologists (Table 17). Opportunity for promotion (60%), restrictions on merit raises (58%), and loss to private or government sector (51%) also were reported as barriers to retaining epidemiologists.

**Table 17. Barriers in retaining epidemiologists (N=53 agencies)**

Barrier	A problem		Neutral		Not a problem	
	n	%	n	%	n	%
Salary scale	33	62%	13	25%	7	13%
Opportunity for promotion	32	60%	10	19%	11	21%
Restrictions on merit raises	30	57%	10	19%	12	23%
Loss to private or government sector	27	51%	9	17%	17	32%
Personnel policies and procedures (e.g., hiring)	18	34%	24	45%	11	21%
Job location	9	17%	31	58%	13	25%
Opportunities for training	9	17%	29	55%	15	28%
Restrictions on travel outside jurisdiction	9	17%	32	60%	12	23%
Job security	8	15%	36	68%	9	17%
Job interests/fulfillment	7	13%	25	47%	21	40%
Job benefits (e.g., health, retirement)	6	11%	38	72%	9	17%
Travel permitted	4	8%	34	64%	15	28%
Travel required	2	4%	43	81%	8	15%
*Other factors	6	86%	1	14%	0	0%

\*Other factors identified included 24/7 availability; bureaucratic frustrations; no department funds for position(s)--all grant funded; position unavailability; public service; family, childbirth, child care.

### ***Formal Planning to Maintain Management***

Respondents were asked about succession planning for senior-level epidemiologists in their health departments. Seventy percent of states had not initiated any formal planning to maintain senior-level epidemiology management in the event of staff turnover over the next 5 years (Table 18).

**Table 18. Succession planning for senior-level epidemiologists in management (N=53 agencies)**

Succession Planning	Yes		No		Unknown	
	n	%	n	%	n	%
Formal planning to maintain epidemiology senior-level management over the next 5 years	13	25%	37	70%	3	6%

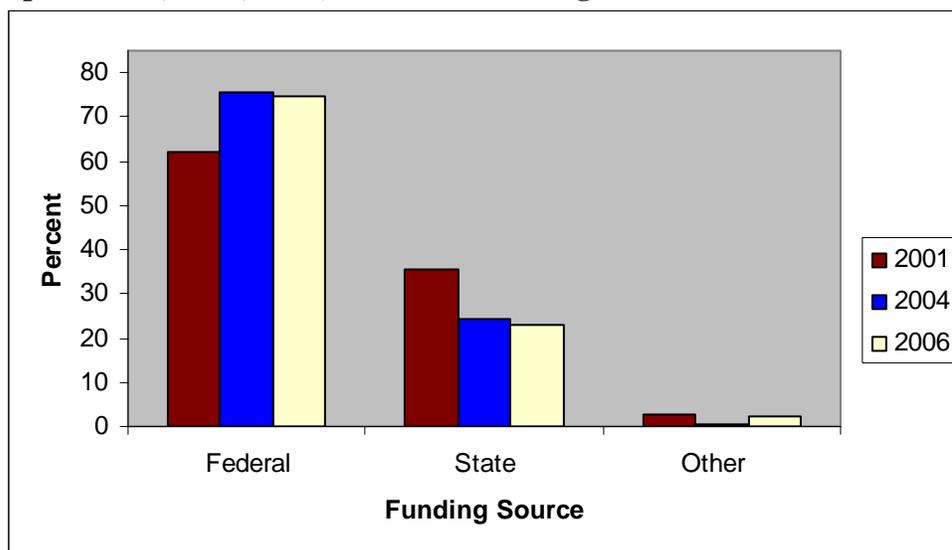
## Part II. Summary of Trend Data from 2001, 2004, and 2006 Epidemiology Capacity Assessments

Forty agencies responded to all three CSTE ECAs. Their responses were compared over time (2001, 2004, and 2006) to reveal trend data.

### *Funding*

Twenty-eight agencies provided complete information about funding sources (federal, state, and other) in all three assessments. The percentage of federal funding states has received on average increased from 62% in 2001 to 75% in 2006 (Figure 4). Funding levels did not differ significantly between 2004 and 2006. Conversely, the average percentages of state funds to support epidemiology activities decreased from 36% in 2001 to 23% in 2006.

**Figure 4. Percentages of funding sources for all epidemiology activities in state health departments, 2001, 2004, and 2006 (N=28 agencies)**



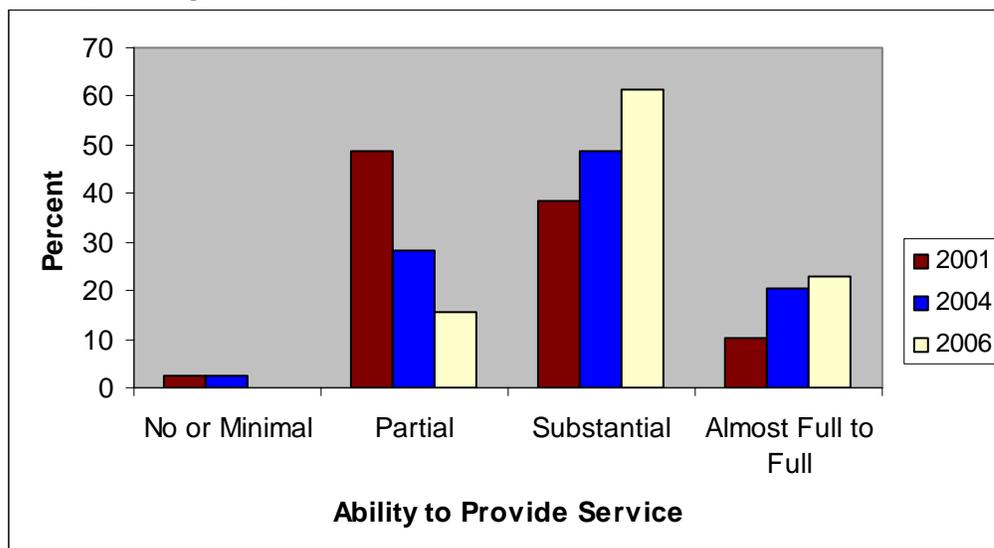
### *Epidemiology Capacity for Addressing the Essential Services of Public Health*

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

#### *ESPH 1. Monitor health status to identify and solve community health problems.*

The number of agencies that could provide substantial to full epidemiologic capacity in monitoring the health status to identify and solve community health problems increased from 48% in 2001 to 85% in 2006 (Figure 5). No state in 2006 reported no to minimal capacity in this area, compared with the previous two assessments.

**Figure 5. State health departments' ability to provide essential service #1,\* 2001, 2004, and 2006. (N=39 agencies)**

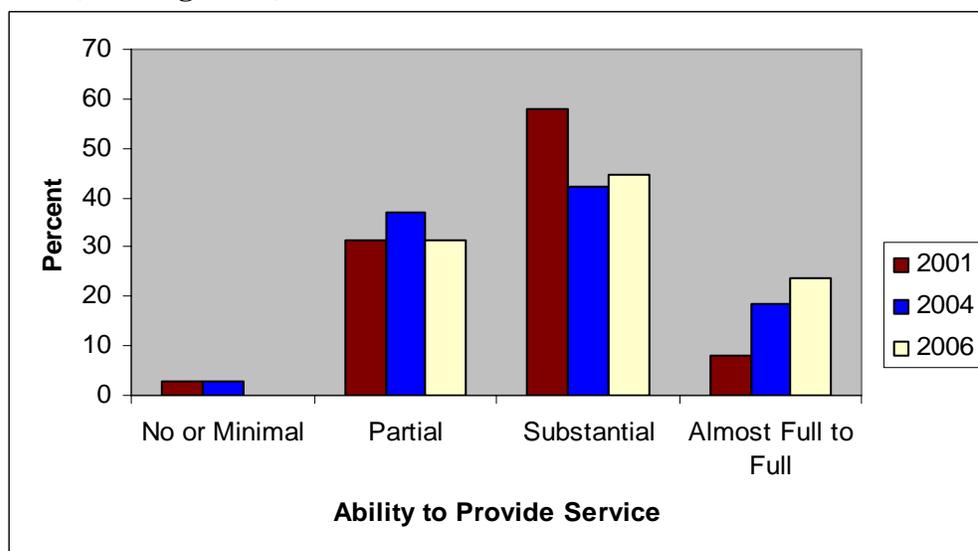


\*Monitor health status to identify and solve community health problems.

*ESPH 2. Diagnose and investigate health problems and health hazards in the community.*

States' ability to provide substantial to full epidemiologic capacity to diagnose and investigate health problems and health hazards in the community increased slightly from 66% in 2001 and 60% in 2004 to 69% in 2006 (Figure 6). The proportion of states reporting almost full to full capacity increased from 8% in 2001 to 24% in 2006. Respondents who reported partial capacity across the assessments varied slightly for all three ECAs; whereas none reported none to minimal capacity in 2006.

**Figure 6. State health departments' ability to provide essential service #2,\* 2001, 2004, and 2006 (N=38 agencies)**

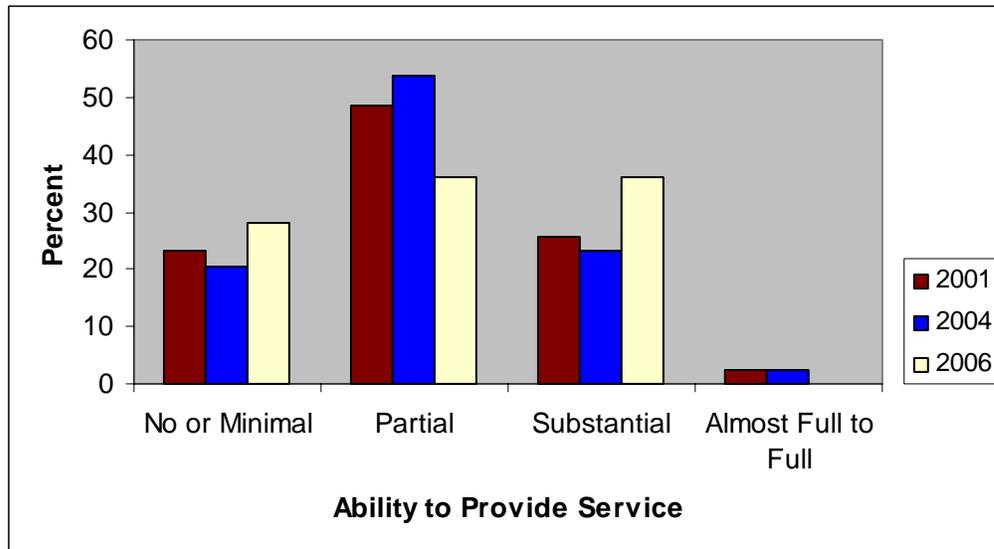


\*Diagnose and investigate health problems and health hazards in the community.

