National Assessment of Epidemiologic Capacity in Chronic Disease: Findings and Recommendations

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Council of State and Territorial Epidemiologists

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EXECUTIVE SUMMARY

INTRODUCTION

Over the past 15 years federal, state and local public health agencies have established chronic disease primary and secondary prevention activities and programs due to the public health importance of chronic diseases and the availability of effective prevention and control strategies[2-6], The National Center for Chronic Disease Prevention and Health Promotion (NCCDPHP) was created at the Centers for Disease Control and Prevention (CDC) in 1988, and this center now supports prevention activities through extramural grants for diabetes, breast and cervical cancer, tobacco, and behavioral risk factor surveillance in all 50 states. In addition, a majority of states receive grants to support prevention activities related to heart disease and stroke, comprehensive cancer prevention, cancer registries, and arthritis. About 40% of states receive funds to support obesity-related activities.

The number of chronic disease epidemiologists practicing in state and local health departments has simultaneously increased with the emerging number of chronic disease programs over the past 15 years. Since 1991, the CDC has assisted 25 states through the State-Based Epidemiology for Public Health Program Support (STEPPS) by providing staff (13 states) or salary (12 states) support. Eight of the 12 states receiving salary support have hired a non-federal chronic disease epidemiologist through a CDC cooperative agreement with the Council of State and Territorial Epidemiologists (CSTE)[7].

In 2000, CDC, CSTE, and the Association of State and Territorial Chronic Disease Program Directors (ASTCDPD) developed a strategic plan, "Developing State-based Chronic Disease Epidemiology Capacity Nationwide," with the primary objective of establishing a "State Chronic Disease Epidemiologist" position in each state by 2004[8]. Utilizing this strategic plan along with the three important tasks emphasized by Remington et al[10] describing the necessary accomplishments of epidemiologists in order to support chronic disease programs, CSTE developed the National Assessment of Epidemiologic Capacity in Chronic Disease survey instrument in 2002. This survey describes chronic disease epidemiology capacity of state and territorial health departments. The results of the assessment are presented in this report and may be useful in determining the need for additional chronic disease epidemiology resources.

METHODS

In June 2002, CSTE chronic disease workgroup members revised a draft of the Chronic Disease Epidemiology Capacity Assessment. The workgroup consisted of individuals from the CDC, academic centers, and state health departments. The survey instrument was pilot tested in seven states in February 2003, and feedback from the pilot states was used to produce the final version of the assessment (Appendix 1).

Each state or territory was asked to complete one assessment and data were collected between April and July 2003. The results presented in this report are

for 46 responding states and the District of Columbia (n=47; 92% of 51). Delaware, Nebraska, New Mexico, and Utah did not submit an assessment and two states responded that they had zero chronic disease epidemiology positions and did not respond to any other questions. An additional state reported zero capacity on a scale of 0-10, but did report filled or unfilled position(s) in chronic disease epidemiology and completed the remainder of the assessment. These three states are included in the denominator for all calculations. Territory responses are not included in this report and the term "states" includes the District of Columbia.

SUMMARY OF RESULTS AND RECOMMENDATIONS

The median summary self-assessment measure of chronic disease epidemiologic capacity from this assessment was 5 on a scale of 0 to 10, and 74% of states reported a capacity score of 4 or greater.

The information reported in this assessment suggests that chronic disease epidemiologic capacity is unevenly distributed across states and less than desirable in many states.

- 43% of responding states did not have a State Chronic Disease Epidemiologist or person recognized as such even if not formally titled. The goal of a State Chronic Disease Epidemiologist in every state by 2004 has not been met.

⇒ Recommendation 1: Every state health department should have a designated State Chronic Disease Epidemiologist.

- 43% of states had fewer than 5 chronic disease epidemiologists; 6% had none. Except for the 10 most populous states which tended to have more CDEs, the number of CDEs was not directly related to state population.

  ⇒ Recommendation 2: Every state should have a minimum of 5 full time CDEs, including the State Chronic Disease Epidemiologist.

  ⇒ Recommendation 3: CSTE and NCCDPHP should continue to collaborate in their efforts to define the number and type of CDEs needed by state health agencies.

- Four states (8%) reported no doctoral level CDE.

  ⇒ Recommendation 4: Every state should have at least one doctoral level CDE.

- 31% of states have no Epidemiology category in their personnel system.

  ⇒ Recommendation 5: Every state should have an epidemiology series in their personnel system.

- States were more likely to hire CDEs with CDC cooperative agreement funds (77%) than with state funds (51%); some states used both. In terms of CDEs, 44% of all CDEs were supported by CDC cooperative agreement funds compared with 35% with state funds.

  ⇒ Recommendation 6: State governments should assume greater responsibility for chronic disease epidemiologic activities within the

state public health agency to assure that state issues are addressed as well as national issues.

- For all diseases and risk factors covered by the assessment, more states have CDEs working on the disease or risk factor than states have CDEs formally dedicated to the study of the topic. For example, 87% of states report that CDEs work on the risk factor physical activity but only 23% of states report that they have at least one-quarter CDE dedicated to studying physical activity.

  ⇒ Recommendation 7: State health departments should provide the supervision and organizational structure to support coverage of the breadth of chronic diseases and their risk factors.

- Easy and timely access to key data sets is not uniform, with less than half (45%) of states reporting easy and timely access to state mortality data, and only two-thirds reporting easy and timely access to cancer registry (62%) and BRFSS (68%) data. CDEs cannot conduct timely analyses and prepare timely reports if access to data is untimely.

  ⇒ Recommendation 8: Easy and timely access by CDEs to state mortality data should be a priority for the health agency in every state.

- In about one-third of states, CDEs did not have or did not know if they had an established consultant for complex sampling schemes (38%) and analytic methods (34%).

⇒ Recommendation 9: CDEs in the public health agency of every state should have an established consultant to assist with complex survey designs and complex analytic tasks.

- More than 90% of states reported that CDEs performed subgroup analyses and age-adjusted overall mortality rates, indicating a reasonable level of competence and, hence, capacity. However, sex- and race/ethnic-specific rates were age-adjusted in fewer states (84%), and confidence intervals for overall mortality rates were calculated by 64% of states.

  ⇒ Recommendation 10: CDC and CSTE should develop minimum standards for the routine analyses of chronic disease data.

- In about one-third of states (36%), CDEs did not have reasonably convenient access to a scientific library. Although nearly all states reported that CDEs had internet access, for many articles only the abstract is available on the internet.

  ⇒ Recommendation 11: CDEs in the public health agency of every state should have easy access to a medical library or reasonable access to a copying service.

- In more than a third of the states (39%), CDEs reported inadequate clerical support.

  ⇒ Recommendation 12: CDEs in the public health agency of every state should have adequate clerical support.

- In about half of responding states (54%), CDEs were organizationally located within the chronic disease program unit and about one-quarter (26%) in the epidemiology unit.
  - ⇒ Recommendation 13: CSTE and NCCDPHP should research the factors that foster a productive chronic disease epidemiologic unit in state public health agencies, including the importance of location within the organization.
  - ⇒ Recommendation 14: CSTE and NCCDPHP should continue their collaboration to improve the descriptions of the duties, skills, and measures of productivity of state public health CDEs.

