

National Assessment of Epidemiologic Capacity: Findings and Recommendations

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Council of State and Territorial Epidemiologists

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The Epidemiology Capacity Assessment workgroup CSTE accomplished this project with cooperation from the state health departments, Centers for Disease Control and Prevention (CDC), Health Resources and Services Administration (HRSA), Indian Health Service (IHS), Association of State and Territorial Health Officers (ASTHO), Association of Schools of Public Health (ASPH), and American Public Health Association (APHA).

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EXECUTIVE SUMMARY

BACKGROUND

Increased vigilance to threats of bioterrorism has caused the nations public health system to confront new obstacles. The Institute of Medicine and the U.S. Department of Health and Human Services suggest a need to build a comprehensive public health infrastructure capable of responding to both acute and chronic threats to the Nation's health, including detection, control and prevention of major health problems. In response to this call, the Council of State and Territorial Epidemiologists developed an instrument to assess U.S. state and territorial health agencies core and infectious disease epidemiologic capacity.

METHODS

The Epidemiology Capacity Assessment (ECA), structured around the Ten Essential Services of Public Health, was developed into two components: core epidemiology and infectious disease epidemiology. After piloting in 10 states, the 108-question assessment was administered to all states and territories electronically and by paper between November 2001 and April 2002. State Epidemiologists and/or their delegates were asked to complete the assessment.

RESULTS AND DISCUSSION

As the first survey of a comprehensive nationwide assessment of core epidemiology infrastructure, this baseline information will be important in evaluating the impact of future funding for epidemiology capacity in the nation.

Federal dollars for epidemiology and surveillance programs in states account for 61% of total support while state support accounts for 36%. Federal expenditures are likely to increase with recent bioterrorism funding and state support is likely to decrease with mounting state budgetary shortfalls. Large regional variations in per person expenditures for epidemiology programs (national average \$2.22) are evident in the considerable disparities seen amongst states in almost

all areas of epidemiology capacity. Few states reported having high capacity in program areas other than infectious disease.

The ECA survey found that most state and territorial epidemiologists think they have insufficient staff and resources. A comparison can be made to a 1992 survey where there were approximately 1,700 full time equivalent positions engaged in epidemiology surveillance, while the current survey found less than 1,400 epidemiologists working in state and territorial health departments. These figures indicate that there has been no growth in the epidemiology workforce over the last decade. This lack of workforce growth has occurred despite the significant expansion in the scope of responsibilities for epidemiology over this same period of time. Approximately 42% of the current epidemiology workforce in state and territorial health departments lacks formal academic training in epidemiology and few engage in systematic research and publication activities.

Although most states reported high level capacity for monitoring nationally notifiable diseases (72%), very few appear to have surveillance systems that include emergency medical services, emergency departments or have the capacity to adequately monitor non-notifiable conditions or pathogens with bioweapons potential.

Racial disparities have become a priority for public health leaders in reducing disease incidence. However, the assessment found that state health agencies rarely provide cultural competency training to infectious disease epidemiologists. Databases such as Medicaid, CHIP, State household surveys, Bureau of Labor statistics, and PRAMS were utilized by less than 30% of state and territorial health agencies. Use of these databases may aid in the development of prevention efforts addressing health issues of minority populations.

The Ten Essential Public Health services are intended to allow health departments to progress with greater clarity and uniformity in carrying out state public health functions. This assessment

found that epidemiology programs in state and territorial health departments are not fully able to provide these services as outlined by the Institute of Medicine.

RECOMMENDATIONS

- States and territories need increased epidemiology capacity now: they need more highly trained epidemiologists in greater numbers to control and prevent common, endemic diseases as well as to respond to new and emerging health problems, health hazards, and outbreaks. Due to severe budgetary crises in states and territories, funding for increased capacity must come from the federal government.
- The epidemiology capacity within state and territorial health departments should be assessed periodically to monitor the progress in building epidemiology capacity across the nation.
- The measurement of epidemiology capacity in state and territorial health agencies should include both objective and subjective tools that should remain relatively constant so that trends can be detected.
- Epidemiology capacity assessments should be used to allocate resources in health departments and to develop priorities and policy for building and maintaining public health infrastructure.
- There should be standards established for states' epidemiology capacity. Large variations seen in this assessment for yearly and per person expenditures are reflected in significant differences in epidemiology capacity from state to state.
- Given the relative paucity of trained epidemiologists outside the infectious disease area, there needs to be special emphasis placed on increasing the number of trained epidemiologists in program areas such as environmental health, maternal child health, injury, and occupational epidemiology.
- This survey indicates significant deficiencies in infectious disease and all other areas of epidemiology infrastructure. As such, there needs to be much greater advocacy and awareness of the essential role of epidemiology in the public health system.