*ESPH 9. Evaluate effectiveness, accessibility, and quality of personal and population-based health services*

In 2004, 54% of responding state health departments reported partial capacity to evaluate the effectiveness, accessibility, and quality of personal and population-based health services. However, the proportion of states with partial capacity decreased from 2004 to 2006 (Figure 7). No state reported almost full to full capacity in 2006.

**Figure 7. State health departments' ability to provide essential service #9,\* 2001, 2004, and 2006 (N=39 agencies)**

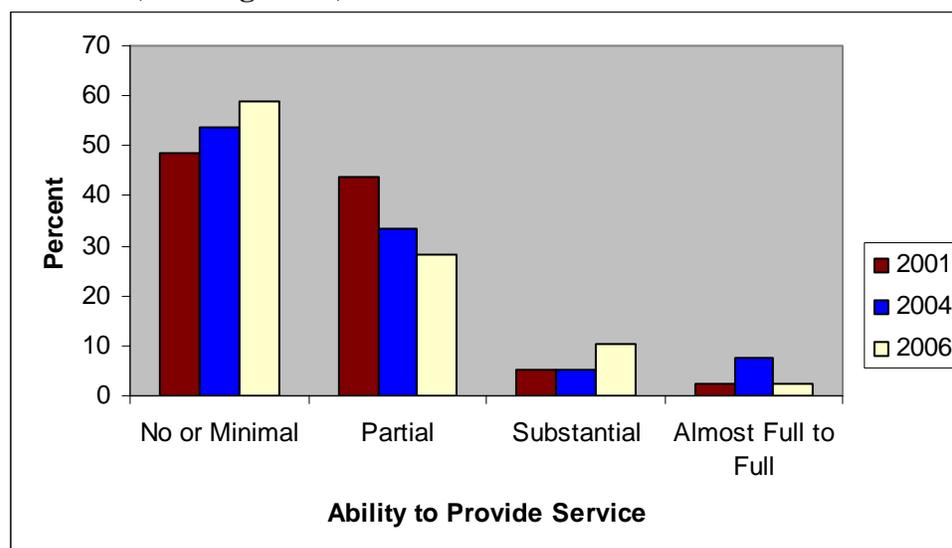


\*Evaluate effectiveness, accessibility, and quality of personal and population-based health services

*ESPH 10. Research for new insights and innovative solutions to health problems.*

In 2006, 59% of agencies reported no or minimal capacity, compared with 49% in 2001 (Figure 8). States with partial capacity in all three assessments decreased from 44% (2001) to 28% (2006). States with substantial and almost full to full capacity fluctuated slightly in all three assessments.

**Figure 8. State health departments' ability to provide essential service #10,\* 2001, 2004, and 2006 (N=39 agencies)**



\*Research for new insights and innovative solutions to health problems.

### ***Epidemiology and Surveillance Capacity***

Since 2001, state health departments' epidemiology and surveillance capacity increased markedly in several programs. Substantial to full capacity in BT programs increased from over 40% in 2001 to 83% in 2006 (Table 19). For maternal and child health, the number of states able to provide substantial to full capacity increased from 35% in 2001 to 52% in 2006. At the same time, states reporting partial capacity in maternal and child health decreased from 60% in 2001 to 27% in 2006; states reporting no to minimal capacity increased from 5% in 2001 to 22% during this same period. In chronic diseases program, partial capacity decreased from 42% in 2001 to 24% in 2006 and increased in no or minimal capacity from 8% to 13% and in substantial capacity from 32% to 45%.

Infectious diseases programs sustained high capacity since 2001. Nearly all agencies reported substantial to full capacity at 95% in 2001 and 2004, with an increase to 100% in 2006. No state reported no or partial capacity in 2006 for infectious diseases.

In environmental health, the number of agencies with partial capacity decreased from 2001 to 2006 (from 37% to 16%); the number of states reporting no to minimal capacity increased (from 29% to 53%). Trends in maternal and child health and environmental health reflect strong growth among states where some states with partial capacity developing stronger programs, whereas other states lost capacity.

In injury, occupational health, and oral health programs, states reporting almost full to full capacity remained consistently low from the initial 2001 survey.

**Table 19. Epidemiology and surveillance capacity in eight key programs in state health departments, 2001, 2004, and 2006**

Program	Year	n	None or Minimal (%)	Partial (%)	Substantial (%)	Almost Full or Full (%)
Bioterrorism/Emergency response	2006	40	0%	18%	40%	43%
	2004	40	5%	8%	45%	43%
	2001	40	5%	50%	23%	23%
Chronic diseases	2006	38	13%	24%	45%	18%
	2004	38	13%	34%	40%	13%
	2001	38	8%	42%	32%	18%
Environmental health	2006	38	53%	16%	24%	8%
	2004	38	40%	32%	21%	8%
	2001	38	29%	37%	21%	13%
Infectious diseases	2006	40	0%	0%	35%	65%
	2004	40	0%	5%	33%	63%
	2001	40	0%	5%	30%	65%
Injury	2006	39	46%	31%	18%	5%
	2004	39	49%	36%	8%	8%
	2001	39	18%	59%	15%	8%
Maternal and child health	2006	37	22%	27%	41%	11%
	2004	37	16%	35%	41%	8%
	2001	37	5%	60%	32%	3%
Occupational health	2006	36	78%	8%	11%	3%
	2004	39	78%	14%	8%	0%
	2001	39	56%	25%	17%	3%
Oral health	2006	39	72%	10%	15%	3%
	2004	39	72%	23%	3%	3%
	2001	39	64%	28%	5%	3%

***Epidemiologists in the Workforce***

BT/emergency response (103% increase), chronic diseases (58%), and maternal and child health (46%) programs increased in the number of epidemiologists from 2001 to 2004. Infectious diseases, environmental health, and injury remained stable during the same period. Occupational health reported a 37% decline in capacity. Overall, the number of epidemiologists working in the eight epidemiology programs did not change from 2004 to 2006. BT/emergency response, which previously reported the greatest increase, remained stable. MCH continued to add epidemiologists and reported a 10% increase; chronic diseases reported a 12% decrease and oral health decreased 29%. Employment of epidemiologists in environmental health, infectious diseases, and injury, which did not change from 2001 to 2004, increased 6%, 8%, and 28%, respectively, by 2006.

**Table 20. Percentage change in persons working as epidemiologists, by program,\* 2001, 2004, and 2006 (N=39)**

<b>Program</b>	<b>2001</b>	<b>2004</b>	<b>% Change 2001 to 2004</b>	<b>2006</b>	<b>% Change 2004 to 2006</b>
Bioterrorism/Emergency response	115	234	103%	232	-1%
Chronic diseases	162	257	58%	226	-12%
Environmental health	166	162	-2%	171	6%
Infectious diseases	631	628	0%	678	8%
Injury	49	46	-6%	59	28%
Maternal and child health	106	155	46%	171	10%
Occupational health	30	19	-37%	22	16%
Oral health	18	31	70%	22	-29%
<b>Total</b>	<b>1277</b>	<b>1532</b>	<b>20%</b>	<b>1581</b>	<b>3%</b>

\*Comprises the 38 states and District of Columbia that provided information in 2001, 2004, and 2006.

## DISCUSSION

The 2006 Epidemiology Capacity Assessment (ECA) findings support the need to employ substantially more epidemiologists—an estimated 34% (859 epidemiologists) above current personnel—to sufficiently staff essential services to protect the public’s health. Despite large growth in public health epidemiology staff between 2001 and 2004 due to federal bioterrorism/emergency (BT) response funding, workforce growth has stagnated. This has resulted in uneven distribution of personnel resources to essential public health programs.

Infectious diseases had the highest capacity of all programs across the three ECA assessments, and increased modestly in 2006. This finding is consistent with public health epidemiology’s historic focus on communicable disease control and the resultant sustained programmatic strength in this area. Conversely, BT capacity in state health departments was virtually nonexistent before federal grant programs began in 2000. Concurrent and rapid development of BT response and preparedness capacity as an important epidemiology program accompanied this funding. Infectious diseases programs benefited from BT funding: approximately 20% of infectious diseases epidemiologists are supported with BT funding. However, other areas have not received similar investments, and program capacity either improved only modestly across the three assessments (e.g., in chronic diseases) or not at all (e.g., environmental health). The distribution of more than half of the public health epidemiology workforce is somewhat counterintuitive considering that morbidity and mortality in the United States is overwhelmingly related to chronic disease, environmental exposures, injuries, and other non-infectious causes which are relatively under-represented by current workforce allocation.

The influx of funds for pandemic influenza preparedness helped support an 8% increase in infectious disease epidemiologists over 2004, whereas the decrease in federal BT funds resulted in a small decrease in epidemiologists assigned to BT/emergency response programs. The proportion of epidemiologists paid with BT funds in each program also has shifted. Almost 90% of epidemiologists in BT/emergency response now are paid with federal BT funds, compared with 62% of epidemiologists working in BT/emergency response in 2004. Fewer state resources are expended on epidemiologists to support BT/emergency response activities, and some BT epidemiologists have shifted to pandemic influenza activities. Program growth was also noted for maternal and child health, however programs in chronic disease, environmental health, and occupational health have largely been ignored when funding is distributed. While competence based training programs (including the Epidemic Intelligence Service and the CDC/CSTE Applied Epidemiology Fellowship) exist to build epidemiology capacity, they fall short of being able to provide enough epidemiologists to fill this critical need, particularly in the underrepresented program areas.

The 2006 ECA also addressed perceived capacity of epidemiologic services provided by state health departments, not solely personnel resources. The Essential Services of Public Health, a recognized set of Department of Health and Human Services goals, are useful in evaluating the functional capacity of a health department to deliver core services (8). For two of the four epidemiology-reliant ESPH (monitoring health status to identify and solve community health problems; and diagnosing and investigating health problems and health hazards in the community), more than 65% of responding agencies indicated substantial to full capacity. This is higher than reported by 2004 data, suggesting general improvement in the ability of states to

carry out these two key functions, and may be related to a better trained epidemiology workforce.

In contrast, fewer respondents reported substantial to full capacity in their ability to perform the other two epidemiology-related ESPH (evaluate effectiveness, accessibility and quality of personal and population-based health service; and conduct research to gain new insights and innovative solutions to health problems), at 38% and 17%, respectively. Although the prioritization, personnel allotment, and dedicated resources were not measured for each of these four ESPH, the major emphasis on epidemiology and surveillance activities in most state health agencies is more consistent with the first two ESPH than the last two. Greater capacity in the first of these two services correlates with both the historic mission and current focus of state health departments. However, without effective assessment of health service programs, states do not have a method to ensure that funding for public health programs is being used effectively. Further, to develop progressive disease prevention strategies, research is essential – but less than 20% of states have substantial capacity to perform applied research.