The assessment has important limitations. First, the definition of a chronic disease epidemiologist may not have been uniformly applied in all states. Despite the efforts of the CSTE chronic disease workgroup to provide a clear definition and calculation instructions, during the course of the survey several state representatives called the CSTE office for guidance, indicating that it was not clear to all users. Discussion about identifying individuals in state health departments who should be considered CDE and included in future assessments should be further examined.

- ⇒ Recommendation 15: CSTE should establish guidelines for defining and counting CDEs in state health departments.

Second, chronic disease epidemiologic capacity is not easy to define and measure. In this survey, the number, training, and experience of CDEs, topics of

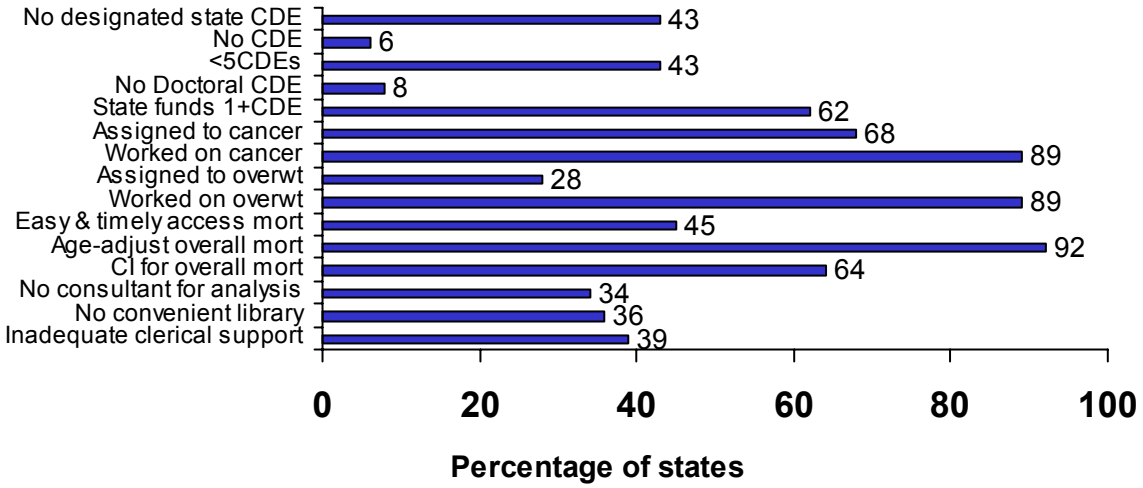
work, access to data, analytical methods, data interpretation, dissemination of products, partnerships, and miscellaneous measures of support (e.g., computers, libraries) were all considered. Perhaps other measures should have been included. The assessment did not include, for example, queries about program evaluation activities. It behooves CDEs and CSTE to work together to develop better methods of assessment.

⇒ Recommendation 16: CSTE should continue to improve the description and measurement of the chronic disease epidemiologic capacity of state health departments.

Finally, four states did not participate in the assessment. The reason they did not participate is unknown and it is not clear whether or how much their input may have modified the results.

In summary, chronic disease epidemiologic capacity in state health departments varies among states. The capacity is clearly low in a number of states and probably insufficient in most if not all.

Measures of CDE capacity in state health departments



INTRODUCTION

Chronic diseases, including heart disease, cancer, stroke, chronic obstructive pulmonary disease, and diabetes, cause a large burden of morbidity and mortality in the United States. More than 1.7 million people in the U.S.A. die every year of a chronic disease (~70% of all deaths), and an estimated 25 million Americans have chronic, disabling conditions that cause major limitations in activity[1]. The direct and indirect costs that result from chronic diseases are high; for example, the estimated annual costs that result from smoking exceed $75 billion[1].

As a result of the public health importance of chronic diseases and the availability of effective prevention and control strategies[2-6], over the past 15 years federal, state, and local public health agencies have established chronic disease primary and secondary prevention activities and programs. The National Center for Chronic Disease Prevention and Health Promotion (NCCDPHP) was created at the Centers for Disease Control and Prevention (CDC) in 1988, and this center now supports prevention activities through extramural grants for diabetes, breast and cervical cancer, tobacco, and behavioral risk factor surveillance in all 50 states. In addition, a majority of states receive grants to support prevention activities related to heart disease and stroke, comprehensive cancer prevention, cancer registries, and arthritis. About 40% of states receive funds to support obesity-related activities.

Simultaneous with the increase in programs for chronic diseases that have emerged over the past 15 years has been an increase in the number of chronic disease epidemiologists practicing in state and local health departments. Since 1991, the CDC has assisted 25 states through the State-Based Epidemiology for Public Health Program Support (STEPPS) by providing staff (13 states) or salary (12 states) support. Eight of the 12 states receiving salary support have hired a non-federal chronic disease epidemiologist through a cooperative agreement between CDC and the Council of State and Territorial Epidemiologists (CSTE)[7].

In 2000, CDC, CSTE, and the Association of State and Territorial Chronic Disease Program Directors (ASTCDPD) developed a strategic plan, "Developing State-based Chronic Disease Epidemiology Capacity Nationwide," with the primary objective of establishing a "State Chronic Disease Epidemiologist" position in each state by 2004[8]. In addition to this strategic plan, the same three organizations developed by consensus, a comprehensive list of 92 chronic disease surveillance indicators (CDI)[9] in 2001. The list along with a glossary, preface, background information, and recent data from states and territories is available on a website maintained by the Department of Health Evaluation Sciences, College of Medicine, at Penn State University[9]. Currently the data are being updated and the website is being transferred to NCCDPHP. One of the purposes of the CDI is to serve as a guide for state and local health department chronic disease epidemiologists in the analysis and display of surveillance data.

In their article discussing the role of epidemiology in chronic disease prevention, Remington et al emphasize that epidemiologists have three important tasks to accomplish to support chronic disease prevention programs: (1) defining the problem, including the nature and burden of chronic diseases within a specified jurisdiction; (2) assessing the quality of the evidence of program effectiveness to identify which programs work; and (3) monitoring trends in outcomes over time to determine the effect of intervention programs[10]. With these roles in mind as well as the strategic plan developed by CDC, CSTE, and ASTCDPD, CSTE developed a survey instrument in 2002 to describe the chronic disease epidemiology capacity of state and territorial health departments, including the number and training of chronic disease epidemiologists; their topic assignments; interactions with program managers and academic centers; and their access to, analysis, and dissemination of specific types of data. The results of the assessment are presented in this report and may be useful in determining the need for additional chronic disease epidemiology resources.

METHODS

In June 2002, CSTE chronic disease workgroup members revised a draft of the Chronic Disease Epidemiology Capacity Assessment. The workgroup consisted of individuals from the CDC, academic centers, and employees from state health departments. The survey instrument was pilot tested in seven states (Georgia, Maine, North Carolina, North Dakota, Ohio, Oregon, and Washington) in February 2003, and feedback from the pilot states was used to produce the final version of the assessment (Appendix 1).

