



**EPIDEMIOLOGY  
CAPACITY ASSESSMENT**

**2024 Epidemiology Capacity Assessment  
Executive Summary**

# Executive Summary



## Background

The Council of State and Territorial Epidemiologists (CSTE) conducted the first comprehensive nationwide assessment of core epidemiology capacity in state and territorial health departments in November 2001. Since then, CSTE has conducted additional ECAs in 2004, 2006, 2009, 2013, 2017, 2021 and now 2024. All states and the District of Columbia (DC) responded since 2004 for a 100% response rate. This report does not include numbers for Big Cities Health Coalition members, local, or tribal health department capacity.

Historically, the ECA has documented the need for epidemiologists to achieve ideal capacity. Trends in the applied epidemiology workforce include increased capacity in well-established program areas while emerging areas lagged behind, increased need for competency-based training, stagnant salaries for epidemiologists that do not keep up with inflation, and an increasing reliance on federal funding (Council of State and Territorial Epidemiologists, 2004, 2006, 2009, 2013, 2017, 2021). The ECA serves a range of stakeholders, notably state and national public health leaders and schools and programs of public health. Data produced by these assessments are used to inform government planning for the provision of public health services with respect to staffing, salary levels, and relative state and federal funding levels. For schools and programs of public health, which are responsible for training much of the epidemiology workforce, the ECA provides necessary information on the skills needed to be successful in the field and where the greatest needs for expertise and training lie.

Public health is entering a period of uncertainty coming out of the COVID-19 pandemic. The pandemic response brought on an influx of short-term federal funding that health departments utilized to make much needed public health infrastructure changes and

support temporary staffing. Now, as COVID-19 has been integrated into regular surveillance activities, funding and support for public health is anticipated to decline. This, combined with political backlash and workforce well-being concerns, has made the future of public health progress and activities unclear. Describing the status of the applied epidemiology workforce regarding staffing, vacancies, and challenges facing health departments is critical for identifying what approaches can be taken to adjust to the changing landscape.

The 2024 ECA was launched in January 2024 and completed in April 2024. Building on recommendations from the 2021 ECA, the 2024 ECA was designed to achieve 5 goals:

1. Enumerate and describe the applied epidemiology workforce;
2. Describe the training needs of the applied epidemiology workforce;
3. Describe the funding supporting the applied epidemiology workforce;
4. Describe the level of epidemiology capacity in state and DC health departments; and
5. Assess the impact of the COVID-19 pandemic on epidemiologic capacity and staffing.

## Methods

The assessment was developed in an online format using Qualtrics® software and was piloted in November 2023 in 5 states. After revision, the assessment was distributed to the State or Territorial Epidemiologist in the remaining states, DC, and the 8 US territories and freely associated states.

The 2024 ECA had 42 questions, including 7 open-ended qualitative questions. Most of the questions were short-answer, multiple choice, scales, or matrix tables. Wherever possible, questions, response categories, and definitions remained identical to previous ECA questions to ensure comparability with previous data.

The 2024 ECA added several program areas, including: foodborne/waterborne diseases, general infectious disease, HAI/AR, HIV, pan-respiratory, reproductive health, STD, tribal, tuberculosis, vaccine-preventable diseases, vector-borne/zoonotic diseases, viral hepatitis, and wastewater surveillance. The tool also included new questions about the role of the State Epidemiologist, ELC funding needs, disease forecasting and modeling and recruiting a diverse workforce. The 2024 ECA included epidemiologists employed by the state, DC, and territorial health departments; epidemiologists working at the state level who are federal assignees, contract employees, contractors from schools of public health to work at the health department, fellows, or state employees assigned to work at the local or regional level.