Percentage of state funding for epidemiology has declined over the past 5 years from an average of 35% to just 23%. Increasingly tight state budgets likely have led to reduced public health funding, thus federal funding has become increasingly essential to provide epidemiologic services. Many federally-funded positions in state health departments are temporary or contract based, meaning that staff may not be considered “state employees” and are not entitled to associated health and retirement benefits. Further, job stability is reliant on continued federal funding and instability in the workforce ensues when strong epidemiologists leave public health for jobs with higher stability and benefits. This is a particularly distressing prospect, especially when epidemiologists with academic training abandon public health.

The relatively high levels of untrained epidemiologists measured in 2001 prompted CSTE to recommend that at least 80% of the state and territorial epidemiology workforce have formal training in epidemiology. Differentiating between epidemiologists with on-the-job-training only and epidemiologists with a degree in epidemiology or public health is useful for measuring the collective level of training in the workforce. The number of epidemiologists with only on-the-job training decreased from 25% 2004 to 13% in 2006. At the same time, the proportion of epidemiologists with degrees in epidemiology increased from 51% to 54%. These changes suggest that the epidemiology workforce is becoming better trained.

The steady improvement in epidemiology training measured over the past 5 years may be attributable in part to the finding that many states now fund, provide, or otherwise support training and continuing education. Although most state health agencies do not require epidemiology staff to participate in continuing education, many agencies provide access to distance learning, web-based courses, pay for formal training or education, and have access to many training partners including CDC, schools of public health, and centers of public health preparedness.

Use of the newly developed applied epidemiology competencies (Appendix C) helped assess the adequacy of public health and epidemiology training. State health departments reported that more than half of their epidemiologists were competent in 26 of the 30 competencies assessed. This finding is encouraging given that competence-based education is now the basis for the

Council on Public Health's accreditation of schools of public health and for the public health worker certification examination being developed by the National Board of Public Health Examiners. Still, weakness was evident in several basic—and key—competencies, such as evaluation of surveillance systems, for which only 39% of agencies deemed their epidemiologists competent. Continued evaluation of the workforce using this set of competencies will ultimately lead to standardization in expected knowledge and expertise for epidemiologists nationwide.

The stability of the overall epidemiology workforce is supported by the measured proportion of all epidemiologists with more than 5 years' work experience (52%). This is an encouraging sign for the epidemiology workforce in that these proportions, though not high, are generally better than those in the general public health workforce (4,5). Poor retention rates for highly skilled and highly paid staff are particularly costly for an organization because of the substantial amount of time involved in hiring, orientation, and training and the initial months of sub par productivity while a new employee becomes acclimated to the new job. Similarly, the measured proportion of epidemiologists planning to retire or change careers in the next 5 years (11%) reveals a positive trend compared to the entire national public health workforce, from which an estimated 40%–50% plan to retire within 5 years (4,5). The lower number of planned retirements may relate to the fairly rapid growth of the epidemiology workforce between the 2002 and 2004 assessments.

Despite stability in the number of public health epidemiologists and the fewer planned retirements, previous and current assessment findings make clear that most health departments experience difficulties in both recruiting and retaining well-trained epidemiologists (2). Recruitment problems have undoubtedly been intensified during the period of new federal funding for BT/emergency response. The increased funding and heightened expectations for rapidly enhanced preparedness capacity necessitated hiring qualified individuals with skills in epidemiology and surveillance system development. Many state programs were unable to use federal funds quickly enough in building capacity because of recruiting barriers including restrictions on offering competitive pay and access to enough qualified applicants. It is presumed some health agencies were left with having to shift epidemiologists from one subject area to BT/emergency response.

Retention difficulties also are reflected in the low proportion of states (25%) with formal succession planning to maintain senior management, which has potential long-term implications for both organizational capacity and leadership. Because salary scale and restrictions on offering competitive pay are two primary barriers to recruiting epidemiologists and important barriers to retaining epidemiologists, state programs must reevaluate salary structure within their state health agencies. This reevaluation should provide pay competitive with that of other public health positions to attract well-qualified professionals to boost and then sustain epidemiology capacity at the state and local levels. Recruitment and retention clearly will remain of paramount importance and at the forefront of issues confronting attempts to sustain recent improvements in national epidemiology capacity.

The information described in this report is subject to limitations. As in past ECAs, information collected on perceived capacity, strengths, and barriers is self-assessed data. Methods used by respondents to estimate this information likely varied between respondents. In addition, to assist in data collection, CSTE provided data collection worksheets that have not been provided in the

past (Appendix B). Although this may slightly affect comparability from previous ECAs, these worksheets sought to ensure data collected for the 2006 Epidemiology Capacity Assessment was as accurate and thorough as possible. Finally, results in this report only estimate epidemiology capacity at the state local and may not be applicable to epidemiology capacity and training needs at the local level.

Based on the information provided in this report, several recommendations can be made or modified from earlier ECAs. These recommendations target epidemiology capacity, training standards, credentialing, and funding.

## RECOMMENDATIONS

### ➤ **Building Workforce Capacity**

- State and federal agencies should work to increase the number of Epidemic Intelligence Service, CSTE, and state-based epidemiology training program positions to begin to fill the critical gap in needed epidemiologists (estimated at more than 1200 nationwide).
- Federal grant programs and state programs should increase their investment in epidemiologists, particularly in lower-capacity noninfectious diseases areas, such as chronic disease, environmental health, injury, maternal and child health, and occupational health.
- Because salary scale and restrictions on offering competitive pay were the two primary barriers to recruiting epidemiologists and an important barrier to retaining epidemiologists, state programs must reevaluate salary structure within their state health agencies. This reevaluation should provide pay competitive with that of other public health positions to attract well-qualified professionals to boost and then sustain epidemiology capacity at the state and local levels.

### ➤ **Training Standards of Public Health Epidemiologists**

- Federal, state, and local public health agencies should aggressively promote the development and implementation of standards for applied epidemiology training using a competence-based model.
- CSTE, along with leaders in public health, including the Centers for Disease Control and Prevention (CDC), should evaluate the current availability of training programs that address the largest training gaps described in this report. CSTE should identify funding partners to develop training programs that will meet the essential needs in epidemiology workforce competence.
- CDC should develop training modules that states can deploy to specifically address high-priority training needs of the existing workforce, including surveillance system evaluation, risk communication, communication of epidemiologic findings to nonprofessional audiences, and creation of an analysis plan and data analysis.
- State health departments should develop partnerships with schools of public health to address unmet needs, including research to gain insights and innovative solutions to public health problems and to develop a workforce with skills necessary to better evaluate the effectiveness of public health services.
- State health departments and schools of public health need to support the full integration of the newly developed applied epidemiology competencies for public health epidemiologists.
- State health departments should map training currently offered internally and externally to applied epidemiology competencies to assess gaps in training.

### ➤ **Credentialing**

- States should encourage a move toward credentialing public health epidemiologists to support a highly competent workforce and to strengthen the professionalism of public health epidemiology practice.

➤ **Funding**

- State health departments should work to sustain the increase in epidemiologists under the broader subject of all-hazard preparedness.
- State health departments should reverse the trend of increased reliance on federal funds and provide a larger proportion and investment of funding to promote long-term stability of the epidemiology workforce.

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## NOTES:



# **2006 National Assessment of Epidemiologic Capacity: Appendices**

**Appendix A:** 2006 Epidemiology Capacity Assessment

**Appendix B:** 2006 Epidemiology Capacity Assessment:  
Supplemental Materials

**Appendix C:** CDC/CSTE Applied Epidemiology  
Competencies for Governmental Public Health Agencies



# 2006 National Assessment of Epidemiologic Capacity in Public Health Council of State and Territorial Epidemiologists

## BACKGROUND

The first national Epidemiology Capacity Assessment (ECA) was conducted between November 2001 and April 2002, and structured around the Ten Essential Services of Public Health. The purpose was to measure the baseline status of core epidemiologic capacity in the United States. The findings were published in 2003 and may be downloaded at <http://www.cste.org/pdffiles/ecacover1.pdf>. The ECA was revised in 2004 to focus on the infrastructure of public health surveillance programs, core epidemiology capacity and training opportunities in state and territorial health departments. The purpose of the 2004 ECA was to compare the data with baseline data collected in 2001 and 2002, prior to an increase of nearly \$2 billion in distributed Federal bioterrorism funds. The final report may be viewed at <http://www.cste.org/Assessment/ECA/pdffiles/ECAfinal05.pdf>

CSTE's continued effort to reassess the epidemiologic workforce capacity is prompted by the Healthy People 2010 Objective 23-14, which calls on CSTE to provide a broad snapshot of epidemiology capacity in states to perform essential public health services, including monitoring health status, diagnosing and investigating health problems and health hazards, and conducting evaluation and research.

The current ECA for 2006 has two sections consisting of 1) a core epidemiology assessment and 2) training, retention, and recruiting. The data obtained from the report will allow comparative use of the data to measure differences between State Health Departments in number of epidemiologists, training, and retention and recruitment methods. The current assessment will also allow comparative use of data within program specific areas in State Health Departments such as bioterrorism and emergency response, chronic disease, environmental health, infectious diseases, injury, maternal and child health, and occupational health.

Your state's information is crucial to the success of this important national initiative, and will provide policymakers along with federal and state partners the information they need about the status of epidemiology capacity in the Nation's health departments. More specifically, the information submitted by your state will be used to sketch out regional and national trends in epidemiology capacity, and findings will be shared with all participating states. However, CSTE will not release state-specific information in any reports unless otherwise approved by the state(s).

## INSTRUCTIONS

This assessment is comprised of two parts. Part I consists of 13 questions and focuses on the health department's (HD) core capacity in epidemiology. Part II consists of 10 questions and focuses on training within the State HD.

Assessment respondents may include the State Epidemiologist and/or delegate(s), in addition to other HD epidemiologists when appropriate.

Answer every question by selecting the choice that is the best match of your HD's situation. All questions refer to your **STATE** HD unless otherwise indicated. When completing the assessment, please:

- Enter additional text to explain your answers when indicated (i.e. if you select "Other," please specify your response in the space provided).
- Select only one response UNLESS otherwise indicated.
- Describe half-time employees as ½ (i.e. 0.5).
- Enter '0' if your response to a question is 0 (Zero)--Please do not leave the field blank.

To navigate through the assessment, please click the  or  button. To save your survey, click  and close your browser window.