"Chronic disease epidemiologists" (CDEs) were described as persons who analyze and interpret data related to chronic diseases or risk factors for chronic diseases. They combine data from different sources, such as vital statistics and population estimates, to calculate rates, commonly at one or across several points in time for groups of persons. They may include BRFSS coordinators, cancer registry workers, and people in data analyst positions, depending upon their skills and duties. The workgroup concluded that if such persons calculate and interpret rates, they may be counted as CDEs. In addition, to be counted for the survey they had to work $\geq$ 25% of the time at the health department doing health department related chronic disease epidemiologic work regardless of whether they receive their paycheck from another organization.

Each state or territory was asked to complete one assessment, and CSTE asked that the assessment be completed, in order of preference, by: 1) the State or

Territorial Chronic Disease Epidemiologist; 2) the person recognized as the state chronic disease epidemiologist even if not formally titled as such; 3) the State or Territorial Epidemiologist; or 4) the person most knowledgeable about state chronic disease epidemiologic activities as determined by the State or Territorial Epidemiologist.

States and territories were notified by email and U.S. mail of the assessment, and data were collected between April and July 2003. Follow-up telephone calls were made and reminder emails were sent to those states and territories that did not initially respond. The results presented in this report are for 46 responding states and the District of Columbia (n=47; 92% of 51). Delaware, Nebraska, New Mexico, and Utah did not submit an assessment. Two states responded that they had zero chronic disease epidemiology positions and did not respond to any other question. These two states are included in the denominator for all calculations. An additional state reported zero capacity on a scale of 0-10, but did report filled or unfilled positions in chronic disease epidemiology. Therefore, this state completed the remainder of the assessment and is also included in the denominator for all calculations. Only two of six U.S. territories submitted a complete assessment, and the territory responses are not included. For convenience, in this report the term “states” includes the District of Columbia.

Rates (percentages) are calculated with the number of states or the number of CDEs as the denominator, depending on the question. Unless otherwise

specified, all CDEs are counted as one epidemiologist even if they do not work full time on chronic disease epidemiology. The denominator for calculating percentages varies because not all questions were answered by all states or for all individuals. Frequencies were calculated using SAS version 8 software.

RESULTS

I. Respondent

The person who completed the assessment was titled the State Chronic Disease Epidemiologist (32%, n=15) a person recognized as the state chronic disease epidemiologist but not formally titled (26%, n=12), a person most knowledgeable about state chronic disease epidemiologic activities as determined by the State Epidemiologist (26%, n=12), and the State Epidemiologist (17%, n=8) in of states. Based on responses given, 43% of states did not have a State Chronic Disease Epidemiologist or person recognized as such even if not formally titled.

II. Summary Assessment

Respondents were asked to provide a summary assessment (scale 0-10) of chronic disease epidemiologic capacity in the state health agency. For this question, the median score was 5; seven states (15%) gave themselves a score of 8-9, 27 states (59%) a score of 4-7.5, 12 states (26%) scored from 0-3, no state scored itself as a 10, and the score was unknown for one state.

III. Number of Chronic Disease Epidemiologists

The total number of established, funded, and *filled* chronic disease epidemiology positions for all states was 339 and the number of established, funded, but *unfilled* positions was 41; the filled or unfilled status of 7 positions was not reported. Of the 339 filled positions, 213 (63%) were full time on chronic disease epidemiology, 15 (4%) were 0.75-0.99 full time equivalents (FTE), 42 (12%) were 0.50-0.74 FTE, 23 (7%) were 0.25-0.49 FTE, and the status of FTE was unknown for 46 (14%).

The ability of state health department CDEs to meet the needs of the state is a function of the number of CDEs in the state and, most likely, the population of the state. The number of CDEs per state and CDEs per 1,000,000 state population varied widely. The median number of CDEs in a state health department was 5, with a range from 0-45. Twenty states (42%) reported having fewer than 5 CDEs (Figure 1). The median number of CDEs per 1,000,000 state population was 1.3, with a range from 0-15.5. About two-thirds (68%) reported ≤2.00 CDEs per 1,000,000 state population. Except for the 10 most populous states for which the median number of CDEs was 10.5, the number of CDEs per state is not related to state population (Figure 2).

Figure 1. Percentage of states by number of CDEs

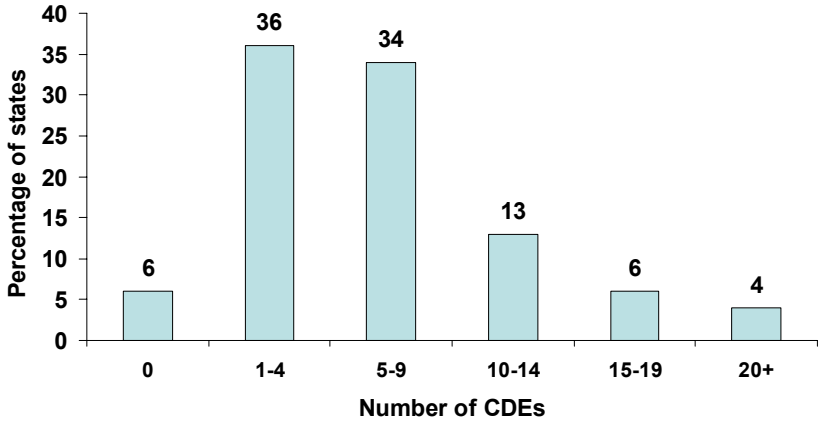
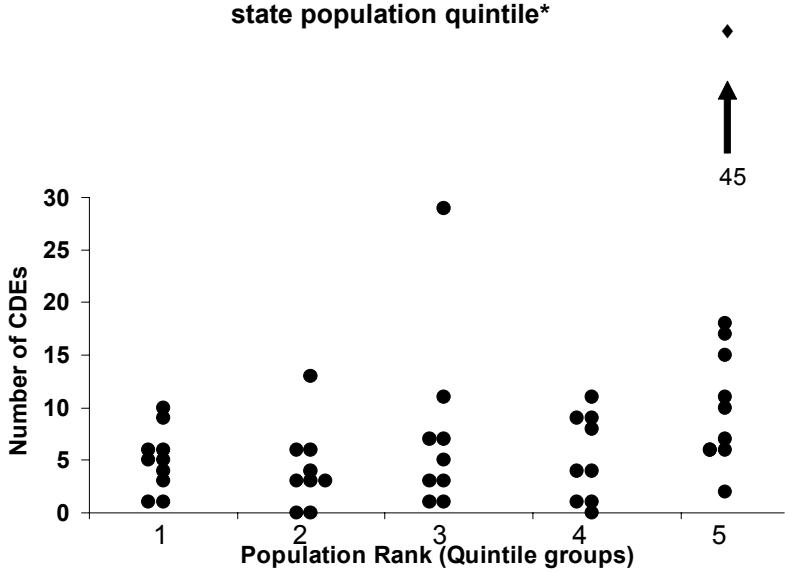


Figure 2. Number of CDEs in state public health agency by state population quintile*



*Quintile 1 includes the 10 least populous states and quintile 5 includes the 10 most populous states

IV. Training, Experience, and Salary Source

The ability of CDEs to perform epidemiologic work depends upon their level of training and their experience. Four states (8%) reported having no doctoral level CDE; two of the four reported at least one master's level CDE, two reported no CDEs (Table 1). In addition, among states with at least one filled CDE position, three states did not have a CDE with formal epidemiology training. That is, they did not have a CDE with a PhD in epidemiology, an MPH in epidemiology, or a CDE with EIS training.