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BACKGROUND

In 1988, the Institute of Medicine outlined in *The Future of Public Health* the status of public health in the United States and generated a set of ‘core functions’ of public health. The study stated, “this nation has lost sight of its public health goals and has allowed the system of public health activities to fall into disarray”¹. Recommendations from the report outlined that every health agency should regularly and systematically collect, assemble, analyze, and make available information on the health of the community, including statistics on health status, community health needs, and epidemiologic and other studies of health problems. In 1997, a study was undertaken to determine if forward momentum created by the IOM report continued. The study reported that there were several key areas lacking in implementation such as policy development, personal health services, and some areas of infrastructure².

With today’s heightened consciousness of bioterrorism, the nation’s public health system has a new set of obstacles to overcome. These threats call for a resilient public health system and well-prepared workforce. The U.S. Department of Health and Human Services (HHS) has emphasized the need for a closely linked nationwide network utilizing local, regional and state health resources. HHS also states that the network should possess the capability for detection and reporting of unusual patterns and have substantial laboratory resources³. In public health a strong infrastructure may provide the capacity to prepare for and respond to both acute and chronic threats to the Nation’s health. Such an infrastructure serves as the foundation for planning, delivering, and evaluating public health. The recent IOM report, *The Future of the Public’s Health in the 21st Century*, states that government public health agencies are in need of support and resources⁴. The Committee on Assuring the Health of the Public in the 21st Century found that “the governmental public health infrastructure has been neglected, and an overhaul of its components is needed to ensure quality of services and optimal performance”⁴.

Epidemiology can be considered the central science of public health. Epidemiologists are needed for the management of major public health problems including detection, control and prevention. Health data and surveillance systems provide information on illness, disability, and

death from acute and chronic conditions; injuries; personal, environmental, and occupational risk factors; preventive and treatment services; and costs.

CSTE is one of a number of public health organizations to have developed an instrument to assess the capacity of data and information systems in health departments. The Council of State and Territorial Epidemiologists (CSTE) Epidemiology Capacity Assessment (ECA) instrument was originally developed in 1997 and piloted in 10 states for the purpose of self-assessment. Revision of the ECA Tool was prompted by the Healthy People 2010 Objective 23-14 which calls for an “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”⁵, including quickly detecting, investigating and responding to diseases in order to prevent unnecessary transmission.

In January 2001, a small advisory group was organized under the charge of the CSTE Executive Committee to begin revision of the ECA tool. The ECA tool was reviewed by individuals from federal and national organizations such as the Centers for Disease Control and Prevention (CDC), Health Resources and Services Administration (HRSA), Indian Health Service (IHS), Association of State and Territorial Health Officers (ASTHO), Association of Schools of Public Health (ASPH), and American Public Health Association (APHA). Also included in the review process were individuals from academia and state health department employees.

The tool evolved into a full assessment of data and epidemiology capacity structured around the ten essential services. The current tool, included in Appendix A of this report, consists of two components: core epidemiology and infectious disease questionnaires. This instrument is one of several modules developed, the others being questionnaires in chronic diseases, maternal and child health, and food safety. All are formatted to the framework of the Ten Essential Services of Public Health.

The Public Health Functions Steering Committee of the American Public Health Association (APHA) adopted the Essential Services of Public Health in the fall of 1994 with the goal of creating a national standard for public health: the Ten Essential Services of Public Health. The Ten Essential Services are:

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 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 a competent public and personal health care workforce.
9. Evaluate effectiveness, accessibility and quality of personal and population-based services.
10. Research for new insights and innovative solutions to health problems.

A public health agency's epidemiologic capacity is its ability, based on human and other resources, to perform those epidemiologic functions necessary to achieve its defined goals and objectives⁶. The purpose of this assessment was to measure the baseline status of core and infectious disease epidemiologic capacity in U.S. states and territories.