## CONTACT INFORMATION

Please provide information on the **primary respondent** who will be completing the 2006 Epidemiology Capacity Assessment:

<b>First name</b>	<input type="text"/>
<b>Last name</b>	<input type="text"/>
<b>Degree(s)</b>	<input type="text"/>
<b>Title</b>	<input type="text"/>
<b>Health Department</b>	<input type="text"/>
<b>Address</b>	<input type="text"/>
<b>Address</b>	<input type="text"/>
<b>City</b>	<input type="text"/>
<b>State</b>	<input type="text"/>
<b>Zip</b>	<input type="text"/>
<b>Telephone</b>	<input type="text"/>
<b>Fax</b>	<input type="text"/>
<b>Email</b>	<input type="text"/>

Please provide information on **additional respondents** who will be completing portions of the 2006 Epidemiology Capacity Assessment:

**Name/ Title**

**Preferred Contact Information (phone or email)**

**Questions Completed (please list the question number(s) this respondent completed)**

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**Name/ Title**

**Preferred Contact Information (phone or email)**

**Questions Completed (please list the question number(s) this respondent completed)**

## DEFINITIONS

### Epidemiologist

According to Last (*A Dictionary of Epidemiology, 4<sup>th</sup> Ed., 2001*), 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, observation, 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 preventative 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, focus on the functions performed by the individual rather than the job title.

#### Who should be counted as a STATE Health Department (HD) Epidemiologist

Epidemiologists employed or contracted by the STATE HD. For example, epidemiologists who work at the LOCAL or STATE level that are employed or contracted by the state are considered STATE epidemiologists

**PART I – Core Questionnaire**

Important – Please consult other HD program epidemiologists for questions pertaining to domains not under your area of responsibility. All questions refer to your STATE Health Department UNLESS otherwise indicated. STATE Health Department refers to employees of your STATE Health Department. Please click [here](#) for a definition of a STATE epidemiologist. If you have any questions, please contact [ECA@cste.org](mailto:ECA@cste.org).

**1. What are the funding sources for all epidemiology activities within the STATE HD?  
(Check all that apply)**

<input type="checkbox"/> Federal Funds	Specify Percentage:	<input type="text"/>	%
<input type="checkbox"/> State Funds	Specify Percentage:	<input type="text"/>	%
<input type="checkbox"/> Other, please specify below	Specify Percentage:	<input type="text"/>	%
<input type="text"/>	<b>Total:</b> (must equal 100)	<input type="text"/>	100

**2. Are local and regional county health departments centralized within the state health department or decentralized as an independent public health entity?**

- Centralized** - (A state operated public health system)
- Decentralized** - (A public health system operated by local government)
- Other - Please specify**
- Unknown**

**3. How is Epidemiology organized within your STATE HD?**

- Organized as a bureau, division, office, section or unit (i.e. all epidemiologists are located together in one organized epidemiology unit).
- Individual epidemiologists are located within specific programs (i.e. chronic disease epidemiologists are located within the chronic disease program area).
- A combination of the above choices (i.e. epidemiology has a separate unit, however, some epidemiologists are located within program specific areas). If YES, please see question 3a

**3a. What is the percentage of epidemiologists within each division?**

The sum of the numbers entered must equal 100.

<input type="text"/>	% of epidemiologists located within the epidemiology bureau, division, office, section, or unit?
<input type="text"/>	% of epidemiologists located within specific programs?
<input type="text"/>	<b>Total (Must equal 100%)</b>

**4. What is the extent of the epidemiology and surveillance capacity in the following program areas in your STATE HD? If needed, please seek the guidance of other State HD staff within program specific areas when completing this question. See below for a definition of the scale used in this question.**

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

<b>Bioterrorism / Emergency Response</b>	<b>Chronic Disease</b>	<b>Environmental Health</b>	<b>Infectious Disease</b>
<input type="checkbox"/> None*	<input type="checkbox"/> None*	<input type="checkbox"/> None*	<input type="checkbox"/> None*
<input type="checkbox"/> Minimal	<input type="checkbox"/> Minimal	<input type="checkbox"/> Minimal	<input type="checkbox"/> Minimal
<input type="checkbox"/> Partial	<input type="checkbox"/> Partial	<input type="checkbox"/> Partial	<input type="checkbox"/> Partial
<input type="checkbox"/> Substantial	<input type="checkbox"/> Substantial	<input type="checkbox"/> Substantial	<input type="checkbox"/> Substantial
<input type="checkbox"/> Almost Fully			
<input type="checkbox"/> Full	<input type="checkbox"/> Full	<input type="checkbox"/> Full	<input type="checkbox"/> Full
*If none, are you currently developing a program or have plans to implement one? <input type="checkbox"/> Yes <input type="checkbox"/> No	*If none, are you currently developing a program or have plans to implement one? <input type="checkbox"/> Yes <input type="checkbox"/> No	*If none, are you currently developing a program or have plans to implement one? <input type="checkbox"/> Yes <input type="checkbox"/> No	*If none, are you currently developing a program or have plans to implement one? <input type="checkbox"/> Yes <input type="checkbox"/> No
<b>Injury</b>	<b>Maternal and Child Health</b>	<b>Occupational Health</b>	<b>Oral Health</b>
<input type="checkbox"/> None*	<input type="checkbox"/> None*	<input type="checkbox"/> None*	<input type="checkbox"/> None*
<input type="checkbox"/> Minimal	<input type="checkbox"/> Minimal	<input type="checkbox"/> Minimal	<input type="checkbox"/> Minimal
<input type="checkbox"/> Partial	<input type="checkbox"/> Partial	<input type="checkbox"/> Partial	<input type="checkbox"/> Partial
<input type="checkbox"/> Substantial	<input type="checkbox"/> Substantial	<input type="checkbox"/> Substantial	<input type="checkbox"/> Substantial
<input type="checkbox"/> Almost Fully			
<input type="checkbox"/> Full	<input type="checkbox"/> Full	<input type="checkbox"/> Full	<input type="checkbox"/> Full
*If none, are you currently developing a program or have plans to implement one? <input type="checkbox"/> Yes <input type="checkbox"/> No	*If none, are you currently developing a program or have plans to implement one? <input type="checkbox"/> Yes <input type="checkbox"/> No	*If none, are you currently developing a program or have plans to implement one? <input type="checkbox"/> Yes <input type="checkbox"/> No	*If none, are you currently developing a program or have plans to implement one? <input type="checkbox"/> Yes <input type="checkbox"/> No

5. Does your STATE HD have adequate epidemiologic capacity to provide the following four essential public health services? Please click [here](#) for a list of the essential public health services. See below for a definition of the scale used in this question.

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

Monitoring health status to identify and solve community health problems	Diagnosing and investigating health problems and health hazards in the community	Evaluating effectiveness, accessibility, and quality of personal and population-based health services	Researching for new insights and innovative solutions to health problems
<input type="checkbox"/> Not at all	<input type="checkbox"/> Not at all	<input type="checkbox"/> Not at all	<input type="checkbox"/> Not at all
<input type="checkbox"/> Minimally	<input type="checkbox"/> Minimally	<input type="checkbox"/> Minimally	<input type="checkbox"/> Minimally
<input type="checkbox"/> Partially	<input type="checkbox"/> Partially	<input type="checkbox"/> Partially	<input type="checkbox"/> Partially
<input type="checkbox"/> Substantially	<input type="checkbox"/> Substantially	<input type="checkbox"/> Substantially	<input type="checkbox"/> Substantially
<input type="checkbox"/> Almost Fully	<input type="checkbox"/> Almost Fully	<input type="checkbox"/> Almost Fully	<input type="checkbox"/> Almost Fully
<input type="checkbox"/> Full	<input type="checkbox"/> Full	<input type="checkbox"/> Full	<input type="checkbox"/> Full

**Questions 6-10**

Describe the **number** of individuals currently working as epidemiologists in the following areas in your STATE HD by the highest degree the individual has received. In addition, please describe the estimate of need of epidemiologists to address the Essential Public Health Services, the number epidemiologists paid for with federal bioterrorism (BT) funds, the number of epidemiologists on contract, the number of epidemiologists that plan to retire within the next five years and the number of epidemiologists with five years or more of epidemiology experience.

Please NOTE, Questions 7-10 correspond to the total number of individuals in question 6.

If needed, please seek the guidance of other State HD staff within program specific areas when completing this question.

**Example**

- **Q6.** Please indicate the total number of epidemiologists working by program area and highest degree earned. If an epidemiologist has responsibilities divided over more than one program area, please count the epidemiologist in the program specific area that the individual has greatest responsibility (i.e. spends most of his/her time). Please click [here](#) to see who should be counted as an epidemiologist. Half time employees should be designated as 0.5 (1/2).
- **Q8.** Please indicate the total number of epidemiologists whose position is paid for with Federal Bioterrorism (BT) funds by program area and highest degree earned. If an individual only receives partial BT funding, exact decimal numbers may be used. For example, an individual whose position is paid for with 50% BT funding would be described as 0.50.
- **Q9.** Please indicate the total number of epidemiologists that are contract employees by program area and highest degree earned.
- **Q10.** Please indicate the total number of epidemiologists that plan to retire or charge careers out of epidemiology in the next five years by program area and highest degree earned.
- **Q10a.** Please indicate the total number of epidemiologists with at least five years experience working as an epidemiologist by program area and highest degree earned.
- **Q13.** Please indicate the total number of epidemiologists by highest level of epidemiology training received by program area.

Example Epidemiologists (MD) working within Bioterrorism/Emergency Response	Q6. Current Number	Q7. Estimate of Need	Q8. Number Paid for with Federal BT funds	Q9. Number on Contract	Q10. Number planning to retire or change careers out of epidemiology in the next 5 years	Q10a. Number with > 5 years experience. as Epi.
<b>Degree</b>						
MD, DO	10	15	5	0	1	10

Use decimals if necessary. See instructions for Q8 above.

Please enter your responses for Q6-10 for each program area below. This question will be repeated for all 8 program areas which include BT/ER, Chronic Disease, Environmental Health, Infectious Disease, Injury, Maternal and Child Health, Occupational Health, and Oral Health.

For assistance in collecting data, please click [here](#) for worksheets and instructions on how to capture information at the individual epidemiologist level.