Table 1. ***Degree/Training of CDEs***	**# States reporting none (%)**	**# States reporting 1 (%)**	**#States reporting >1 (%)**
Doctoral training (PhD, MD, DO, DVM, DDS)			
Any doctoral degree	4 (8)	13 (28)	30 (64)
PhD (or equivalent) in epidemiology	24 (51)	10 (21)	13 (28)
MD, DO (US)	29 (62)	14 (30)	4 (8)
DVM, DDS, or equivalent	40 (85)	6 (13)	1 (2)
Foreign medical graduate	31 (66)	9 (19)	7 (15)
Other PhD (or equivalent)	23 (49)	9 (19)	15 (32)
Master's training			
Any MPH (or equivalent)	6 (13)	6 (13)	35 (74)
MPH (or equivalent) in epidemiology	10 (21)	9 (20)	28 (60)
MPH (or equivalent) in biostatistics or demography	29 (62)	9 (19)	9 (19)
Other MPH (or equivalent)	21 (45)	15 (32)	11 (23)
Other certification or training			
Board Certified in Preventive Medicine	37 (79)	10 (21)	0 (0)
Epidemic Intelligence Service (EIS) alumnus	36 (77)	9 (20)	2 (4)
Other training	26 (55)	11 (23)	10 (21)

Among the 339 filled CDE positions, the most frequently reported academic degree was MPH (or equivalent) in epidemiology (41%,n=140), followed by MPH (or equivalent) other than epidemiology (22%, n=75), PhD (or equivalent) in epidemiology (19%, n=65), and PhD (or equivalent) other than epidemiology

(14%, n=49). The mean and median number of years of experience as a chronic disease epidemiologist were 6.8 years and 4.0 years, respectively.

The most common source of primary funding support for CDEs was CDC cooperative agreements (CDC "grants"). Thirty six (77%) states reported using CDC cooperative agreement funds to support at least one CDE; 24 (51%) states reported using state funds (Table 2). Of all CDEs, nearly half (44%) were supported by CDC cooperative agreements; about one-third (35%) were supported by state funds. The mean number of CDEs funded per state by CDC cooperative agreements was 3.1, and the mean number funded by state funds (including tobacco settlement funds) was 2.5.

Table 2. ***Source of funding of CDEs***	**States**		**CDEs**	
	No. (n=47)	**% of total**	**No. (n=339)**	**% of total**
State funds (including tobacco settlement)	24	51%	119	35%
Prevention block grant	11	23%	17	5%
CDC cooperative agreement (CDC "grants")	36	77%	148	44%
Medicaid match funds	1	2%	1	0%
CDC assignee – EIS officer or PMR	3	6%	3	1%
CDC assignee – other	2	4%	2	1%
CDC salary support via CSTE or ASTCDPD	2	4%	2	1%
Other	8	17%	16	5%
Deleted or Missing* (positions with more than one source, n=23, were removed)			31	9%

V. Topic Assignments and Topics Worked on

Some CDEs are hired to work on a specific disease, condition, or risk factor, commonly because the funding source requires it. The most common chronic diseases with at least 0.25 dedicated FTE were cancer (68% of states) and diabetes (64%); the most common risk factors were tobacco (49%) and cancer screening (45%) (Table 3). For all diseases, conditions, and risk factors asked

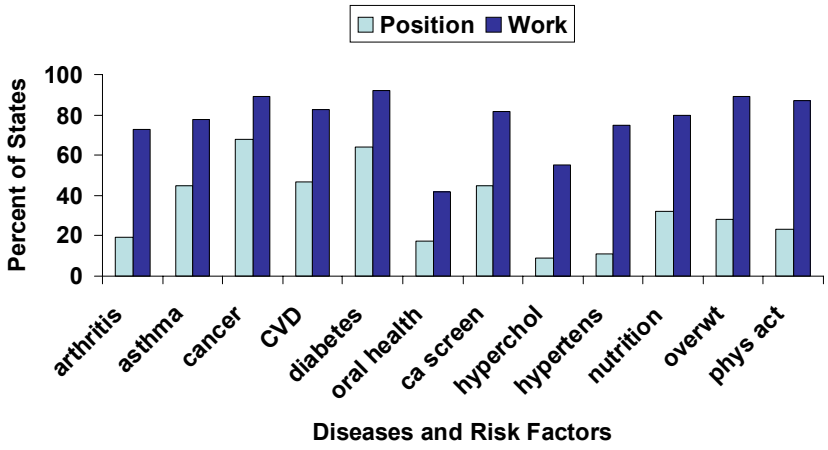
about in the assessment, a large number of states reported that CDEs worked on a program area than CDEs assigned. States reported that the diseases most commonly studied by CDEs were diabetes (92% of states) and cancer (89%); the risk factors most commonly worked on were overweight/obesity (89%) and physical activity (87%) (Table 4). [Note: In the assessment tool, tobacco was inadvertently omitted from the list of risk factors worked on and may have been worked on in more states than overweight/obesity.] For all diseases, conditions, and risk factors, states were more likely to perform work on the topic than to have a person formally assigned to it. The discrepancy was greater for risk factors than for diseases (Figure 3).

Table 3. ***Filled or unfilled CDE positions by program area***

Program Area	No		Yes, < 25% FTE		Yes, ≥ 25% FTE		Missing	
	n	row%	n	row%	n	row%	n	row%
Arthritis	20	43	15	32	9	19	3	6
Asthma	18	38	7	15	21	45	1	2
Cancer	8	17	7	15	32	68	0	0
CVD	14	30	8	17	22	47	3	6
Diabetes	8	17	8	17	30	64	1	2
Oral Health	32	68	5	11	8	17	2	4
Other	14	30	1	2	12	26	20	43
Cancer Screening	16	34	7	15	21	45	3	6
Hypercholesterolemia	30	64	7	15	4	9	6	13
Hypertension	28	60	7	15	5	11	7	15
Nutrition	21	45	6	13	15	32	5	11
Overweight/obesity	19	40	9	19	13	28	6	13
Physical Activity	22	47	9	19	11	23	5	11
Tobacco	13	28	7	15	23	49	4	9
Other Risk Factors	17	36	0	0	2	4	28	60