Quantitative data were analyzed in Excel 2008 and R Studio statistical software. For most questions, results were tabulated separately for the 50 states and DC and for the 8 participating territories (American Samoa, Guam, Northern Mariana Islands, US Virgin Islands, Federated States of Micronesia, Republic of the Marshall Islands, Republic of Palau and Puerto Rico). The territories were analyzed separately because they differed substantially from the 50 states and DC in their organization of epidemiology services, hiring practices, and salary scales. For some analyses, data were stratified by population size: small (<2 million; 14 states and DC), medium (2–6 million; 17 states), or large (>6 million; 19 states) and by region (Northeast, South, Midwest, and West). Qualitative data from the open-ended questions were coded and grouped thematically by CSTE staff during analysis, and illustrative quotations were selected for inclusion.

## Results and Conclusions

The response rate for the states, DC and the 8 US territories and freely associated states was 100%. Overall, the 2024 ECA shows that the epidemiology workforce continues to grow; however, many jurisdictions will lose personnel with the end of pandemic funding. Ongoing unmet need continues to exist in both well-established areas, such as infectious diseases, and emerging program areas, like informatics and genomics. Compared with 2021, capacity has increased for EPHS 1 and EPHS 2, with the percentage of states reporting at least partial

capacity for EPHS 9 (research and evaluation) rising from 39% to 53%. Participants cited job interest/fulfillment, opportunity to work remotely and job benefits as assets for recruiting and retaining epidemiologists. Participants noted that it is still challenging to recruit a diverse workforce due to the available candidate pool and restrictions in hiring practices. Similar to past years, data analytics remains the top training need across departments. State and territorial health departments continue to rely heavily on federal funding for both epidemiology activities and personnel.

## Key Findings

### Number of epidemiologists

**The number of epidemiologists continues to increase but states and territories anticipate losing staff with the end of pandemic funding.**

- A total of 5706 epidemiologists work in the 50 states and DC, a 38% increase over the 4135 reported in 2021 and the highest number observed in the ECA. An additional 337 were reported by the 8-participating territories and freely associated states.
- The number of epidemiologists per 100,000 population increased 35% since 2021, from 1.26 to 1.70/100,000. This composite value continues to mask low rates (<1/100,000) in 7 states. The program area with the greatest absolute and relative increase from 2021 to 2024 was informatics, for which 487 positions were added, a 245% increase.
- Infectious disease remains the largest program area with 2541 epidemiologists, followed by informatics (685) and COVID-19 response (510). Since 2021, COVID-19 lost 468 epidemiologists (a 48% decrease), likely a result of re-allocating epidemiologists from the pandemic response and proactively incorporating them into permanent roles as COVID-19 transitions to routine respiratory surveillance. Vital statistics also saw a 12% decrease since 2021.

**The need for additional staffing remains, even in program areas that saw growth since 2021.**

- State Epidemiologists expressed the need for nearly 2537 additional epidemiologists to reach full capacity in the EPHS, representing a 44% increase over the 5706 current number, for a total of 8243 epidemiologists.

- The territories indicated a need for an additional 139 epidemiologists, bringing the ideal number to 476.
- The greatest number of positions needed were in infectious disease areas combined (1019), informatics (249), chronic disease (160), maternal and child health (145) and environmental health (143).
- While the number of epidemiologists needed in program areas with less capacity was relatively small, the percentage increase was profound, with tribal needing a 242% increase (from 9 to 30 epidemiologists) and oral health needing a 144% increase (from 22 to 52 epidemiologists).

## EPHS capacity

### **States continue to have substantial capacity for monitoring and assessing health problems but lack capacity for research and evaluation.**

- In 2024, the percentage of states and DC with substantial to full capacity for EPHS 1 (monitoring health status) was 84%, an increase from 76% in 2021.
- The percentage of states and DC with substantial to full capacity for EPHS 2 (investigating health problems and hazards) was 90%, an increase from 88% in 2021.
- The percentage of states and DC with substantial to full capacity for EPHS 9 (research and evaluation) was 37%, a decrease from 43% in 2021. Notably, the percentage of states reporting at least partial capacity for EPHS 9 rose from 39% to 53% between 2021 and 2024.