### Bioterrorism Emergency Response

<ul style="list-style-type: none"> <li>Enter 0 for none</li> <li>Describe half-time employees as ½</li> <li>List by highest Degree</li> </ul>	Q6. Current Number	Q7. Estimate of Need	Q8. Number Paid for with Federal BT funds	Q9. Number on Contract	Q10. Number planning to retire or change careers out of epidemiology in the next 5 years	Q10a. Number with > 5 years exp. as Epi.
<b>Degree</b>						
MD, DO						
DDS						
DVM						
PhD, DrPH, other doctoral						
MPH, MSPH, other master						
BA, BS, BSN, other bachelor						
Associate or no post high school degree						

### Chronic Disease

<ul style="list-style-type: none"> <li>Enter 0 for none</li> <li>Describe half-time employees as ½</li> <li>List by highest Degree</li> </ul>	Q6. Current Number	Q7. Estimate of Need	Q8. Number Paid for with Federal BT funds	Q9. Number on Contract	Q10. Number planning to retire or change careers out of epidemiology in the next 5 years	Q10a. Number with > 5 years exp. as Epi.
<b>Degree</b>						
MD, DO						
DDS						
DVM						
PhD, DrPH, other doctoral						
MPH, MSPH, other master						
BA, BS, BSN, other bachelor						
Associate or no post high school degree						

### Environmental Health

<ul style="list-style-type: none"> <li>• Enter 0 for none</li> <li>• Describe half-time employees as ½</li> <li>• List by highest Degree</li> </ul>	Q6. Current Number	Q7. Estimate of Need	Q8. Number Paid for with Federal BT funds	Q9. Number on Contract	Q10. Number planning to retire or change careers out of epidemiology in the next 5 years	Q10a. Number with > 5 years exp. as Epi.
<b>Degree</b>						
MD, DO						
DDS						
DVM						
PhD, DrPH, other doctoral						
MPH, MSPH, other master						
BA, BS, BSN, other bachelor						
Associate or no post high school degree						

### Infectious Disease

<ul style="list-style-type: none"> <li>• Enter 0 for none</li> <li>• Describe half-time employees as ½</li> <li>• List by highest Degree</li> </ul>	Q6. Current Number	Q7. Estimate of Need	Q8. Number Paid for with Federal BT funds	Q9. Number on Contract	Q10. Number planning to retire or change careers out of epidemiology in the next 5 years	Q10a. Number with > 5 years exp. as Epi.
<b>Degree</b>						
MD, DO						
DDS						
DVM						
PhD, DrPH, other doctoral						
MPH, MSPH, other master						
BA, BS, BSN, other bachelor						
Associate or no post high school degree						

## Injury

<ul style="list-style-type: none"> <li>Enter 0 for none</li> <li>Describe half-time employees as ½</li> <li>List by highest Degree</li> </ul>	Q6. Current Number	Q7. Estimate of Need	Q8. Number Paid for with Federal BT funds	Q9. Number on Contract	Q10. Number planning to retire or change careers out of epidemiology in the next 5 years	Q10a. Number with > 5 years exp. as Epi.
<b>Degree</b>						
MD, DO						
DDS						
DVM						
PhD, DrPH, other doctoral						
MPH, MSPH, other master						
BA, BS, BSN, other bachelor						
Associate or no post high school degree						

## Maternal and Child Health

<ul style="list-style-type: none"> <li>Enter 0 for none</li> <li>Describe half-time employees as ½</li> <li>List by highest Degree</li> </ul>	Q6. Current Number	Q7. Estimate of Need	Q8. Number Paid for with Federal BT funds	Q9. Number on Contract	Q10. Number planning to retire or change careers out of epidemiology in the next 5 years	Q10a. Number with > 5 years exp. as Epi.
<b>Degree</b>						
MD, DO						
DDS						
DVM						
PhD, DrPH, other doctoral						
MPH, MSPH, other master						
BA, BS, BSN, other bachelor						
Associate or no post high school degree						

### Occupational Health

<ul style="list-style-type: none"> <li>• Enter 0 for none</li> <li>• Describe half-time employees as ½</li> <li>• List by highest Degree</li> </ul>	Q6. Current Number	Q7. Estimate of Need	Q8. Number Paid for with Federal BT funds	Q9. Number on Contract	Q10. Number planning to retire or change careers out of epidemiology in the next 5 years	Q10a. Number with > 5 years exp. as Epi.
<b>Degree</b>						
MD, DO						
DDS						
DVM						
PhD, DrPH, other doctoral						
MPH, MSPH, other master						
BA, BS, BSN, other bachelor						
Associate or no post high school degree						

### Oral Health

<ul style="list-style-type: none"> <li>• Enter 0 for none</li> <li>• Describe half-time employees as ½</li> <li>• List by highest Degree</li> </ul>	Q6. Current Number	Q7. Estimate of Need	Q8. Number Paid for with Federal BT funds	Q9. Number on Contract	Q10. Number planning to retire or change careers out of epidemiology in the next 5 years	Q10a. Number with > 5 years exp. as Epi.
<b>Degree</b>						
MD, DO						
DDS						
DVM						
PhD, DrPH, other doctoral						
MPH, MSPH, other master						
BA, BS, BSN, other bachelor						
Associate or no post high school degree						

11. Are there other current epidemiologists in other epidemiology and surveillance programs that are not listed in question 6?

Yes  No

Number of current epidemiologists in other epidemiology and surveillance programs that are not listed in Q6?

What program areas are these epidemiologists located? (Please list all program areas that apply)

1.
2.
3.
4.
5.

12. This question is intended to determine the number of epidemiologists working in city, county, and regional jurisdictions. Please provide the number of epidemiologists working in the jurisdictions below:

Jurisdiction	12a. Are Epidemiologists within this jurisdiction included in Q6?	12b. Number of epidemiologists working at this jurisdiction?	12c. Is the count in 12b an estimate?
City/Metro	Yes No Unknown		Yes No
County	Yes No Unknown		Yes No
Regional	Yes No Unknown		Yes No
Other: <input type="text"/>	Yes No Unknown		Yes No

**13. Referring to question 6, how many of the listed STATE HD epidemiologists *currently* employed have formal academic training in epidemiology? If needed, please seek the guidance of other State HD staff within program specific areas when completing this question.**

**For assistance in collecting data at the individual epidemiologist level and to determine who to count as an epidemiologist, please click [here](#).**

**Examples:**

- 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 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 or 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**.

Your data previously entered in Question 6 is included in the yellow box below. These numbers include the total number of epidemiologists you entered by program area. Please indicate the epidemiology training for these epidemiologists according to the categories listed below. The numbers you enter by program area will automatically be summed and will be indicated in the green box at the bottom of the table. If the totals differ than what was entered into question six, the green box will turn red and you will not be able to continue.

<ul style="list-style-type: none"> <li>• Enter 0 for none</li> <li>• Describe half-time employees as ½</li> <li>• List by highest Degree</li> </ul>	BT / Emergency Response	Chronic Disease	Enviro. Health	Infectious Disease	Injury	Maternal & Child Health	Occ. Health	Oral Health
<b>Total from Q6</b>								
<b>Level of academic training in Epidemiology</b>								
1 PhD, DrPH, other doctoral degree in <i>Epidemiology</i>								
2 Professional background (e.g. MD, DO, DVM, DDS, etc.) with a dual degree in <i>Epidemiology</i>								
3 MPH, MSPH, other master degree in <i>Epidemiology</i>								
4 BA, BS, other bachelor degree in <i>Epidemiology</i>								
5 Completed formal training program in <i>Epidemiology</i> (e.g. EIS)								
6 Completed some coursework in <i>Epidemiology</i>								
7 Received on the job training in <i>Epidemiology</i>								
8 No formal training in <i>Epidemiology</i> (i.e. epidemiologist does not fit into any of the above categories)								
9 Unknown								
<b>Subtotal</b>								

**PART II – 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, please contact [ECA@cste.org](mailto:ECA@cste.org).

**Part A - Workforce Competency**

This section is intended to ascertain competency in selected areas as defined by the CDC/CSTE Applied Epidemiology Competencies accessible at: <http://www.cste.org/competencies.asp>. This part of the “training” section is also designed to collect information regarding availability, access and barriers to training. All questions within this section should be based on the perspective of the State Epidemiologist or a senior level health official within this agency.

**1. Providing continuing education for epidemiology staff is a problem in our organization.**

No Problem Major Problem Don't know

1  2  3  4  5

**2. In the past twelve months, has the STATE HD supported training or education to enhance the competence of epidemiologists in performing the essential public health services? Please click [here](#) for a list of the essential public health services.**

Yes

No

Don't Know

**3. Epidemiology Competencies\*: Please describe the competence and training need in the following selected areas:**

Strongly Agree <-----> Strongly Disagree	Don't Know						Staff are competent in this area					Additional training is needed						
	1	2	3	4	5	?	1	2	3	4	5	?	1	2	3	4	5	?
<b>Epidemiology Capacities</b>																		
Use critical thinking to determine existence of public health problem	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>						
Articulate need for investigation from literature review and data assessment	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>						
Collaborate with others to identify problems and form recommendations	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>						
Design surveillance for public health issue & identify surveillance data needs	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>						
Implement/revise a surveillance system & identify key surveillance findings	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>						
Conduct evaluation of surveillance systems	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>						

Conduct a community health status assessment and prioritize identified issues	<input type="checkbox"/>												
Assist in design of an investigation including hypotheses generation	<input type="checkbox"/>												
Follow ethics guidelines/principles in studies, research, and data use	<input type="checkbox"/>												
Describe differences between public health practice and research	<input type="checkbox"/>												
Describe human subjects' research & apply IRB processes	<input type="checkbox"/>												
Apply privacy laws to protect confidentiality including HIPAA	<input type="checkbox"/>												
Create and manage a database	<input type="checkbox"/>												
Create analysis plan and conduct analysis of data	<input type="checkbox"/>												
Apply epidemiologic principles to make recommendations on data validity	<input type="checkbox"/>												
Assess the limitations of study's results	<input type="checkbox"/>												
Establish cultural/social/political basis for recommendations/interventions	<input type="checkbox"/>												
Utilize scientific evidence to support actions or interventions	<input type="checkbox"/>												
Develop measurable and relevant goals and objectives	<input type="checkbox"/>												
Develop program logic models and theories of action	<input type="checkbox"/>												
Apply epidemiologic principles to make recommendations on data validity	<input type="checkbox"/>												
Assess the limitations of study's results.	<input type="checkbox"/>												
Apply understanding of causes of disease in practicing epidemiology	<input type="checkbox"/>												
Use knowledge of environmental and behavioral sciences in epidemiology practice	<input type="checkbox"/>												
Apply knowledge of laboratory resources to support epidemiologic practice	<input type="checkbox"/>												
Employ appropriate statistical and communication software	<input type="checkbox"/>												
Communicate epi findings orally and in writing to non-professional audiences	<input type="checkbox"/>												
Demonstrate the skills and principles of risk communication	<input type="checkbox"/>												
Convene and provide appropriate data for community planning processes	<input type="checkbox"/>												
Practice culturally appropriate epidemiological activities	<input type="checkbox"/>												
Apply appropriate fiscal and administrative guidelines to epidemiology practice	<input type="checkbox"/>												
Use leadership, systems thinking in epi planning and policy development	<input type="checkbox"/>												

**\*Tier 2 competencies were selected as a general level of assessment for all epidemiologists**

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

Epidemiology Capacities	Yes	No	Don't Know
Require continuing education in epidemiology and surveillance	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Include education and training objectives in performance review	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Pay for formal training or education outside your organization ( conferences or seminars)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Provide on-site trainings (epidemiology seminars, etc)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Provide access to distance learning or internet/web based courses	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Provide training or education to epidemiologists at the local level	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Has staff position(s) responsible for internal training	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<b>Provide training in collaboration with any of the following organizations / groups:</b>			
Centers for Disease Control and Prevention (CDC)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Schools of Public Health	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Schools of Medicine	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Schools of Veterinary Medicine	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Other Academic Institutions	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Centers for Public Health Preparedness	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
HRSA Training Centers	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Other Healthcare Organizations	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Other Federal/Government Agencies	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Public Safety/First Responders	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Other Healthcare Providers	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Other (specify) <input type="text"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

**Part B- RECRUITMENT AND RETENTION**

This section is intended to focus on existing practices, incentives and barriers aimed at strengthening the epidemiology workforce at 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.