Table 4. ***CDE performed work in program area in previous 12 months?***	**Yes n (row %)**	**No n (row %)**
Arthritis	32 (73)	12 (27)
Asthma	35 (78)	10 (22)
Cancer (including registry)	41 (89)	5 (11)
CVD	38 (83)	8 (17)
Diabetes	43 (92)	4 (9)
Oral Health	17 (42)	24 (59)
Other diseases	10 (50)	10 (50)
Cancer Screening	36 (82)	8 (18)
Hypercholesterolemia	21 (55)	17 (45)
Hypertension	30 (75)	10 (25)
Nutrition	35 (80)	9 (21)
Overweight/obesity	40 (89)	5 (11)
Physical activity	40 (87)	6 (13)
Other risk factors	18 (72)	7 (29)

Figure 3. States with positions for topic and states doing work on topic



VI. Access to Data and Access to Consultants

The ability of CDEs to perform epidemiology depends upon access to data, some of which has been collected by others. Therefore, easy and timely access to important data sets is a measure of chronic disease epidemiologic capacity. The data sets most commonly shown to be accessed by at least one CDE in states were BRFSS (87%), cancer registry (83%), and mortality (81%) data (Table 5).

Table 5. ***Unfettered access to the data sets below?***	**Yes n (row %)**	**No n (row %)**	**Don't know n (row %)**	**Not collected n (row %)**	**Missing n (row %)**
State mortality (not via WONDER)	38 (81)	9 (19)	0 (0)	-	0 (0)
State hospital discharge	32 (68)	12 (26)	0 (0)	3 (6)	0 (0)
State emergency department	9 (19)	25 (53)	2 (4)	11 (23)	0 (0)
State EMS	9 (19)	29 (62)	6 (13)	3 (6)	0 (0)
Statewide cancer registry	39 (83)	8 (17)	0 (0)	0	0 (0)
State Medicaid	16 (34)	30 (64)	0 (0)	-	1 (2)
State Medicare	9 (19)	34 (72)	3 (6)	-	1 (2)
State BRFSS (not via CDC website)	41 (87)	6 (13)	0 (0)	-	0 (0)
State YRBS (or equivalent)	30 (64)	12 (26)	2 (4)	3 (6)	0 (0)
State adult tobacco survey (ATS)	22 (47)	12 (26)	5 (11)	7 (15)	1 (2)
State youth tobacco survey (YTS)	31 (66)	10 (21)	4 (9)	2 (4)	0 (0)

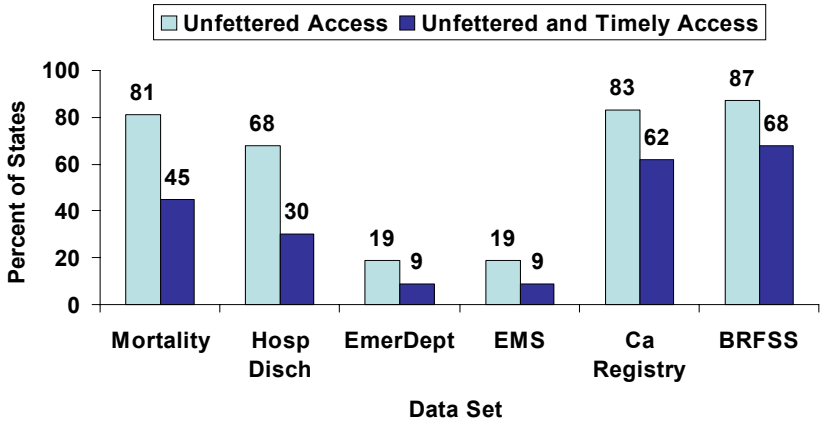
A dash indicates this response choice was not an option

For the respondents who answered "yes" to the data access question above, there was a follow-up inquiry about whether the data were available in a "timely" manner, the meaning of "timely" varying by data set (e.g., 2000 mortality data available by October 1, 2001; 2000 cancer registry data available by January 2003). BRFSS (68%), state cancer registry (62%), and mortality (45%) were also the data sets available to most states in a timely fashion (Table 6, Figure 4).

Table 6. ***Data available by October 1 of following year?***	**Always or Almost Always n (row %)**	**Sometimes n (row %)**	**Rarely or Never n (row %)**	**Don't know n (row %)**	**Missing n (row %)**	**N/A* n (row %)**
State mortality (not via WONDER)	21 (45)	0 (0)	10 (21)	5 (11)	2 (4)	9 (19)
State hospital discharge	14 (30)	7 (15)	6 (13)	2 (4)	3 (6)	15 (32)
State emergency department	4 (9)	3 (6)	1 (2)	1 (2)	0 (0)	38 (81)
State EMS	4 (9)	0 (0)	2 (4)	2 (4)	1 (2)	38 (81)
Statewide cancer registry	29 (62)	3 (6)	4 (9)	1 (2)	2 (4)	8 (17)
State BRFSS (not via CDC website)	32 (68)	5 (11)	0 (0)	2 (4)	2 (4)	6 (13)

*Number of states not asked the question because they did not indicate unfettered access to the data set.

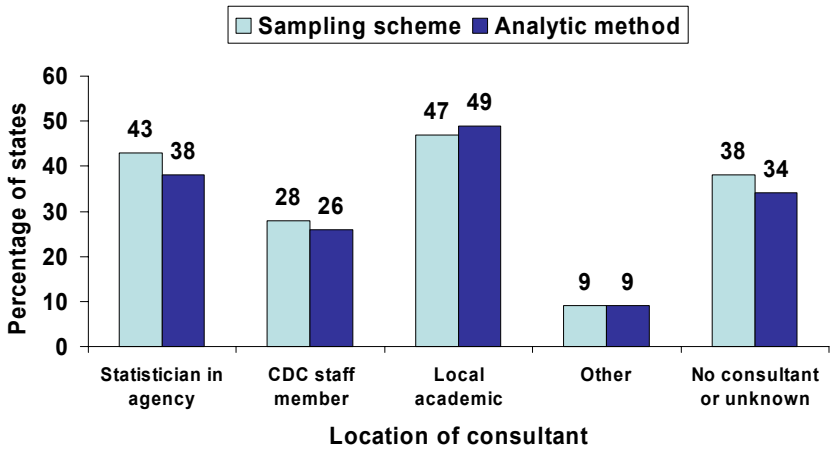
Figure 4. States with =1 CDE with unfettered access and with timely access to key data sets



Chronic disease epidemiology often requires the collection of data using complex sampling schemes and the analysis of data with complex analytic requirements. Approximately two-thirds of states reported that CDEs had an established

consultant for sampling schemes (62%) and analytic methods (66%). For states with an established consultant regarding sampling and data analysis, consultants were most commonly at a local academic institution or within the state public health agency (Figure 5).

Figure 5. Percentage of states with established consultant by type of question and location of consultant



More than half the states also reported that they had a person on staff who knew how to design a sampling scheme for a population based survey (85%), state-wide hospital chart review (57%), state-wide school-based survey (76%), and state-wide work site survey (61%) (Table 7).