METHODS

The core component of the assessment examines the resources available for building a solid public health epidemiology infrastructure, including monetary support and workforce competency. The first 22 questions of the ECA are the core capacity assessment, and the last 86 questions are the infectious disease component.

A draft version of the tool was piloted in 10 states, including Alabama, Arkansas, Connecticut, Florida, Iowa, Kansas, Maine, Missouri, Nebraska, and New Mexico. Data for the final version of the ECA were collected between November 2001 and April 2002. This version was administered by paper and electronically, and the respondent could select their preferred format. The assessment included instructions for the form to be completed by the State Epidemiologist and/or delegate(s), in addition to other agency epidemiologists when appropriate.

The ECA was transmitted to 51 states (including District of Columbia) and 5 territories. In the data analyses, these locations were grouped into the following region categories:

1. Northeast (n=9): CT, MA, ME, NH, NJ, NY, PA, RI, VT;
2. Midwest (n=12): IA, IL, IN, KS, MI, MO, MN, ND, NE, OH, SD, WI;
3. South (n=17): AL, AR, DC, DE, FL, GA, KY, LA, MD, MS, NC, OK, SC, TN, TX, VA, WV;
4. West (n=13): AK, AZ, CA, CO, HI, ID, MT, NM, NV, OR, UT, WA and WY; and
5. Territories (n=5): American Samoa, Commonwealth of Northern Mariana Islands, Federated States of Micronesia, Guam and Puerto Rico.

Follow-up telephone calls and emails were made to those states that did not respond to initial requests to complete the assessment. Forty-six states and territories provided responses. Once the assessments were returned, data were analyzed using SAS. Frequencies were calculated for selected questions from the ECA tool. Data were tabulated for all respondents together as well as by region.

In the analyses of core capacity, the following program abbreviations are used: BT=bioterrorism; CD=chronic disease; EH=environmental health; ID=infectious disease; INJ=injury; MCH=maternal and child health; OH=occupational health; and OrH=oral health.

RESULTS

The response rate for the 51 states and 5 territories combined was 79% (n=44). The response rate for the states and the District of Columbia alone was 80%. Response rates by region were as follows: Northeast = 78%; Midwest = 83%; South = 82%; West = 77%; and Territories = 60%. Appendix B contains frequency data for each question.

Core Capacity Questionnaire

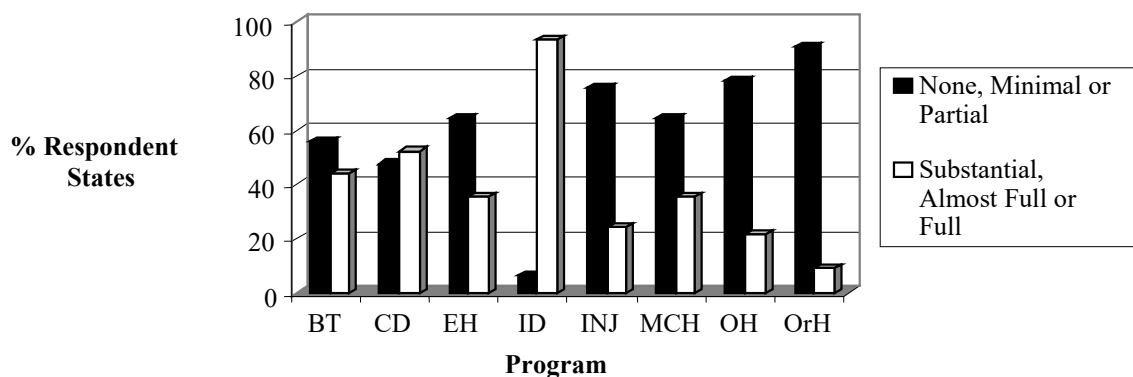
The average total state expenditures for epidemiology programs (n=26) were \$8,849,857 and the average expenditure per person was \$2.22. The latter statistic ranged from \$0.80 in the Midwest region to \$3.36 in the South region. Table 1 shows that for the 27 responding states and territories, a majority of epidemiologic activities funding came from federal sources (*Q4*)*.

Table 1. Funding sources for Health Departments epidemiology activities (%) (N=27)	
Federal Funds	61.27
State Funds	36.57
Other Funds	2.16

Figure 1 presents the capacity levels by program areas with responses grouped into two categories (the bottom two and upper two response categories are grouped). Infectious and chronic disease programs were the only two programs in which more than half of the responding states reported having substantial or full capacity. “No or minimal” capacity was reported by 28.6% of respondents in environmental health, 53.7% in occupational health, and 65.1% in oral health.