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

Not a problem <-----> Major Problem						
1	2	3	4	5		
<b>Epidemiology Capacities</b>		1	2	3	4	5
Salary scale	<input type="checkbox"/>					
Enough qualified applicants	<input type="checkbox"/>					
Personnel policies and procedures (e.g. hiring)	<input type="checkbox"/>					
Job benefits (e.g. health, retirement)	<input type="checkbox"/>					
Job security	<input type="checkbox"/>					
Job location	<input type="checkbox"/>					
Opportunity for promotion	<input type="checkbox"/>					
Travel required	<input type="checkbox"/>					
Travel permitted	<input type="checkbox"/>					
Job Interests/Fulfillment	<input type="checkbox"/>					
Opportunities for Training	<input type="checkbox"/>					
Limitations recruiting outside your organization	<input type="checkbox"/>					
Restrictions on choosing best candidate	<input type="checkbox"/>					
Restrictions on hiring quickly enough	<input type="checkbox"/>					
Restrictions on offering competitive pay	<input type="checkbox"/>					
Hiring freezes	<input type="checkbox"/>					
Other factor? (specify) <input type="text"/>	<input type="checkbox"/>					

**2. To what extent is each of these factors a problem in retaining epidemiologists?**

Not a problem <-----> Major Problem

1            2            3            4            5

<b>Epidemiology Capacities</b>	1	2	3	4	5
Salary scale	<input type="checkbox"/>				
Personnel policies and procedures (e.g. hiring)	<input type="checkbox"/>				
Job benefits (e.g. health, retirement)	<input type="checkbox"/>				
Job security	<input type="checkbox"/>				
Job location	<input type="checkbox"/>				
Opportunity for promotion	<input type="checkbox"/>				
Travel required	<input type="checkbox"/>				
Travel permitted	<input type="checkbox"/>				
Job Interests/Fulfillment	<input type="checkbox"/>				
Opportunities for training	<input type="checkbox"/>				
Loss to private or gov't sector	<input type="checkbox"/>				
Restrictions on merit raises	<input type="checkbox"/>				
Restrictions on travel outside jurisdiction	<input type="checkbox"/>				
Other factor? (specify) <input type="text"/>	<input type="checkbox"/>				

**3. The following are useful recruitment settings or activities for our organization:**

<b>Epidemiology Capacities</b>	Yes	No	Don't know
Universities/schools of public health	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Recruitment job fairs	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Professional organizations (CSTE, APHA, ASPH, ACE, etc.)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Federal programs (EIS, PHPS, CEFO)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Other health agencies within the state	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Local media	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Epi Monitor or periodic epidemiology newsletter	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
State and/or local government websites	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Public Health career websites (Emory Public Health Employment Connection)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

4. What number of your epidemiology staff have a joint appointment or partnership with: 1) a university, academic center, or related institution (i.e., non-profit), and 2) CDC employed epidemiologist (i.e., CEFO, EIS, etc.)?

a university, academic center, or related institution (i.e., non-profit)

CDC employed epidemiologist (i.e., CEFO, EIS, etc.)

5. For epidemiology/surveillance staff at the Masters' degree and above level, please estimate the number of staff resigning, retiring, or released during calendar year 2005.

An annual turnover rate will be calculated based on the number you provide below and the numbers entered in question 6.

Number of epidemiology staff with a Master degree or higher that resigned, retired, or were released during calendar year 2005 within the 8 program areas (BT, CD, EH, ID, IJ, MCH, OH, and OrH) and other

6. Have you initiated any formal planning to maintain epidemiology senior level management for the next 5 years in the event of staff retirement and other turnover?

Yes

No

Unknown

**Thank you for completing this assessment.** The information submitted by your state will be used to sketch out regional and national trends in epidemiology capacity, and findings will be shared with all participating agencies. However, CSTE will not release state-specific information in any reports unless otherwise approved by the state(s).

Please provide your comments in the following box. What topics should or should not be covered? Did you have difficulty estimating or understanding specific questions contained in this assessment? Do you have any additional suggestions?



## 2006 Epidemiology Capacity Assessment

### Individual Assessment Data Collection Worksheets

The Council of State and Territorial Epidemiologists (CSTE) appreciates your support in completing the 2006 Epidemiology Capacity Assessment (ECA). In order to assist you in collecting the necessary data to complete this survey, we have included three worksheets for your use which are described below.

**Worksheet 1** and **Worksheet 2** are for you to distribute to each of your epidemiologists to complete. You may use one or both forms at your discretion to assist in data collection. The purpose of these forms is to collect detailed information at the individual epidemiologist level and include questions regarding program area of work, degree information, position funding sources (contract or federal bioterrorism funding), career plans, public health experience and level of epidemiology training. Once all individual epidemiologists have completed either **Worksheet 1** or **Worksheet 2**, the totals to questions 6, 8, 9, 10, 10a, 13 and question 4 from Part IIB can be tallied using **Worksheet 3** and entered on the online assessment at <http://www.cste.org/assessment/eca06/index.asp>.

For question 8a, please sum the number of positions that are funded by Federal Bioterrorism funds. Positions that are only partially funded (less than 100%) may be identified using a number less than 1. For example, positions that are only 33% funded by Federal Bioterrorism Funds should be indicated by using a 0.33 (33%). Positions that are 100% funded by Federal Bioterrorism funds should be indicated by using a 1 (100%). The **total** percentage of all epidemiologists whose position is at least partially paid for by Federal Bioterrorism funds should be entered in the online assessment under question 8.

Instructions on who should be counted as an epidemiologist can be found at <http://www.cste.org/assessment/eca06/core2.asp>. Once information has been collected for all epidemiologists, please make copies of **Worksheet 3** as needed to tally the information. Once the final data has been collected and calculated, information may be entered on the online assessment at <http://www.cste.org/assessment/eca06/index.asp>.

For questions, please contact [eca@cste.org](mailto:eca@cste.org)

## 2006 Epidemiology Capacity Assessment

### INSTRUCTIONS

1. Distribute **Worksheet 1** or **Worksheet 2** to all state health agency epidemiologists and ask them to complete.
2. Have the Primary Coordinator for your state collect worksheets and use **Worksheet #3** to tally the information. **Worksheet #3** should be copied as needed for each program area.
3. Transfer the information from **Worksheet #3** to the online assessment <http://www.cste.org/assessment/eca06/index.asp> link.
4. The complete questions below are those needed to complete questions 6-10, question 13, and question 4 (Part IIB) on the online assessment:

**Q6.** Please indicate the total number of epidemiologists working by program area and highest degree earned.

If an epidemiologist has responsibilities divided over more than one program area, please count the epidemiologist in the program specific area that the individual has greatest responsibility (i.e. spends most of his/her time). If the epidemiologist spends equal time between more than one program area, please count the individual as a part time employee and complete questions 6-10 and question 13 for each applicable program area. For example, if an epidemiologist spends equal time between two program areas, the epidemiologist should be counted as a 0.5 employee for each applicable program area.

**Q8.** Please indicate the total number of epidemiologists whose position is paid for with Federal Bioterrorism (BT) funds by program area and highest degree earned.

If an individual only receives partial BT funding, exact decimal numbers may be used. For example, an individual whose position is paid for with 50% BT funding would be described as 0.50.

**Q9.** Please indicate the total number of epidemiologists that are contract employees by program area and highest degree earned.

**Q10.** Please indicate the total number of epidemiologists that plan to retire or change careers out of epidemiology in the next five years by program area and highest degree earned.

**Q10a.** Please indicate the total number of epidemiologists with at least five years experience working as an epidemiologist by program area and highest degree earned.

**Q13.** Please indicate the total number of epidemiologists by highest level of epidemiology training received by program area.

**Q4, Part IIB.** Please indicate the total number of epidemiologists with joint appointments or partnerships with 1) A university, academic center, or related institution (i.e., non-profit) or 2) CDC employed epidemiologist.

## 2006 Epidemiology Capacity Assessment WORKSHEET #1

What is your name or initials? \_\_\_\_\_

What program area do you work? *If an epidemiologist has responsibilities divided over more than one program area, please count the epidemiologist in the program specific area that the individual has greatest responsibility (i.e. spends most of his/her time). If the epidemiologist spends equal time between more than one program area, please count the individual as a part time employee and complete questions 6-10 and question 13 for each applicable program area. For example, if an epidemiologist spends equal time between two program areas, the epidemiologist should be counted as a 0.5 employee for each applicable program area.*

- |  |   |
|--|---|
| <input type="checkbox"/> Bioterrorism/Emergency Response | <input type="checkbox"/> Maternal and Child Health                |
| <input type="checkbox"/> Chronic Disease                 | <input type="checkbox"/> Occupational Health                      |
| <input type="checkbox"/> Environmental Health            | <input type="checkbox"/> Oral Health                              |
| <input type="checkbox"/> Infectious Disease              | <input type="checkbox"/> Other (None of the program areas listed) |
| <input type="checkbox"/> Injury                          |   |

How many hours per week do you work within this program area? \_\_\_\_\_

**Note:** Questions 1-5, 7, 11 and 12 will be completed by the State Epidemiologist and/or appointed delegate as necessary.