Table 7. ***Aspects of study design***	**Yes n (row%)**	**No N (row%)**	**Don't Know n (row%)**
Does the CDE staff have an established consultant if they have questions about:			
• the most appropriate sampling scheme?	29 (62)	14 (30)	4 (9)
• the most appropriate analytic method?	31 (66)	13 (28)	3 (6)
Does the CDE staff include someone who knows how to design a sampling scheme for:			
• population-based survey	39 (85)	5 (11)	2 (4)
• state-wide hospital chart review survey	26 (57)	16 (35)	4 (9)
• state-wide school-based student survey	35 (76)	8 (17)	3 (7)
• state-wide work site survey	28 (61)	15 (33)	3 (7)

VII. Data Analysis

CDEs need access to adequate software to perform data analysis. Eighty-nine percent of states reported that all CDEs who needed it had access to SAS, SPSS, or STATA; whereas only 56% had access to SUDAAN, a software package necessary to calculate confidence intervals properly for surveys such as BRFSS and YRBS. CDEs in 44 of 46 (96%) responding states had access to Microsoft Office and a spreadsheet (Table 8).

Table 8. ***If needed, do CDEs have access to the following software?***	**Yes n (row %)**	**No access, software needed* n (row %)**	**No access, software not needed n (row %)**
SAS	38 (81)	6 (13)	3 (6)
SPSS	32 (68)	5 (11)	10 (21)
STATA	9 (21)	7 (16)	27 (63)
SUDAAN	25 (56)	12 (27)	8 (18)
Epi Info	40 (85)	2 (4)	5 (11)
Other statistical packages	8 (32)	1 (4)	16 (64)
A spreadsheet	44 (96)	0 (0)	2 (4)
Microsoft Office	44 (96)	0 (0)	2 (4)
WordPerfect	24 (57)	2 (5)	16 (38)
Graphic software	37 (84)	3 (7)	4 (9)
Other software	15 (65)	1 (4)	7 (30)

VIII. Data Interpretation

Data interpretation is the most important task for state-level CDEs. While data interpretation encompasses more than performing statistical manipulations of data, data cannot be adequately interpreted if some manipulations are not performed in most if not all situations. Three common and important data manipulations are calculating group-specific rates (e.g., age-specific), age-adjustments, and calculating confidence intervals. Most states reported that CDEs calculated age- (94%), sex- (94%), and race/ethnic-specific (92%) rates and83% calculated rates for geographic sub regions of the state (Table 9). Most states also reported age-adjustment of mortality rates (92%), and sex- and race/ethnicity-specific mortality rates (84%). Just over half (55%) reported age-adjustment of hospital discharge and BRFSS (51%) data. Confidence intervals were calculated less routinely for mortality (64%) and hospital discharge (49%) rates, but more often for BRFSS (84%).

Table 9. ***Aspects of data interpretation and data analysis***	**Yes n (row%)**	**No n (row%)**	**Don't know n (row%)**	**Not Collected n (row%)**
Do CDE staff commonly calculate:				
• age-specific rates	44 (94)	2 (4)	1 (2)	-
• sex-specific rates	44 (94)	2 (4)	1 (2)	-
• race/ethnic-specific rates	43 (92)	3 (6)	1 (2)	-
• region- or county-specific rates	39 (83)	7 (15)	1 (2)	-
Do CDE staff usually age-adjust the following types of rates:				
• overall mortality rates (n=47)	43 (92)	2 (4)	2 (4)	-
• sex- and race/ethnicity-specific mortality rates (n=43)	36 (84)	5 (12)	2 (5)	-
• hospital discharge rates (n=40)	22 (55)	15 (38)	-	3 (8)
• BRFSS rates (n=45)	23 (51)	22 (49)	-	0 (0)
Do CDE staff usually calculate confidence intervals for:				
• mortality rates (n=44)	28 (64)	14 (32)	2 (5)	-
• hospital discharge rates (n=41)	20 (49)	17 (42)	-	4 (10)
• BRFSS prevalence rates (n=44)	37 (84)	6 (14)	1 (2)	-
Do CDE staff commonly provide comparison rates (e.g. U.S. rate, HP 2010 Objectives) for presentation of:				
• mortality rates (n=46)	40 (87)	3 (7)	3 (7)	-
• hospital discharge rates (n=43)	24 (56)	15 (35)	-	4 (9)
• BRFSS prevalence rates (n=46)	41 (89)	2 (4)	3 (7)	-
During the past 12 months, have the CDEs used in a report, article, or presentation:				
• a regression analysis performed by one of your CDEs	25 (53)	19 (40)	3 (6)	-
• a survival analysis performed by one of your CDEs	10 (21)	33 (70)	4 (9)	-
Do CDE staff sometimes:				
• present annual percent rate of change over time	33 (73)	9 (20)	3 (7)	-
⇒ If yes, do they calculate: *[choose all that apply]*				
• 100 x (final yr – first yr)/(# of yrs)	19 (63)			
• Average of each one-yr percent change	11 (37)			
• Other method	9 (30)			
• combine yrs of mortality data to achieve larger sample	40 (89)	3 (7)	2 (4)	-
⇒ If yes, do they use the comparability ratios for the deaths prior to 1999 when they include years of ICD9 and years of ICD10?	25 (69)	7 (19)	4 (11)	-

A dash indicates this response choice was not an option

IX. Dissemination

"The timely dissemination of these [health and behavioral] data to persons who can undertake effective prevention and control activities" [11] is an important function for state CDEs. Respondents were asked to give the number of annual reports, ad hoc reports, articles in the state epidemiology newsletter, or other similar publications in the previous 12 months that were prepared by CDEs and printed or published. Thirty nine states reported a total of 465 reports with a mean of 11.9, median of 10, and the maximum by any one state of 62. States reported that 308 of these reports had been posted on the state public health web site, with a mean of 8.3, median of 5, and the maximum by any one state of 33. Other ways that chronic disease data could be disseminated are displayed below in Table 10.

Table 10. ***Dissemination of chronic disease data by CDEs in the past 12 months***	**Yes n (row%)**	**No n (row%)**	**Don't Know n (row%)**
Interactive/queriable on-line system for CD epidemiology data?	17 (36)	30 (64)	0 (0)
CDE primary preparer of grant/coop. agreement application?	30 (64)	15 (32)	2 (4)
CDE prepared "burden" or "epidemiology" section of grant/coop. agreement application?	40 (85)	6 (13)	1 (2)
Scientific presentations at state or national meetings requiring abstract submission been given by CDEs?	33 (73)	8 (18)	4 (9)

X. Outreach/Partnership

The mean and median number of CDEs with a university faculty appointment was 1.1 and 1.0, respectively. Among the 45 states that responded to this question, there were total of 49 CDEs with faculty appointments, the maximum in any one state being five. Table 11 displays other types of academic linkages and partnerships by state CDEs. The most and least frequently reported

collaborations were, respectively, with private voluntary organizations (81%) and managed care organizations (40%).