## Training priorities

### **Like 2017 and 2021, data analytics remains a top training priority among states.**

- Forty-three states highlighted data analytics as the top training priority and 31 states also mentioned software skills, persuasive communication and continuing education.

### **Access to peer-reviewed literature that is not open-access remains limited in many states.**

- Timely access to peer-reviewed literature is essential to respond to emerging threats and to ensure that ongoing activities are evidence-based. More than a third of all states and DC have access to peer-reviewed literature within 24 hours of requesting it. Similar to 2021,

14% of states and DC still do not have access to peer-reviewed literature, and >40% of states had to wait >24 hours after a request to gain access.

- Seven of the 8 territories had no access to the peer reviewed literature, and the remaining territory had access but must wait at least 24-72 hours from the initial request to gain access.

## Funding

### **Federal funding continues to pay for most epidemiology activities and personnel.**

- Nearly identical to 2021, on average federal funds constituted 83% of funding for all epidemiologic activities in state programs. States contributed an average of 15%, and other sources accounted for only a small percentage of the total in most states.
- Similar to epidemiology activities, federal funds constituted 84% of funding for personnel. States contributed an average of 14%, and other sources accounted for a small percentage of the total in most states.
- Federal grants constitute the vast majority of funds for virtually all program areas; only for tribal and vital statistics did state funding contribute >50% of funding.

## Recruitment and retention

### **The key assets for recruiting and retaining the epidemiology workforce include job interest and fulfillment, opportunity to work remotely, and job benefits.**

- The minimum and maximum median salaries for all positions (except deputy state epidemiologists) increased between 2021 and 2024. However, when salaries are adjusted for inflation, there was a decrease in all position salaries, except for mid-level epidemiologist which experienced a minimal (less than 2%) increase since 2021.
- Like previous years, epidemiologists are starting at inadequate base salaries and often not receiving regular increases to cope with inflation and the increased cost of living. In an era of increasing education costs and student debt, the salaries offered by health departments are likely to be even less competitive than in the past.
- The most cited assets for recruiting and retaining epidemiologists were job interest and fulfillment, opportunity to work remotely, and job benefits.

- Like 2021, minimum and maximum salaries in the 50 states and DC increased with educational attainment, and physician pay was considerably higher than pay for PhDs and DVMs. Salaries also increased by career level, although the more managerial positions of Deputy State Epidemiologist and State Epidemiologist had substantially higher median salary ranges than those at and below senior level.
- Data indicated that Western states tended to have higher maximum salary levels across all positions, compared to Northeastern, Southern or Midwestern regions.
- Participating states cited allowing telework, a flexible work schedule, and promoting meaningful relationships at work as major strategies for minimizing burnout.

### Epidemiology leadership

#### **A high proportion of State and Territorial epidemiologists are still relatively new to the role, and many have additional responsibilities within the department.**

- State and Territorial Epidemiologists have been on the job for a median of 4.25 years, slightly up from 4 years in 2021.
- More than half of State and Territorial Epidemiologists have been in the position less than 5 years, with 7% only having been in the position less than 1 year.
- Half of State and Territorial Epidemiologists reported overseeing and directly supervising infectious disease program areas with 48% also overseeing and supervising surveillance and informatics. Less than a tenth reported overseeing and supervising public health preparedness and response (8%) and public health laboratories (6%).
- Many State and Territorial Epidemiologists serve in other roles, including as the chief of communicable disease, medical director/chief medical officer and other roles not listed such as commissioner or IRB review board chairs.

#### **A number of program areas experienced a decrease in the percentage of states with a lead epidemiologist present, and most states still lack a lead in oral health, genomics/AMD, reproductive health, generalist, tribal and mental health.**

- The greatest increase in program area leads occurred in genomics/advanced

molecular detection, where the percentage of jurisdictions with a lead epidemiologist nearly tripled, a significant increase from 12% to 41% (p=.0006).