* Questions may be found in Appendix A and frequency of responses for a specific question in Appendix B.

Figure 1: Capacity Level of Epidemiology and Surveillance Programs within State and Territorial Health Departments



Respondents were asked to provide the number of employees working as epidemiologists by program and level of training (*Q6a*). 1,366 persons work as epidemiologists in all program areas combined. 47.7% (652/1366) of these work in infectious disease. Less than 50 employees nationwide work in each of the areas of injury, occupational health, or oral health in state health departments.

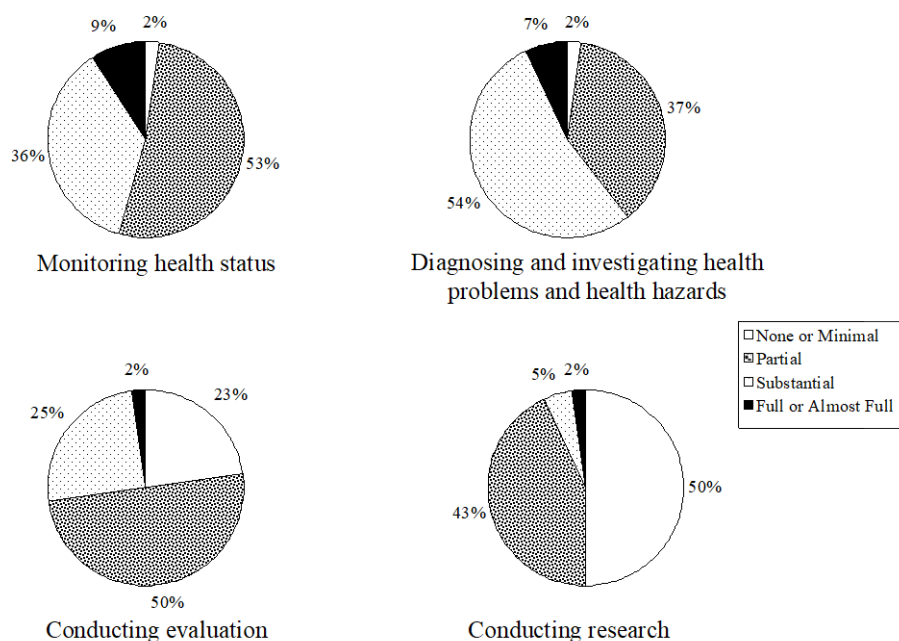
28.6% of the epidemiologists had doctoral level training; 40.0% had masters level training, 18.4% had bachelor level training and 13% had other types of training. The region with the greatest percentage of doctoral level epidemiologists was the West (35.9% or 89/248). The region with the smallest percentage of doctoral level epidemiologists (15.9%) and the highest percentage of epidemiologists with other types of training (28.4%) was the Territories. Of the 1,366 epidemiologists, 57.7% (n=787) had formal training in epidemiology (*Q6b*).

The median salary range was highest for MDs, and the ranking of median salary range by degree from doctoral to bachelor and other (*Q6d*). Salaries varied by region with no apparent trend: the highest median salary range for MDs was in the South, for PhDs in the Midwest, and for Masters level in the Northeast.

As shown in Figure 2 below, 61% of respondents reported having substantial, almost full, or full capacity to diagnose and investigate health problems and hazards and 45% reported having

substantial, almost full, or full capacity to monitor health status. Capacity to conduct evaluation and conduct research was considerably less (Q7).

Figure 2. General State Health Department Capacity and Evaluation



Infectious Disease Capacity Questionnaire

Essential Service 1: Monitor Health Status to Identify Community Health Problems

There were three indicators for this Essential Service: providing surveillance of reports of disease and conditions, providing expanded scope and capability of state health department epidemiology surveillance systems, and conducting and supporting local initiatives that periodically monitor health status. Most states and territories (72%) reported that they have “full” or “almost full” capacity to monitor all diseases and conditions placed under the National Notifiable Disease Surveillance System (NNDSS) (Q23). Less than 25% of states and territories reported that they have “full” or “almost full” capacity to require health care providers to report infectious disease conditions not included in NNDSS (Q25).