Table 11. ***Academic Linkages and Collaborations in the past 12 months by CDEs***	**Yes n (row %)**	**No n (row %)**	**Don't know n (row %)**
Given university lectures (n = 47)	36 (77)	11 (23)	0 (0)
Supervised student interns or supervised written thesis work (n = 46)	24 (52)	21 (46)	1 (2)
Collaborated with academic center (n = 46)	32 (70)	12 (26)	2 (4)
Collaborated with private voluntary organizations (n = 47)	38 (81)	7 (15)	2 (4)
Collaborated with managed care organizations (n = 47)	19 (40)	23 (49)	5 (11)
Collaborated with state peer review organization (n = 43)	20 (47)	18 (42)	5 (12)
Collaborated with other organizations (n = 45)	28 (62)	11 (24)	6 (13)

XI. Miscellaneous

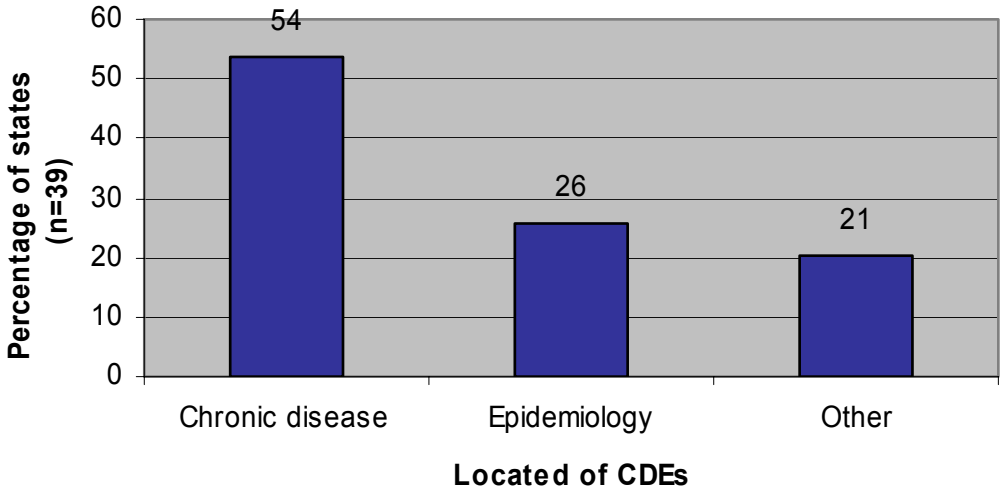
A supportive work environment facilitates productivity and contributes to capacity. Almost all states (96%) reported CDEs had access to the internet and speaker phones for conference calls (Table 12). Only 64% of respondents had access to a conveniently located scientific library, and only 63% reported that their health department provided a service to obtain articles not held at a conveniently located library. Only 59% reported adequate clerical support. A minority of respondents reported that their health department provided either time-off (36%) or tuition support (34%) for long-term training.

Table 12. ***Resources, access, and support for CDEs by the Health Department***	**Yes n (row %)**	**No n (row %)**	**Don't know or N/A n (row %)**
Access to internet from own computer	44 (96)	2 (4)	0 (0)
Access to speakerphone for conference calls	45 (96)	2 (4)	0 (0)
Access to convenient major scientific library	30 (64)	17 (36)	0 (0)
Provide service to obtain articles not held at conveniently located library	29 (63)	16 (35)	1 (2)
Hold regular scientific seminars or journal clubs	21 (45)	26 (55)	0 (0)
Provide tuition or travel support for epidemiology or computer training	25 (54)	19 (41)	2 (4)
Provide tuition support for long-term training	16 (34)	29 (62)	2 (4)
Provide time-off for long-term training	16 (36)	21 (48)	7 (16)
Access to adequate clerical support	27 (59)	18 (39)	1 (2)

XII. Organizational Placement

The preferred organizational placement of CDEs (e.g., within the program unit, within the epidemiology unit) is not established and may vary with local conditions. Of responding states, half (54%) said the majority of CDEs were located within the chronic disease program unit, compared to 26% located in the epidemiology program unit (Figure 6). Most CDEs (68%) reported frequent contact (3-5 times per week) with programmatic colleagues.

Figure 6. Percentage of states by organizational unit where the majority of CDEs are located



Of the 46 respondents, 32 (69%) answered affirmatively to the question of whether the state personnel system had a job description for one or more epidemiology positions. Of the states that answered "Yes" to this question, 18 (39%) responded to a sub-question about their agency's personnel series: 4

(22%) reported there was only one grade level for all epidemiology positions, 11 (61%) had 2-4 grades, and 3 (17%) reported five or more grades.

DISCUSSION AND RECOMMENDATIONS

This report is the fourth in a series of six assessments completed by CSTE to assess epidemiologic capacity in state and territorial health departments—the previous three assessments concerned overall core and infectious capacity, food safety capacity, and maternal and child health capacity[12-14]. While chronic disease epidemiologic capacity was briefly highlighted in the overall capacity report and was addressed in 25 states in an evaluation of the CDC STEPPS program[2], this report is the most comprehensive and detailed analysis of states' chronic disease epidemiologic capacity to date. In the overall capacity report conducted in 2001, 52% of the 44 responding states and territories reported they had full, almost full, or substantial chronic disease epidemiology capacity. The 2003 data presented in this report, reflects a median summary self-assessment measure of chronic disease epidemiologic capacity of 5 on a scale of 0 to 10, and 74% of states reported a capacity score of 4 or greater. It appears, therefore, that for this one measure, the findings of the two assessments are similar.

The information reported in this assessment suggests that chronic disease epidemiologic capacity is unevenly distributed across states and less than desirable in many states.

- 43% of responding states did have a State Chronic Disease Epidemiologist or person recognized as such even if not formally titled. The strategic goal of having a State Chronic Disease Epidemiologist in every state by 2004 has not been met.

  ⇒ Recommendation 1: Every state health department should have a designated State Chronic Disease Epidemiologist.

- 43% of states had fewer than 5 chronic disease epidemiologists; 6% had none. Except for the 10 most populous states which tended to have more CDEs, the number of CDEs was not directly related to state population. The number of chronic disease epidemiologists needed by each state to provide adequate CD epidemiologic capacity is not established. Given the large number of diseases and risk factors related to chronic diseases, the large, diverse, and complex sets of data pertaining to those diseases and risk factors, and the diverse number of groups for whom the findings need to be summarized and interpreted, the number of CDEs needed to complete data related tasks is likely to be substantial.

  ⇒ Recommendation 2: Every state should have a minimum of 5 full time CDEs, including the State Chronic Disease Epidemiologist.

  ⇒ Recommendation 3: CSTE and NCCDPHP should continue to collaborate in their efforts to define the number and type of CDEs needed by state health agencies.

- Four states (8%) reported no doctoral level CDE.

⇒ Recommendation 4: Every state should have at least one doctoral level CDE.

- Thirty-one percent of states have no Epidemiology category in their personnel system.

  ⇒ Recommendation 5: Every state should have an epidemiology series in their personnel system.