- Several program areas experienced a decrease in the percentage of states with a lead epidemiologist present, including COVID-19 (-14%), generalist (-10%), environmental health (-8%), mental health (-8%), vital statistics (-6%) and maternal and child health (-4%).
- More than half of states and DC still lack program leads in oral health, genomics/ advanced molecular detection, reproductive health, generalist, tribal and mental health.

### Data Modernization

#### **Additional funding is needed for data modernization efforts, both for infrastructure and personnel.**

- Nearly half of states (48%) indicated that they have funds to modernize and build new infrastructure but require additional funds to sustain these systems long-term. However, 10% of states indicated that their current data modernization funds are ‘definitely not enough.’
- When asked about the top 3 biggest challenges states are encountering with data modernization, 29% of jurisdictions noted uncertain sustained funding and 20% of jurisdictions highlighted an inability to hire a workforce with the necessary skills.

### Outbreak forecasting and disease transmission models

#### **States and territories agree that outbreak forecasting is important for future emergencies but currently lack personnel capacity.**

- Most states do not have staff dedicated to outbreak forecasting and disease transmission models, however, 45 of the participating states and territories agreed or strongly agreed that outbreak forecasts would be useful to the decision makers in their jurisdiction during the next public health emergency.

## Recommendations

The following recommendations focus on data modernization and informatics, public health funding, collaboration and engagement, enhancing the workforce pipeline, recruiting and retaining the workforce, and training needs. The recommendations are intended for funders, policy makers, health department leaders, academic partners and others committed to improving the applied epidemiology workforce.

### Data Modernization and Informatics

Data is essential to the role of an epidemiologist and departments require interoperable infrastructure to manage and harness increasingly available public health data. Epidemiologists need foundational informatics knowledge to efficiently manage data exchange, interpret without bias and update systems to be timely, accurate and in alignment with national standards. Additionally, health departments need dedicated professionals with technical informatics skills and job classifications to effectively meet the data needs of their agencies. Public health is actively growing informatics skillsets to continue advancing the ability to leverage current and non-traditional data sources and maximize the impact of public health interventions.

- Secure sustainable funding to strengthen data modernization workforce, systems and infrastructure to allow for timely, useful and accurate data transmission. Sustainable funding is essential to maintain modern data systems and continue to leverage the technology advancements now in place.
- Update informatics competencies to outline the role and responsibilities of informaticians in health departments and their alignment with epidemiology.
- Create a comprehensive competency-based curriculum that equips epidemiologists with skills and knowledge to implement data modernization activities.
- Provide on-the-job training for current health department staff to learn data modernization and informatics skills in a way that provides direct translation to work tasks.

### Funding

More than 80% of epidemiology activities are supported by federal funds. With the looming end to pandemic funding, state health departments are poised to lose nearly 1,020 positions or one-fifth of the current epidemiology workforce.

The field needs sustainable, flexible funding that allows for permanent hiring and the ability to prioritize the distinct needs of communities.

- Retain temporary staff from the COVID-19 pandemic as permanent positions in health departments.
- Include response-ready (or flexible) epidemiologists in funding opportunities to allow departments to meet the specific needs of their communities, during daily and emergency operations.
- Provide long-term flexible, disease-agnostic funding streams that allow jurisdictions to prioritize the needs of their community.
- Innovate epidemiology funding streams that allow for greater investment in public health from lawmakers, state and local administrations and the public.

### Workforce Pipeline

The workforce needs additional epidemiologists to operate at optimal capacity. Collaborative partnerships with academic institutions are vital to ensuring the workforce continues to grow and graduates are prepared for careers in governmental public health.