Question 26 queried both access to and surveillance use of 24 different data systems. Access to ambulatory/emergency room systems was reported by 38.6%, to emergency medical service systems by 34.9%, to Poison control systems by 34.9%, to antimicrobial resistance systems by 60.5%, to Medicaid systems by 50%, and to CHIP systems by 23.4%. Use of these systems for surveillance was even less, although it correlated with access. 18.6% of states and territories reported that they have “full” or “almost full” capacity for routine analysis and reporting of data from any of the surveillance databases (*Q26a*).

Regarding written protocols for detection, investigation and response to emergencies, 51.2% reported substantial, almost full, or full capacity for bioterrorism events, compared to 52.5% for radiologic events and 54.7% for natural disasters (*Q28*). Less than 10% of states and territories reported having “full” or “almost full” capacity to maintain surveillance systems for health outcomes related to emergencies including bioterrorism events, radiologic events, environmental/other hazardous substances, explosions, natural disasters and injuries (*Q29*).

53.5% of the states and territories reported substantial, almost full, or full capacity in infectious disease epidemiology to monitor the health status of the population (*Q31*).

Essential Service 2: Diagnose and Investigate Health Problems and Health Hazards

The indicators for Essential Service 2 include providing epidemiologic response to disease outbreaks or crisis incidents and conducting epidemiologic investigations, surveys and studies that are directed at defining or identifying specified public health problems. 61.9% of respondents reported that they had “full” or “almost full” capacity to have initiated or participated in epidemiologic investigations in the past year (*Q33*). For outbreaks not investigated, the most frequently reported factors limiting ability were delayed notification of case reports (95.2%), limited staff (78.6%), competing priorities for use of public health resources (73.8%), jurisdictional issues (40.5%), and laboratory capacity (31.0%) (*Q34*). 63.6% of the states and territories reporting having substantial, almost full, or full [adequate] capacity in infectious disease epidemiology [in general] to diagnose and investigate problems and health hazards (*Q40*).

Essential Services 3 through 10:

The table below summarizes results for the remaining eight essential services. Appendix A provides exact wording of each question, and Appendix B provides additional details concerning the tabulation of responses to a particular question.

Table 2. Summary Results for Essential Services 3 through 10				
Essential Service	Indicator	Question	Capacity	
			None or partial (%)	Substantial, full or almost full (%)
Inform, educate, and empower people about health issues	3A	43: Does ID epi support efforts to inform of status of epi issues	15.9	84.1
	3B	47: Does ID epi use non-mass media venues to inform public	48.8	51.2
Mobilize partnerships	4A	48: Does ID epi have effective relationships with non-ID epis	43.2	56.8
	4C	56: Does ID epi collaborate with community groups	55.8	44.2
Develop plans for individual and community health	5A	61: Written protocol for epi investigations	45.5	54.5
	5B	64: Are epis involved in selection of data to monitor agency objectives	37.2	62.8
	5B	65: Does agency use sentinel surveillance or 2° surveillance to monitor health of high interest groups	62.8	37.2
Enforce laws and regulations	6A	68: Are reported cases reviewed to ensure meet case definition	18.2	81.8
	6B	70: Do ID epi routinely assist in development of legislation and regulations	34.1	65.9
	6B	71: Do epis have opportunity to suggest revisions to statutes	25.0	75.0

Table 2. cont.				
Link people to needed personal health services	7A	73 (part 4): Do ID epis evaluate delivery service programs	79.6	20.4
Assure competent workforce	8A	76: Does agency have training for ID epis	61.4	38.6
	8B	82: Is there requirement for ID epis to obtain continuing education	95.4	4.6
	8C	86: Does agency provide ID epis training in cultural competency	80.9	19.6
Evaluate personal and population-based services	9A	87: Does agency have capacity in ID epi to evaluate activities	79.1	20.9
	9A	88: Does ID epi evaluate surveillance systems	75.0	25.0
	9B	93: Are QA surveillance problems monitored over time	77.3	22.7
	9B	97: Does ID epi develop annual reports	74.4	25.6
Research for solutions to health problems	10A	98: Does ID epi conduct research	79.5	20.5
	10B	106: Does ID epi apply research to public health practice	25.0	75.0

Two additional tables are displayed below for questions that were not structured in the none/partial/substantial/almost full/full capacity response format. These results concern Essential Service 4 (Question 52) and Essential Service 10 (Question 105), and they are displayed below, in addition to being part of Appendix B, because of their importance to the overall interpretation of the results.