- States were more likely to hire CDEs with CDC cooperative agreement funds (77%) than with state funds (51%); some states used both. In terms of CDEs, 44% of all CDEs were supported by CDC cooperative agreement funds compared with 35% with state funds. The positive perspective on these data is that states and CDEs are successfully seeking and getting funds from non-state sources to conduct state-focused chronic disease epidemiology. States however, on average, support only about one-third of the chronic disease epidemiologic activities that occur within state health departments, thereby relinquishing to the federal government control over content, direction, and focus of state-level chronic disease epidemiologic activities.

  ⇒ Recommendation 6: State governments should assume greater responsibility for chronic disease epidemiologic activities within the state public health agency to assure that state issues are addressed as well as national issues.

- For all diseases and risk factors covered by the assessment, there are more states with CDEs working on the disease or risk factor than states

have CDEs formally dedicated to the study of the topic. For example, 87% of states report that CDEs work on the risk factor physical activity but only 23% of states report that they have at least one-quarter CDE dedicated to studying physical activity. This is not an alarming finding. However, it indicates the need for CDEs whose work is not restricted to a particular disease or risk factor. It also has implications for supervisory arrangements and organizational placement. If most CDEs are required to work on two or more topics then the supervisor should have the knowledge and experience to guide the epidemiologic study of diverse topics and the organizational structure should facilitate this arrangement.

⇒ Recommendation 7: State health departments should provide the supervision and organizational structure to support coverage of the breadth of chronic diseases and their risk factors.

- Easy and timely access to key data sets is not uniform, with less than half (45%) of states reporting easy and timely access to state mortality data, and only two-thirds reporting easy and timely access to cancer registry (62%) and BRFSS (68%) data. CDEs cannot conduct timely analyses and prepare timely reports if access to data is not timely.

  ⇒ Recommendation 8: Easy and timely access by CDEs to state mortality data should be a priority for the health agency in every state.

- In about one-third of states, CDEs did not have or did not know if they had an established consultant for complex sampling schemes (38%) and

analytic methods (34%). No CDE, despite extensive training, has the expertise needed to conduct all necessary surveys with complex sampling schemes and perform all indicated data analyses. Lack of access to appropriate consultants reduces a state's epidemiologic capacity.

⇒ Recommendation 9: CDEs in the public health agency of every state should not only be aware of present consultants, but have an established consultant to assist with complex survey designs and complex analytic tasks.

- Indicators of the quality of data interpretation were generally high but should be higher. Subgroup analysis (e.g., by age, by sex), age-adjustment of rates, and use of confidence intervals or other measures of precision are essential chronic disease epidemiologic tools. More than 90% of states reported that CDEs performed subgroup analyses and age-adjusted overall mortality rates, indicating a reasonable level of competence and, hence, capacity. However, sex- and race/ethnic-specific rates were age-adjusted in fewer states (84%), and confidence intervals for overall mortality rates were calculated by 64% of states. While these rates may be taken to indicate a generally high level of competence, CDEs in all states should be able to and should perform subgroup analyses, age-adjust rates, and calculate confidence intervals.

  ⇒ Recommendation 10: CSTE should develop minimum standards for the routine analyses of chronic disease data.

- In about one-third of states (36%), CDEs did not have reasonably convenient access to a scientific library. Although virtually all states reported that CDEs had internet access, the abstracts for many articles are only available via the internet.

  ⇒ Recommendation 11: CDEs in the public health agency of every state should have easy access to a medical library or reasonable access to a copying service.

- In more than a third of the states (39%), CDEs reported inadequate clerical support. Inadequate clerical support is inefficient and impedes productivity.

  ⇒ Recommendation 12: CDEs in the public health agency of every state should have adequate clerical support.

- In about half of responding states (54%), CDEs were organizationally located within the chronic disease program unit and about one-quarter (26%) in the epidemiology unit. The preferred organizational location for CDEs is not established. More detailed analysis of the data from this survey might provide some suggestions.

  ⇒ Recommendation 13: CSTE and NCCDPHP should research the factors that foster a productive chronic disease epidemiologic unit in state public health agencies, including the importance of location within the organization.

⇒ Recommendation 14: CSTE and NCCDPHP should continue their collaboration to improve the descriptions of the duties, skills, and measures of productivity for state public health CDEs.

The assessment has important limitations. First, the definition of a chronic disease epidemiologist may not have been uniformly applied in all states. Despite the efforts of the CSTE workgroup to provide a clear definition and quantification instructions for CDEs, during the course of the survey several state representatives called the CSTE National office for guidance, indicating that it was not clear to all users. Discussion about who in state health departments is a CDE, deserves further consideration and should be included in future assessments.

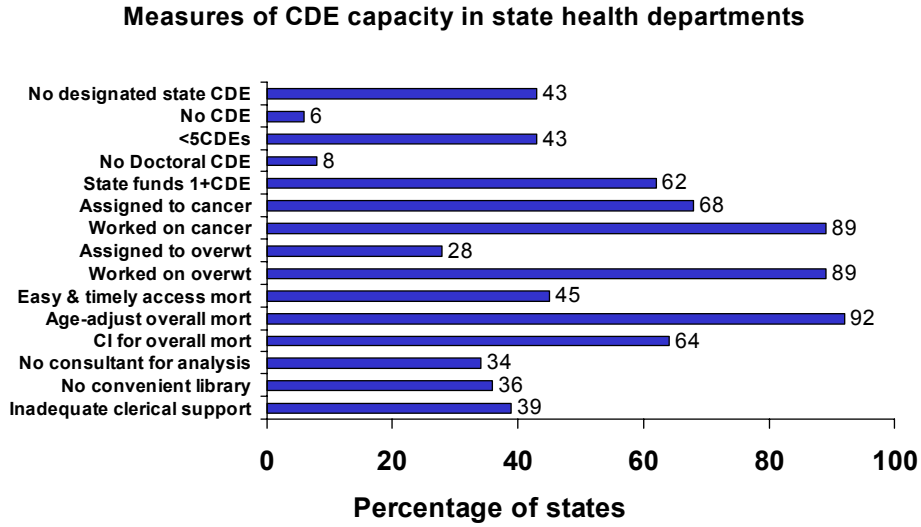
⇒ Recommendation 15: CSTE should establish guidelines for defining and quantifying CDEs in state health departments.

Second, chronic disease epidemiologic capacity is not easy to define and measure. In this survey, the number, training, and experience of CDEs, topics of work, access to data, analytical methods, data interpretation, dissemination of products, partnerships, and miscellaneous measures of support (e.g., computers, libraries) were all considered. Perhaps other measures should have been included. The assessment did not include, for example, queries about program evaluation activities. It behooves CDEs and CSTE to work together to develop better methods of assessment.

⇒ Recommendation 16: CSTE should continue to improve the description and measurement of the chronic disease epidemiologic capacity of state health departments.

Finally, four states did not participate in the assessment. The reason they did not participate is unknown and it is not clear whether or how much their input may have modified the results.

In summary, chronic disease epidemiologic capacity in state health departments varies among states. The capacity is clearly low in a number of states and probably insufficient in most if not all cases.



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