- Facilitate relationships with academic institutions (e.g., high schools, colleges and universities, graduate institutions) to promote awareness of governmental epidemiology as a career path.
- Incorporate the 2023 Applied Epidemiology Competencies (AECs) into undergraduate and graduate curricula to prepare graduates for careers in governmental public health.
- Promote capacity building by facilitating internship opportunities for students at health departments (and creating virtual opportunities for health departments without a geographically nearby academic institution).
- Engage with communities about applied epidemiology as a career path through career fairs, collaborating with STEAM educational programs, etc.

### Hiring, Recruitment and Retention

The demand for epidemiology talent is beyond what is feasible for the existing workforce. To recruit candidates, health departments need timely hiring processes and competitive compensation to compete with other industries. Hiring barriers must be dismantled, including shortening timelines and providing accessible education on civil service testing. Expedited hiring processes are particularly vital during

public health emergencies, as demonstrated during the COVID-19 pandemic.

- Fill all currently vacant positions to increase the number of positions filled within the workforce by 37%.
- Prioritize hiring for program areas with greatest need, including infectious disease and informatics.
- Document and share lessons learned from early adopters in program areas experiencing rapid growth, including informatics and genomics to accelerate capacity building for other agencies.
- Recruit and hire epidemiologists with specific skillsets, including data analytics and persuasive communication.
- Provide education and outreach on civil service testing and hiring requirements to enhance access to careers in governmental public health.
- Support Public Loan Service Forgiveness (PLSF) efforts as a benefit to choosing a career in applied epidemiology.
- Provide competitive salaries and benefits to recruit and retain epidemiologists, account for rising inflation and remain competitive with other industries.
- Provide opportunities for flexible schedules and telework to expand the applicant pool, increase employee satisfaction and reduce burnout.
- Recognize staff contributions and accomplishments as a tool to foster retention and demonstrate appreciation of their institutional knowledge.
- Invest in training programs (e.g., Applied Epidemiology Fellowship, CSTE LEAD) to create our next governmental public health leaders.

#### **Collaboration and engagement**

Partnership is essential for data sharing and engaging the community. Epidemiologists must have the knowledge to detect disease patterns and the skills to engage with partners when making decisions with communities.

- Enhance collaborations with partners (e.g., hospitals, health systems, labs, immunization registries, wastewater, schools and public safety, coroners) to facilitate timely and accurate data sharing and connectedness.
- Build relationships with community partners to enhance implementation of public health measures, particularly in preparation for future emergencies.
- Build trust within the community to ensure the success of public health measures.
- Communicate and display data in a meaningful way to inform public health action.

#### **Training**

The epidemiology workforce requires additional on-the-job training, particularly in introductory and advanced epidemiology methods, communication, and data visualization.

However, staff struggle to prioritize professional development without dedicated time and leadership support.

- Provide on-the-job training for the current workforce in introductory and advanced epidemiology methods, including data analytics and software skills.
- Provide robust training for recent graduates on applied epidemiology basics and professionalism in the workplace.
- Provide training to strengthen the workforce's ability to effectively communicate with partners and communities ahead of the next public health emergency.
- Facilitate protected, dedicated time and leadership support for professional development of personnel.
- Promote education for epidemiologists on tribal sovereignty and consultation processes to enhance collaborative relationships with American Indian and Alaska Native populations and tribal nations to ensure data representation and sharing, both routinely and during emergencies.

#### **Future Assessments**

Future assessments are critical for measuring the progress of the applied epidemiology workforce over time. Additional ECAs should be considered to measure the impact of the end of pandemic funding, progress in data modernization efforts (for infrastructure and personnel), and progress towards enhancing the epidemiology pipeline and diversifying the public health workforce.

#### **Future ECA Objectives**

- Conduct additional ECAs to measure the impact of the end of pandemic funding.
- Assess and monitor public health's progress toward creating a more representative and diverse public health workforce and the field's ongoing response to structural racism as a public health issue and prioritization of health equity.
- Conduct an ECA to assess informatics capacity in a systematic manner for all states and territories.
- Monitor enumeration trends in the applied epidemiology workforce.