Table 3. (Question 52) State HD ID epidemiology personnel ongoing collaboration to improve epidemiology, surveillance, response, investigation and special studies

	N	%
Academic epidemiologists	30	68.18
Universities	34	77.27
HMO medical directors	10	22.73
Local medical Society	20	45.45
Infectious Disease clinicians	37	84.09
Infection control practitioners	41	93.18
Sentinel Physicians	34	77.27
State medical society	33	75.00
Local and regional medical examiners and coroners	26	59.09
Local and regional hospitals	36	81.82
Independent laboratories	25	56.82
Other state agencies	35	79.55
Private medical insurance companies	7	15.91
Peer review organizations	11	25.00
US military hospitals and bases, and VA	26	59.09
Other	9	20.45

Table 4. (Question 105) Factors limiting State Health Departments ability to conduct studies, research, cost benefit analysis or analytic studies

	Epidemiology Studies N (%)	Epidemiologic research N (%)	Cost benefit analysis N (%)	Analytic studies N (%)
Lack of expertise	6 (13.64)	8 (18.18)	28 (63.64)	6 (13.95)
Difficulty funding controls	8 (18.18)	5 (11.36)	4 (9.09)	9 (20.93)
Too few cases to have a meaningful study	23 (52.27)	13 (29.55)	9 (20.45)	16 (37.21)
Lack of epidemiology staff	30 (68.18)	31 (70.45)	28 (63.64)	28 (65.12)
Too many competing priorities	38 (86.36)	38 (86.36)	35 (79.55)	37 (86.05)
Not included in the job description	1 (2.33)	8 (18.18)	10 (22.73)	6 (14.29)
Insufficient support	18 (40.91)	20 (45.45)	21 (47.73)	21 (48.84)
Lack of resources	33 (75.00)	35 (79.55)	34 (77.27)	34 (79.07)
Other	1 (2.27)	2 (4.55)	1 (2.27)	0 (0.0)

DISCUSSION

The Epidemiology Capacity Assessment was conducted between November 2001 and April 2002, and it was self-administered primarily by State Epidemiologists. This survey represents the first comprehensive nationwide assessment of core epidemiology infrastructure in the public health system ever performed. The timing of the survey was fortuitous coming as it did just prior to the award of new bioterrorism grant funding to every state. This baseline assessment of epidemiology infrastructure will be invaluable in evaluating the impact of future funding on building and improving epidemiology capacity nationwide.

The ECA was designed to evaluate epidemiology capacity within the context of the ten essential public health services. This survey design is in keeping with the Healthy People 2010 Objective 23-14 which calls for an “increase in the proportion of Tribal, State and local health agencies that provide or assure comprehensive epidemiology services to support the essential public health services.” The use of the ten essential services as the foundation of public health capacity assessments has become more commonplace and affords greater ease of interpretation when comparing across different areas of public health. Other entities such as the Association of State and Territorial Health Officials⁷, the National Association of County and City Health Officials, and the National Public Health Performance Standards Program⁸ promote the use of the ten essential service methodology. In future surveys it may be useful to also correlate a given state’s assessment with more objective measures of epidemiology capacity such as infectious disease incidence or costs associated with hospitalization for specific chronic diseases.

The ECA survey found that federal expenditures for epidemiology and surveillance programs in the states were almost twice that of state support with federal expenditures likely to increase given new bioterrorism funding and state support likely to fall in the face of their growing budgetary shortfalls. There were very large regional variations in per person expenditures for epidemiology programs, which are reflected in the significant disparities seen amongst states in almost all areas of epidemiology capacity. The majority of states reported having greater capacity in infectious disease than all other program areas of epidemiology and surveillance.

This is to be expected given public health's long historic tradition of working in communicable diseases and recent funding initiatives like epidemiology and laboratory capacity and emerging infections programs. Significantly, only half of all state reported having substantial or full capacity in chronic disease epidemiology and most states characterize their capacity as low (i.e. none, minimal or partial) in all other major areas of epidemiology capacity including environmental health, maternal and child health, injury, and occupational epidemiology. Not surprising is that only 25% of states reported having significant capacity to conduct programmatic evaluation in these same public health areas.

In its 2002 report, the Institute of Medicine (IOM) commented, "an adequately sized and appropriately trained workforce performing competently is an essential element of the public health infrastructure"⁴. The ECA survey found that most state and territorial epidemiologists think they have insufficient staff and resources. A 1992 survey of state and territorial epidemiologists found there were approximately 1,758 full-time equivalent positions engaged in infectious and non-infectious disease surveillance⁹. Although there were methodological differences between the 1992 survey and the CSTE assessment, the estimated number of epidemiologists for each is relatively close and reflects little, if any, growth in epidemiology personnel over the ten-year span separating the two surveys. This lack of workforce growth has occurred despite the significant expansion in the scope of responsibilities for epidemiology over this same period of time. Over 40% of the state's epidemiology workforce lacks formal academic training in epidemiology and only a small minority of states systematically engages in any type of research and publication activities.

The epidemiology workforce must be able to respond in a timely manner to a wide array of health problems. The complex and large issues that confront infectious disease epidemiologists in states include, but are not limited to, surveillance for West Nile virus infections; analyzing trends in hepatitis C infection; monitoring changes in the prevalence of antibiotic resistance to multiple organisms, and preparing for either a bioterrorist attack or pandemic influenza. Although most states reported high level capacity for monitoring nationally notifiable diseases, very few appear to have surveillance systems that include emergency medical services,

emergency departments or have the capacity to adequately monitor non-notifiable conditions or pathogens with bioweapons potential. The assessment did not gather information about microbiology laboratory capacity, but it did find that many outbreaks were not investigated because of delays in notification. While this might be attributed to shortcomings of surveillance systems, it might also be indicative of shortcomings in diagnostic laboratory capacity (e.g. PCR technology for pertussis or viral gastroenteritis) that could significantly delay or preclude disease reporting.

In the past five years public health leaders have articulated the need to reduce racial disparities in disease incidence. Unfortunately, one finding of the assessment was that state health agencies infrequently provide training to infectious disease epidemiologists in cultural competency. Furthermore, the Medicaid, CHIP, State household surveys, Bureau of Labor statistics, and PRAMS data bases were each used for surveillance by less than 30% of respondents. These databases, however, may help design prevention efforts that address health problems of medically indigent minority populations.

The Ten Essential Services allow health departments to progress with greater clarity of purpose and uniformity for state public health capacities and functions. The list of services was not designed specifically for infectious disease activities; instead, these are services that should be provided by public health agencies. Some of the services, i.e., numbers 1 and 2, are more directly applicable to the work of infectious disease epidemiologists than others, e.g. 7, 8, and 9. The Institute of Medicine suggests that state health departments should facilitate the execution of the Essential Public Health Services by directly carrying them out or by supporting the efforts of local public health departments⁴. According to this assessment, epidemiology programs in state and territorial health departments are not able to fully provide the Ten Essential Services.

RECOMMENDATIONS

- States and territories need increased epidemiology capacity now: they need more highly trained epidemiologists in greater numbers to control and prevent common, endemic diseases as well as to respond to new and emerging health problems, health hazards, and outbreaks. Due to severe budgetary crises in states and territories, funding for increased capacity must come from the federal government.
- The epidemiology capacity within state and territorial health departments should be assessed periodically to monitor the progress in building epidemiology capacity across the nation.
- The measurement of epidemiology capacity in state and territorial health agencies should include both objective and subjective tools that should remain relatively constant so that trends can be detected.
- Epidemiology capacity assessments should be used to allocate resources in health departments and to develop priorities and policy for building and maintaining public health infrastructure.
- There should be standards established for states' epidemiology capacity. Large variations seen in this assessment for yearly and per person expenditures are reflected in significant differences in epidemiology capacity from state to state.
- Given the relative paucity of trained epidemiologists outside the infectious disease area, there needs to be special emphasis placed on increasing the number of trained epidemiologists in program areas such as environmental health, maternal child health, injury, and occupational epidemiology.
- This survey indicates significant deficiencies in infectious disease and all other areas of epidemiology infrastructure. As such, there needs to be much greater advocacy and awareness of the essential role of epidemiology in the public health system.

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APPENDIX A

CSTE Epidemiology Capacity Assessment Tool

APPENDIX B

Frequencies for the ECA Tool