6. What is the highest degree you have obtained?

(Choose ONE)

- A. MD, DO
- B. DDS
- C. DVM
- D. PhD, DrPH, other doctoral
- E. MPH, MSPH, other master
- F. BA, BS, BSN, other bachelor
- G. Associate/no post high school degree

8. Is your position paid for with Federal Bioterrorism Funds?  Yes  No

8a. If **YES**, what percentage (1-100%) of your position is paid for with Federal Bioterrorism Funds? \_\_\_%

9. Are you a contract employee?  Yes  No

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

10a. Do you have at least five years experience as an epidemiologist?  Yes  No

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

- 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**
- 6. Completed some coursework in **Epidemiology**
- 7. Received on the job training in **Epidemiology**
- 8. No formal training in **Epidemiology**

4 (Part IIB): Do you have a joint appointment or partnership with:

A) a university, academic center, or related institution (i.e., non-profit)?  Yes  No

B) CDC employed epidemiologist (i.e., CEFO, EIS, etc.)?  Yes  No

## 2006 Epidemiology Capacity Assessment WORKSHEET #2

Please refer to the complete questionnaire for instructions on how to answer individual questions	What program area(s) do you work?	Employment Status	Highest Degree Obtained (A-G)?	Is your position paid for with Federal BT Funds?	If YES to Q8, what percentage (1-100%) of your position is paid for with Federal Bioterrorism Funds?	Are you a contract Employee?	Do you plan to retire or change careers out of epidemiology within the next 5 years?	Do you have at least five years experience working as an epidemiologist?	Level of Epidemiology Training (1-8)?	Joint appointment or partnership with?		
Name/Initials	Q6			Q8	Q8A	Q9	Q10	Q10a	Q13	Q4, Part IIB		
EXAMPLE	Please refer to KEY 1 below. Refer to the online directions if <u>more than one</u> program area is indicated. Indicate <i>other</i> if your program area is not listed.	Answer 0-1. For example, full time employees should indicate 1 (100%). Half time employees should indicate 0.5 (50%).	Please refer to KEY 2 below							Please refer to KEY 3 below	University, Academic Center, or Related Institution?	CDC?
John Smith	BT	0.5	A (MD)	Yes	50% (0.5)	Yes	No	No	2 (MD, MPH)	Yes	No	
1												
2												
3												
4												
5												
6												
7												
8												
9												
10												
11												
12												
13												
14												
15												
16												
17												
18												
19												
20												

KEY 1 - Program Area		KEY 2 - Highest Degree		KEY 3 - Level of Epidemiology Training	
Bioterrorism/Emergency Response	BT	MD, DO	A	PhD, DrPH, other doctoral degree in Epidemiology	1
Chronic Disease	CD	DDS	B	Professional background with dual degree in Epidemiology	2
Environmental Health	EH	DVM	C	MPH, MSPH, other master degree in Epidemiology	3
Infectious Disease	ID	PhD, DrPH, other doctoral	D	BA, BS, other bachelor degree in Epidemiology	4
Injury	IJ	MPH, MSPH, other master	E	Completed formal training program in Epidemiology	5
Maternal and Child Health	MC	BA, BS, BSN, other bachelor	F	Completed some coursework in Epidemiology	6
Occupational Health	OH	Associate/no post high school degree	G	Received on the job training in Epidemiology	7
Oral Health	OR			No formal training in Epidemiology	8

## 2006 Epidemiology Capacity Assessment WORKSHEET #3

Program Area: \_\_\_\_\_ (BT, CD, EH, ID, IJ, MCH, OH, OrH)

Please make copies as needed. The table below for questions 6-10 should be completed for each of the eight program areas\*.

### Questions 6-10\*

<ul style="list-style-type: none"> <li>• Enter 0 for none</li> <li>• Describe half-time employees as <math>\frac{1}{2}</math></li> <li>• List by highest Degree</li> </ul>	Q6. Current Number	Q8. Number Paid for with Federal BT funds	Q9. Number on Contract	Q10. Plan to retire or change careers out of Epidemiology in the next 5 years	Q10a. Number with > 5 years exp. as Epi.
<b>Degree</b>					
MD, DO (A)					
DDS (B)					
DVM (C)					
PhD, DrPH, other doctoral (D)					
MPH, MSPH, other master (E)					
BA, BS, BSN, other bachelor (F)					
Associate or no post high school degree (G)					

### Question 13

<ul style="list-style-type: none"> <li>• Enter 0 for none</li> <li>• Describe half-time employees as <math>\frac{1}{2}</math></li> <li>• List by highest Degree</li> </ul>	BT	CD	EH	ID	IJ	MCH	OH	OrH
PhD, DrPH, other doctoral degree in <i>Epidemiology</i> (1)								
Professional background (e.g. MD, DO, DVM, DDS, etc.) with a dual degree in <i>Epidemiology</i> (2)								
MPH, MSPH, other master degree in <i>Epidemiology</i> (3)								
BA, BS, other bachelor degree in <i>Epidemiology</i> (4)								
Completed formal training program in <i>Epidemiology</i> (e.g. EIS) (5)								
Completed some coursework in <i>Epidemiology</i> (6)								
Received on the job training in <i>Epidemiology</i> (7)								
No formal training in <i>Epidemiology</i> (i.e. epidemiologist does not fit into any of the above categories) (8)								
Unknown								

\*BT = Bioterrorism/Emergency Response; CD = Chronic Disease; EH = Environmental Health; IJ = Injury; MCH = Maternal and Child Health; OH = Occupational Health; OrH = Oral Health

### **Question 4, Part II B: Total number with a joint appointment or partnership with:**

- A) A university, academic center, or related institution (i.e., non-profit)? \_\_\_\_  
 B) CDC employed epidemiologist (i.e., CEFO, EIS, etc.)? \_\_\_\_



**CDC/CSTE Applied Epidemiology Competencies for Governmental Public Health Agencies**

**I. Skill Domain—Assessment and Analysis**

<b>Tier 1: Entry-level or Basic Epidemiologist</b>	<b>Tier 2: Mid-Level Epidemiologist</b>	<b>Tier 3a: Senior-Level Epidemiologist: Supervisor and/or Manager</b>	<b>Tier 3b: Senior Scientist/Subject Area Expert</b>
<i>A. Recognize public health problems pertinent to the population</i>	<i>A. Identify public health problems pertinent to the population</i>	<i>A. Ensure identification of public health problems pertinent to the population</i>	<i>A. Validate identification of public health problems pertinent to the population</i>
<i>B. Conduct surveillance activities</i>	<i>B. Conduct surveillance activities</i>	<i>B. Oversee surveillance activities</i>	<i>B. Organize surveillance</i>
<i>C. Identify acute and chronic conditions or other adverse outcomes in the population</i>	<i>C. Investigate acute and chronic conditions or other adverse outcomes in the population</i>	<i>C. Ensure investigation of acute and chronic conditions or other adverse outcomes in the population</i>	<i>C. Design investigation of acute and chronic conditions or other adverse outcomes in the population</i>
<i>D. Apply principles of good ethical/legal practice as they relate to study design and data collection, dissemination, and use</i>	<i>D. Apply principles of good ethical/legal practice as they relate to study design and data collection, dissemination, and use</i>	<i>D. Ensure study design and data collection, dissemination, and use follow ethical/legal principles</i>	<i>D. Synthesize principles of good ethical/legal practice for application to study design and data collection, dissemination, and use</i>
<i>E. Organize data from surveillance, investigations, or other sources</i>	<i>E. Manage data from surveillance, investigations, or other sources</i>	<i>E. Ensure management of data from surveillance, investigations, or other sources</i>	<i>E. Manage data from surveillance, investigations, or other sources</i>
<i>F. Analyze data from an epidemiologic investigation or study</i>	<i>F. Analyze data from an epidemiologic investigation or study</i>	<i>F. Evaluate analysis of data from an epidemiologic investigation or study</i>	<i>F. Evaluate data from an epidemiologic investigation or study</i>
<i>G. Summarize results of the analysis, and draw conclusions</i>	<i>G. Summarize results of the analysis, and draw conclusions</i>	<i>G. Evaluate conclusions and interpretations from investigation</i>	<i>G. Evaluate results of the analysis, and interpret conclusions</i>
<i>H. Assist in developing recommended evidence-based interventions and control measures in response to epidemiologic findings</i>	<i>H. Recommend evidence-based interventions and control measures in response to epidemiologic findings</i>	<i>H. Determine evidence-based interventions and control measures in response to epidemiologic findings</i>	<i>H. Formulate new interventions on the basis of evidence when available, and control measures in response to epidemiologic findings</i>
<i>I. Assist in evaluation of programs</i>	<i>I. Evaluate programs</i>	<i>I. Ensure evaluation of programs</i>	<i>I. Evaluate programs</i>

**CDC/CSTE Applied Epidemiology Competencies for Governmental Public Health Agencies**

**II. Skill Domain—Basic Public Health Sciences**

<b>Tier 1: Entry-level or Basic Epidemiologist</b>	<b>Tier 2: Mid-Level Epidemiologist</b>	<b>Tier 3a: Senior-Level Epidemiologist: Supervisor and/or Manager</b>	<b>Tier 3b: Senior Scientist/Subject Area Expert</b>
<i>A. Know how causes of disease affect epidemiologic practice</i>	<i>A. Use current knowledge of causes of disease to guide epidemiologic practice</i>	<i>A. Use current knowledge of causes of disease to guide epidemiologic practice</i>	<i>A. Use current knowledge of causes of disease to guide epidemiologic practice</i>
<i>B. Identify the role of laboratory resources in epidemiologic activities</i>	<i>B. Use laboratory resources to support epidemiologic activities</i>	<i>B. Ensure the use of laboratory resources to support epidemiologic activities</i>	<i>B. Develop processes for using laboratory resources to support epidemiologic activities</i>
<i>C. Use identified informatics tools in support of epidemiologic practice</i>	<i>C. Apply principles of informatics, including data collection, processing, and analysis, in support of epidemiologic practice</i>	<i>C. Ensure application of principles of informatics, including data collection, processing, and analysis, in support of epidemiologic practice</i>	<i>C. Apply principles of informatics, including data collection, processing, and analysis, in support of epidemiologic practice</i>
<i>D. N/A</i>	<i>D. N/A</i>	<i>D. Develop and manage information systems to improve effectiveness of surveillance, investigation, and other epidemiologic practices</i>	<i>D. Develop and manage information systems to improve effectiveness of surveillance, investigation, and other epidemiologic practices</i>

**CDC/CSTE Applied Epidemiology Competencies for Governmental Public Health Agencies**

III. Skill Domain—Communication

<b>Tier 1: Entry-level or Basic Epidemiologist</b>	<b>Tier 2: Mid-Level Epidemiologist</b>	<b>Tier 3a: Senior-Level Epidemiologist: Supervisor and/or Manager</b>	<b>Tier 3b: Senior Scientist/Subject Area Expert</b>
<i>A. Prepare written and oral reports and presentations that communicate necessary information to agency staff</i>	<i>A. Prepare written and oral reports and presentations that communicate necessary information to professional audiences, policy makers, and the general public</i>	<i>A. Ensure preparation of written and oral reports and presentations that communicate necessary information to professional audiences, policy makers, and the general public</i>	<i>A. Organize preparation of written and oral reports and presentations that communicate necessary information to professional audiences, policy makers, and the general public</i>
<i>B. Recognize the basic principles of risk communication</i>	<i>B. Demonstrate the basic principles of risk communication</i>	<i>B. Ensure that the basic principles of risk communication are followed in all communication of epidemiologic findings</i>	<i>B. Create messages that follow the principles of risk communication</i>
<i>C. Incorporate interpersonal skills in communication with agency personnel, colleagues, and the public</i>	<i>C. Incorporate interpersonal skills in communication with agency personnel, colleagues, and the public</i>	<i>C. Model interpersonal skills in communication with agency personnel, colleagues, and the public</i>	<i>C. Model interpersonal skills in communication with agency personnel, colleagues, and the public</i>
<i>D. Use effective communication technologies</i>	<i>D. Use effective communication technologies</i>	<i>D. Ensure utilization of effective communication technologies</i>	<i>D. Use effective communication technologies</i>

**CDC/CSTE Applied Epidemiology Competencies for Governmental Public Health Agencies**

IV. Skill Domain—Community Dimensions of Practice

<b>Tier 1: Entry-level or Basic Epidemiologist</b>	<b>Tier 2: Mid-Level Epidemiologist</b>	<b>Tier 3a: Senior-Level Epidemiologist: Supervisor and/or Manager</b>	<b>Tier 3b: Senior Scientist/Subject Area Expert</b>
<i>A. Provide epidemiologic input into epidemiologic studies, public health programs, and community public health planning processes at the state, local, or tribal level</i>	<i>A. Provide epidemiologic input into epidemiologic studies, public health programs, and community public health planning processes at the state, local, or tribal level</i>	<i>A. Lead epidemiologic studies, public health programs, and community public health planning processes at the state, local, or tribal level</i>	<i>A. Lead epidemiologic studies, public health programs, and community public health planning processes at the state, local, or tribal level</i>
<i>B. Participate in development of community partnerships to support epidemiologic investigations</i>	<i>B. Participate in development of community partnerships to support epidemiologic investigations</i>	<i>B. Develop community partnerships to support epidemiologic investigations</i>	<i>B. Develop community partnerships to support epidemiologic investigations</i>

**CDC/CSTE Applied Epidemiology Competencies for Governmental Public Health Agencies**

**V. Skill Domain—Cultural Competency**

<b>Tier 1: Entry-level or Basic Epidemiologist</b>	<b>Tier 2: Mid-Level Epidemiologist</b>	<b>Tier 3a: Senior-Level Epidemiologist: Supervisor and/or Manager</b>	<b>Tier 3b: Senior Scientist/Subject Area Expert</b>
<i>A. Describe population by race, ethnicity; culture; societal, educational, and professional backgrounds; age; sex; religion; disability; and sexual orientation</i>	<i>A. Describe population by race, ethnicity; culture; societal, educational, and professional backgrounds; age; sex; religion; disability; and sexual orientation</i>	<i>A. Differentiate special populations by race, ethnicity; culture; societal, educational, and professional backgrounds; age; sex; religion; disability; and sexual orientation</i>	<i>A. Differentiate special populations by race, ethnicity; culture; societal, educational, and professional backgrounds; age; sex; religion; disability; and sexual orientation</i>
<i>B. Establish relationships with groups of special concern (e.g., disadvantaged or minority groups, groups subject to health disparities, historically underrepresented groups)</i>	<i>B. Establish relationships with groups of special concern (e.g., disadvantaged or minority groups, groups subject to health disparities, historically underrepresented groups)</i>	<i>B. Establish relationships with groups of special concern (e.g., disadvantaged or minority groups, groups subject to health disparities, historically underrepresented groups)</i>	<i>B. Establish relationships with groups of special concern (e.g., disadvantaged or minority groups, groups subject to health disparities, historically underrepresented groups)</i>
<i>C. Describe surveillance systems that include groups subject to health disparities or other potentially underrepresented groups (using standard categories where available)</i>	<i>C. Design surveillance systems to include groups subject to health disparities or other potentially underrepresented groups (using standard categories where available)</i>	<i>C. Ensure that surveillance systems are designed to include groups subject to health disparities or other potentially underrepresented groups (using standard categories where available)</i>	<i>C. Ensure that surveillance systems are designed to include groups subject to health disparities or other potentially underrepresented groups (using standard categories where available)</i>
<i>D. Conduct investigations using languages and approaches tailored to population</i>	<i>D. Conduct investigations using languages and approaches tailored to population</i>	<i>D. Ensure that investigations use languages and approaches tailored to population</i>	<i>D. Organize investigations that use languages and approaches tailored to population</i>
<i>E. Use standard population categories or subcategories when performing data analysis</i>	<i>E. Use standard population categories or subcategories when performing data analysis</i>	<i>E. Ensure that standard population categories or subcategories are used for data analysis</i>	<i>E. Ensure that standard population categories or subcategories are used for data analyses</i>
<i>F. N/A</i>	<i>F. Use knowledge of specific sociocultural factors in the population to interpret findings</i>	<i>F. Use knowledge of specific sociocultural factors in the population to interpret findings</i>	<i>F. Use knowledge of specific sociocultural factors in the population to interpret findings</i>

**CDC/CSTE Applied Epidemiology Competencies for Governmental Public Health Agencies**

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V. Skill Domain—Cultural Competency

<b>Tier 1: Entry-level or Basic Epidemiologist</b>	<b>Tier 2: Mid-Level Epidemiologist</b>	<b>Tier 3a: Senior-Level Epidemiologist: Supervisor and/or Manager</b>	<b>Tier 3b: Senior Scientist/Subject Area Expert</b>
<i>G. Support public health actions that are relevant to the affected community</i>	<i>G. Recommend public health actions that would be relevant to the affected community</i>	<i>G. Ensure that actions are relevant to the affected community</i>	<i>G. Recommend actions that will be relevant to the affected community</i>

**CDC/CSTE Applied Epidemiology Competencies for Governmental Public Health Agencies**

VI. Skill Domain—Financial and Operational Planning and Management (Operational planning, financial planning, and management skills)

<b>Tier 1: Entry-level or Basic Epidemiologist</b>	<b>Tier 2: Mid-Level Epidemiologist</b>	<b>Tier 3a: Senior-Level Epidemiologist: Supervisor and/or Manager</b>	<b>Tier 3b: Senior Scientist/Subject Area Expert</b>
<i>A. Conduct epidemiologic activities within the financial and operational plan of the agency</i>	<i>Conduct epidemiologic activities within the financial and operational plan of the agency</i>	<i>A. Create operational and financial plans for future epidemiologic activities</i>	<i>A. Conduct epidemiologic activities within the financial and operational plan of the agency</i>
<i>B. Describe the financial planning and budgetary process of the epidemiology program</i>	<i>B. Assist in developing a fiscally sound budget that will support the activities defined in the operational plan and is consistent with the financial rules of the agency</i>	<i>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</i>	<i>B. Describe the financial planning and budgetary process of the agency</i>
<i>C. Implement operational and financial plans</i>	<i>C. Implement operational and financial plans</i>	<i>C. Oversee implementation of operational and financial plans</i>	<i>C. Implement operational and financial plans for assigned projects</i>
<i>D. N/A</i>	<i>D. Assist in preparation of proposals for extramural funding</i>	<i>D. Develop requests for proposals for extramural funding to support additional epidemiologic activities and special projects</i>	<i>D. Prepare proposals for extramural funding for review and input from managers</i>
<i>E. N/A</i>	<i>E. Use management skills</i>	<i>E. Use management skills</i>	<i>E. N/A</i>
<i>F. Use skills that foster collaborations, strong partnerships, and team building to accomplish epidemiology program objectives</i>	<i>F. Use skills that foster collaborations, strong partnerships, and team building to accomplish epidemiology program objectives</i>	<i>F. Promote collaborations, strong partnerships, and team building to accomplish epidemiology program objectives</i>	<i>F. Use skills that foster collaborations, strong partnerships, and team building to accomplish epidemiology program objectives</i>

**CDC/CSTE Applied Epidemiology Competencies for Governmental Public Health Agencies**

**VII. Skill Domain—Leadership and Systems Thinking**

<b>Tier 1: Entry-level or Basic Epidemiologist</b>	<b>Tier 2: Mid-Level Epidemiologist</b>	<b>Tier 3a: Senior-Level Epidemiologist: Supervisor and/or Manager</b>	<b>Tier 3b: Senior Scientist/Subject Area Expert</b>
A. <i>N/A</i>	A. <i>Support the epidemiologic perspective in the agency strategic planning process</i>	A. <i>Promote the epidemiologic perspective in the agency strategic planning process</i>	A. <i>Promote the epidemiologic perspective in the agency strategic planning process</i>
B. <i>Support the organization’s vision in all programs and activities</i>	B. <i>Promote the organization’s vision in all programs and activities</i>	B. <i>Lead the creation of epidemiology program’s vision in the context of the agency’s plan</i>	B. <i>Promote the organization’s vision in all programs and activities</i>
C. <i>Use performance measures to improve epidemiology program effectiveness</i>	C. <i>Use performance measures to evaluate and improve epidemiology program effectiveness</i>	C. <i>Use performance measures to evaluate and improve epidemiology program effectiveness</i>	C. <i>Use performance measures to evaluate and improve epidemiology program effectiveness</i>
D. <i>Promote ethical conduct in epidemiologic practice</i>	D. <i>Promote ethical conduct in epidemiologic practice</i>	D. <i>Promote ethical conduct in epidemiologic practice</i>	D. <i>Promote ethical conduct in epidemiologic practice</i>
E. <i>Practice professional development</i>	E. <i>Promote workforce development</i>	E. <i>Ensure professional development of epidemiology workforce</i>	E. <i>Promote workforce development</i>
F. <i>Prepare for emergency response</i>	F. <i>Prepare for emergency response</i>	F. <i>Lead epidemiology unit in preparing for emergency response</i>	F. <i>Prepare for emergency response</i>

**CDC/CSTE Applied Epidemiology Competencies for Governmental Public Health Agencies**

VIII. Skill Domain—Policy Development

<b>Tier 1: Entry-level or Basic Epidemiologist</b>	<b>Tier 2: Mid-Level Epidemiologist</b>	<b>Tier 3a: Senior-Level Epidemiologist: Supervisor and/or Manager</b>	<b>Tier 3b: Senior Scientist/Subject Area Expert</b>
<i>A. Support the application of epidemiologic knowledge to the development and analysis of public health policies</i>	<i>A. Bring epidemiologic perspective in the development and analysis of public health policies</i>	<i>A. Bring epidemiologic perspective in the development and analysis of public health policies</i>	<i>A. Bring epidemiologic perspective in the development and analysis of public health policies</i>

NOTES: