EPIDEMIOLOGY
CAPACITY ASSESSMENT

2024 Epidemiology Capacity Assessment Report

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Acknowledgments

The Council of State and Territorial Epidemiologists (CSTE) completed this assessment with cooperation and commitment from state and territorial health departments. CSTE acknowledges the contributions of Erica Smith, Ying Zhang, Isaac Benowitz, Kathy Turner, Sarah Kemble, Kenneth Komatsu, Carina Blackmore, Christine Hahn and Laura Williamson to inform the development and fielding of the 2024 Epidemiology Capacity Assessment. CSTE also acknowledges all CSTE staff members that provided input and feedback during tool development. Contributing CSTE National Office staff members are Sarah Auer, Jessica Arrazola, Emily Armstrong, Amanda Masters, Jennifer Lemmings, Janet Hamilton, Amy Heldman, Alexander Coyle, Megan Tompkins and Brenna Daly.

For more than seven decades, CSTE and the US Centers for Disease Control and Prevention (CDC) have worked together to improve the public's health by supporting the efforts of epidemiologists working at the state, territorial, and local levels by promoting the effective use of epidemiologic data to guide public health practice and improve health. CSTE and its members represent two basic components of public health – epidemiology and surveillance. This publication was supported in part by the CDC cooperative agreement number 1 NU38OT000297-02. Its contents are solely the responsibility of the authors and do not necessarily represent the official views of CDC.

Preferred Citation:
Council of State and Territorial Epidemiologists. (2024). 2024 Epidemiology Capacity Assessment. Atlanta, Georgia. https://www.cste.org/group/ECA

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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.

BACKGROUND

Background

The purpose of the field of public health is to improve and protect the population's health. This is achieved through prevention of disease by engaging in critical activities. It also requires collaborating with participants and stakeholders across multiple different sectors, such as government agencies, clinicians, non-governmental organizations, and private sector businesses to be as effective as possible (Frieden Thomas R., 2015). The Council of State and Territorial Epidemiologists (CSTE) supports the field of public health by working with applied epidemiologists and jurisdictions to advance the field of epidemiology and maximize the health of people and communities everywhere. CSTE uses the Epidemiology Capacity Assessment (ECA) to describe the current and past state of the epidemiology capacity that underscores public health activities.

State and local public health agencies play an instrumental role in conducting surveillance, providing scientific knowledge, responding to emergencies, and assessing community needs (National Consortium for Public Health Workforce Development, 2017). Surveillance is a critical epidemiologic activity that collects data to inform prompt and effective action (Groseclose & Buckeridge, 2017) and community needs assessments permit better selection of priorities and identifying at-risk groups. The pandemic, and the simultaneous record high uptick in weather-related disasters, have shown how critical health departments are for addressing and responding to public health emergencies in real time (Trust for America's Health, 2024). Epidemiologists are fundamental to the support of public health surveillance capacity (Drehobl et al., 2012), to the evaluation of community needs, and to preparedness and response activities (Trust for America's Health, 2024).

Public health has entered a period of rapid change and uncertainty in the wake of the COVID-19 pandemic. In an attempt to address the weaknesses in the US public health infrastructure exposed by the pandemic, there has been an influx of short-term federal and state investment in public health activities and infrastructure (de Beaumont Foundation, 2022). Since 2020, federal dollars have been awarded to state and local health departments through funding streams such as the Public Health Infrastructure Grant (PHIG), Epidemiology and Laboratory Capacity (ELC) Program, and Public Health Emergency Preparedness Grant (PHEP). These funds have been crucial to making much needed improvements to public health infrastructure and temporarily increasing staffing. It also allowed for faster and more effective public health action which has resulted in better quality data as updates and changes have been made to antiquated public health systems through routes like the Data Modernization Initiative (DMI). The implementation of electronic case reporting (eCR), syndromic surveillance, interoperable data systems, and more has improved the ability to detect and respond to emerging threats (CSTE, 2024a). Despite the clear benefits of these improvements, funding and support for public health is anticipated to shrink since the national pandemic response has deactivated and COVID-19 activities have been integrated into routine respiratory surveillance. Without long-term funding, the future of public health progress and activities is unclear, and health departments are feeling the impacts (Trust for America's Health, 2023).

In addition to funding, politicization of public health activities and public health workers' well-being have also arisen as major concerns. The visibility of public health during and after the pandemic brought on a wave of support, but also heavy backlash in response to distaste and opposition of new policies and approaches (Yeager, 2022). Burnout, stress, mental health, and even physical safety concerns among those working in public health have risen dramatically (Czeisler et al., 2020), with over half of those working in health departments reporting having at least one symptom of PTSD (de Beaumont Foundation & ASTHO, 2021). These issues have had a cascading effect, as more public health

professionals are leaving the field (Leider, Yeager, et al., 2023). In 2021, amid the pandemic, State Epidemiologists identified the need for an additional 2196 epidemiologists to provide basic public health services. Enumerating epidemiology staff and vacancies and identifying the challenges facing the epidemiology workforce is vital for public health leaders. With this information, they can identify policies and practices needed to move forward, and plan for the implementation of and evaluation of the delivery of core public health functions. Furthermore, having information about how their jurisdiction compares to similarly sized and located jurisdictions can facilitate beneficial conversations about how to improve practices surrounding recruitment, retention, and support for staff.

Over the past few decades, there has been an increase in the number of students entering public health academic programs. Despite this increase, there has been no subsequent increase in the number of public health students being employed in governmental public health agencies (Leider, Burke, et al., 2023). Additionally, despite efforts to have a more diverse workforce, the diversity of graduates from epidemiology and biostatistics programs at Association of Schools and Public Health Programs of Public Health (ASPPH) institutions has not improved (Goodman et al., 2023). In 2023, CSTE revised and updated the Applied Epidemiology Competencies (AECs). These competencies were developed in alignment with the Core Competencies for Public Health Professionals (Koo et al., 2008). The AECs define the roles and responsibilities of epidemiologists and summarize the skills necessary for the different levels of applied epidemiology practice. Schools and programs of public health should know what skills their graduates need to join and contribute to the public health workforce, as they are primarily responsible for equipping and preparing them for success in these careers. Knowing which program areas have the highest need for epidemiologists, the educational and experiential qualifications required for hiring, and the skills that health departments are seeking for successful candidates are essential in the design of curricula and counseling of public health students. There is also a need for the Council on Education for Public Health (CEPH) to use the same information during the accreditation of programs in order to hold institutions accountable to the standards that reflect the needs of public health.

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. This ECA was conducted in part to collect baseline information for monitoring progress with the Healthy People 2010 Public Health Infrastructure objective (CDC, 2003). Since fielding in 2001, CSTE 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. Historically, the ECA has illustrated trends in the applied epidemiology workforce, including a continued need for additional epidemiologists to achieve ideal capacity, 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 (CSTE, 2006; CSTE, 2009; CSTE, 2013; CSTE, 2017; CSTE, 2021).

The Public Health Workforce Interests and Needs Survey (PH WINS) was conducted in 2021 by ASTHO and the de Beaumont Foundation. PH WINS explored the demographics of the public health workforce, identified training needs, and examined job satisfaction amongst state and local health department employees, including epidemiologists (de Beaumont Foundation & ASTHO, 2021). Results demonstrated that 34% of epidemiologists working in state and local health departments intended to leave their position in one year for reasons other than retirement, and that 25% wanted to leave after their experience with COVID (unpublished data, de Beaumont, 2022). Building on the recommendations from the 2021 ECA and the 2021 PH WINS, the 2024 ECA was conducted to better describe the current applied epidemiology workforce and applied epidemiology capacity. The objectives of the 2024 ECA were to illustrate the impacts of recent investments in applied epidemiology activities and personnel and document changes in applied epidemiology capacity over time.

METHODS

Methods

Instrument development and distribution

In the fall of 2023, the CSTE workforce staff convened focus groups with CSTE national office staff and CSTE members to identify the purpose, value, desired outcomes, and diffusion of the 2024 ECA. CSTE also created an ECA workgroup to aid in discussions on assessment content, including removal, editing, and addition of new questions and the training required to prepare State and Territorial Epidemiologists to complete the assessment. The CSTE workforce staff also consulted partners, including the Association of State and Territorial Health Officials (ASTHO), National Association of County and City Health Officials (NACCHO), the Center for Disease Control and Prevention's (CDC's) Center for Forecasting and Outbreak Analytics, CDC's Epidemiology and Laboratory Capacity for Prevention and Control of Emerging Infectious Diseases, and the de Beaumont Foundation.

Based on the climate of public health and burgeoning public health issues, five items that were included in the previous 2021 ECA were excluded from the 2024 ECA to minimize respondent burden and ensure relevant questions. Therefore, the 2024 ECA did not ask about the following topics: the use of outbreak management systems, case-based surveillance system capacity and contact tracing.

Concurrently, 21 questions were added to the 2024 ECA with several of the new questions pertaining specifically to the role of a State Epidemiologist, ELC funding, data modernization, impacts of losing temporary pandemic funding, outbreak forecasting and disease modeling and recruiting a diverse workforce.

Additional modifications were made to the 2024 ECA. Ten new program areas were added to provide more granularity: general infectious disease, foodborne/waterborne diseases, HIV, pan-respiratory, tuberculosis, vaccine-preventable diseases, vector-borne/zoonotic diseases, viral hepatitis, reproductive health and wastewater surveillance. "Genomics" was updated to "Genomics/Advanced Molecular Detection" and "Preparedness" to "Preparedness and Disaster Epidemiology" to better capture what's included in these program areas. Furthermore, additional response options were added to questions about training needs (community collaboration, legal epidemiology, grant management), best practices for recruiting and retaining epidemiologists (working remotely, merit increases/bonuses and attending scientific conferences) and strategies for reducing burnout in staff (hiring additional staff to lessen the workload, allowing telework and providing cross-training).

The final questions were assembled into a single core questionnaire to be completed by State or Territorial Epidemiologists and their designees. The resulting assessment was developed into an online format using Qualtrics software. It was piloted in November 2023 by 5 states (Arizona, Florida, Hawaii, Idaho, and Montana). The assessment was revised on the basis of their feedback. The revised assessment (Appendix A) contained 8 sections:

- Section 1: Epidemiology leadership within the state health department;
- Section 2: Epidemiology and surveillance capacity within the state health department;
- Section 3: Epidemiology funding sources and staffing within the state health department;
- Section 4: Civil service annual salary ranges for epidemiologists in the state health department;
- Section 5: Recruiting the epidemiology workforce;
- Section 6: Vacancies and retention of the state epidemiology workforce;
- Section 7: Leadership feedback; and
- Section 8: Review of the assessment.

Most of the questions were short-answer, multiple-choice, scales (e.g., none, minimal, partial, substantial, full), or matrix tables, such as the fraction of full-time equivalent positions by program area and funding source. The ECA also included open-ended questions pertaining

to utilizing additional funding, recruiting a diverse workforce and critical issues faced by State and Territorial Epidemiologists.

On January 22, 2024, CSTE distributed electronic instructions and individual assessment links to each State and Territorial Epidemiologist in all 50 state health departments, DC, and 8 US territories (American Samoa, Federated States of Micronesia, Guam, Northern Mariana Islands, Puerto Rico, Republic of Palau, Republic of the Marshall Islands and the US Virgin Islands). CSTE accepted responses through the online tool. The online assessment also was converted into an editable PDF and attached to the instructional email. In addition, 2 worksheets were created and attached to the email to assist with gathering information from other staff in the state health department, namely program area leads and human resources directors. Instructions for using the worksheets were included in the assessment instructions within the online tool. The PDF version of the online assessment and worksheets are included in the appendices.

Each State or Territorial Epidemiologist was provided a unique link and was asked to complete the online assessment by March 4, 2024. States and territories were given the email address and telephone number of CSTE staff to contact with questions during business hours. In addition, CSTE hosted a "How to Complete the 2024 ECA Informational Webinar" on January 29, 2024, and held 2 virtual ECA office hours sessions on February 7 and February 21. Each state or territory was also provided with a copy of its 2021 ECA submission to ensure responses considered previous staff enumeration methods.

CSTE extended the deadline because not all jurisdictions were able to complete the assessment by March 4. All responses were collected by April 16, 2024. All 50 states and DC participated, as did all 8 of the US territories and freely associated states. Data were cleaned to identify any errors or incomplete responses. CSTE staff emailed states to request necessary revisions for data validation and to address incomplete responses.

Definitions and response options

Epidemiologist

As in previous years, State Epidemiologists were instructed to count as epidemiologists "all those employed by the state; all those working at the state level who are either federal assignees (e.g., EISO, CEFO, PHAP) or contract employees (e.g. CSTE trainee, contracted from school of public health to work at or for the State Health Department); and state employees assigned to work at a local or regional level (e.g. to conduct investigations for a region of the state)." The instructions also added that "[when] considering who should be counted, please focus on the functions performed by the individual rather than the job title. Reference the AECs for examples of epidemiology job functions if you need assistance in determining the status of an employee."

A link containing additional information about the definition of who should be counted as an epidemiologist was included as a pop-up tab link within the assessment instructions. This link opened to a PDF document referencing John M. Last's definition (Last, 2000): an epidemiologist is "an investigator who studies the occurrence of disease or other health-related conditions or events in defined populations. The control of disease in populations is often also considered to be a task for the epidemiologist." The document also defined epidemiology as the "study of the distribution and determinants of health-related states or events in specified populations, and the application of this study to control of health problems."

In some states, epidemiologists are employed by separate agencies in the state. For example, occupational health is sometimes in the department of labor. In such cases, the epidemiologists working at separate state agencies outside of the state health department were excluded from this analysis.

Capacity in the Essential Public Health Services (EPHS)

Adequate epidemiological capacity was defined as the state health department's ability to lead activities; provide subject-matter expertise; and apply for, receive, and manage resources to conduct key activities. The following scale was used to describe capacities in providing the three indicated EPHS overall and by specific program area.

- *None:* 0% adequate epidemiologic capacity to provide the EPHS.
- *Minimal:* 1%–24% adequate epidemiologic capacity to provide the EPHS.
- *Partial:* 25%–49% adequate epidemiologic capacity to provide the EPHS.
- *Substantial:* 50%–74% adequate epidemiologic capacity to provide the EPHS.
- *Almost full:* 75%–99% adequate epidemiologic capacity to provide the EPHS.
- *Full:* 100% adequate epidemiologic capacity to provide the EPHS.

Vacancies

The following definition was used to describe vacancies in epidemiology/surveillance positions in the state health department: "A vacancy is defined as a position to be filled at the State Health Department that meets the following conditions: (1) there is work available for the position and (2) the job could start within 30 days."

Intend to fill positions

Intend to fill positions were a subset of the vacancies and consisted of positions that human resources were working actively to fill.

Analytic Techniques

Data were analyzed using R Studio software and Microsoft Excel 2008. Results were tabulated for each question among the responding jurisdictions (the 50 states; DC; and the 8 US territories and freely associated states of American Samoa, Federated States of Micronesia, Guam, Northern Mariana Islands, Puerto Rico, Republic of Palau, Republic of the Marshall Islands and the US Virgin Islands). The territories, which range in population from approximately 18,000 (Republic of Palau) to 3.2 million (Puerto Rico) differed substantially from the 50 states and DC in their organization of epidemiology services, hiring practices, and salary scales. Thus, unless otherwise noted, the data for the states and DC were analyzed separately from the data for the 8 territories and freely associated states. Data referencing "the states" comprises the 50 states and DC.

Select analyses were stratified by state population size. Population size was based on 2023 US Census figures for states, DC and Puerto Rico and 2020 US census data for the US Virgin Islands (US Census Bureau, 2023). Population size for territories was based on 2020 census data from the Pacific Community Statistics for Development Division's Pacific Data Hub (Pacific Community Statistics for Development Division, 2024).The three categories were small (<2 million; 14 states and DC), medium (2–6 million; 17 states), or large (>6 million; 19 states) (Figure 1). In addition, some variables were examined by region using standard census categories (Northeast, South, Midwest, and West) (Figure 2).

Figure 1 Categories based on state size

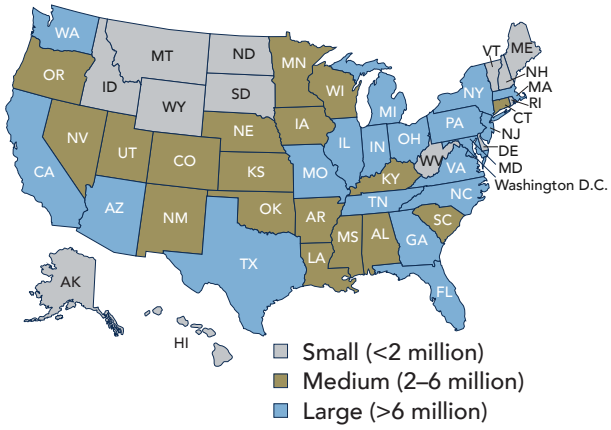
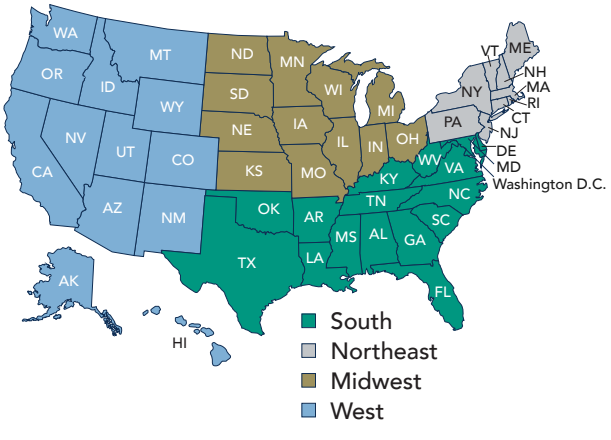


Figure 2 Categories based on U.S. census regions



As in previous assessments, 2 methods were used to calculate the number of epidemiologists per 100,000 population by state population size and by region. In the first, expressed as epidemiologists per 100,000, the total number of epidemiologists in the subgroup (e.g., all epidemiologists in Midwestern states) was divided by the total population of that subgroup (total population of the Midwest). In the second method, referred to as median number of epidemiologists per 100,000 population, the number of epidemiologists per 100,000 was first calculated for each individual state, and the median for all the states in each subgroup was identified.

Trends in certain key findings were assessed using data from the six ECAs in the past 20 years: 2004, 2006, 2009, 2013, 2017 and 2021; for other variables, only the findings for 2021 and 2024 were examined. The 2001 data were excluded because only 39 states participated, making temporal comparisons of data problematic and the 2010 enumeration was not included in some comparisons due to limited data. Where relevant, chi-square tests, Fisher exact tests, Shapiro Wilk tests, Kruskal-Wallis tests and Wilcoxon Rank Sum tests were used to examine differences between groups.

With respect to the open-ended questions, data for the questions about recruitment strategies, critical issues, and data modernization are presented in this document. For the analysis, CSTE staff coded the responses and grouped them thematically. The separate analyses were compared for intercoder reliability and major themes selected.

RESULTS

Results

Epidemiology leadership within the health department

Response rates and characteristics of participating State and Territorial Epidemiologists

The State Epidemiologists from the 50 states and DC responded to the 2024 ECA; 8 territories and freely associated states (American Samoa, the Federated States of Micronesia, Guam, the Northern Mariana Islands, Puerto Rico, Republic of the Marshall Islands, Republic of Palau, and the US Virgin Islands) also participated.

The median number of years State and Territorial Epidemiologists had served in their current position was 4.25 years (range <1 year to 28.5 years). The tenure of leaders is slightly higher than in 2021, when the median time in position was 4 years. A little more than half (51%) of State and Territorial Epidemiologists have been in their position for less than 5 years (Figure 3).

Responsibilities of State and Territorial Epidemiologists

The 2024 ECA included new questions regarding the program areas that State and Territorial Epidemiologists work on and supervise. All (100%) State and Territorial Epidemiologists reported working on infectious disease, with most also working on HAIs (92%). Less than half reported working on chronic disease program areas (Figure 4).

The 2024 ECA sought to understand the additional roles that State Epidemiologists are tasked with serving in the health department.

Figure 3 Number of years in current position among State and Territorial Epidemiologists, ECA 2024 (n=59)

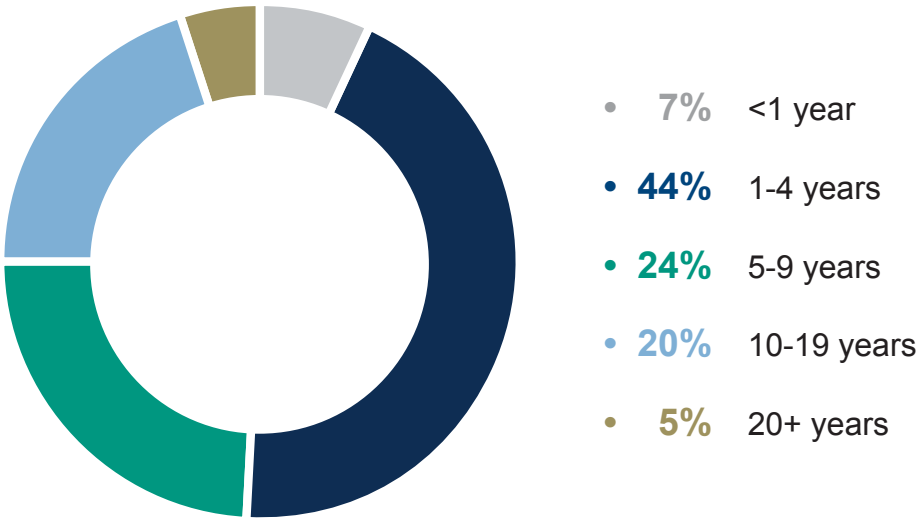
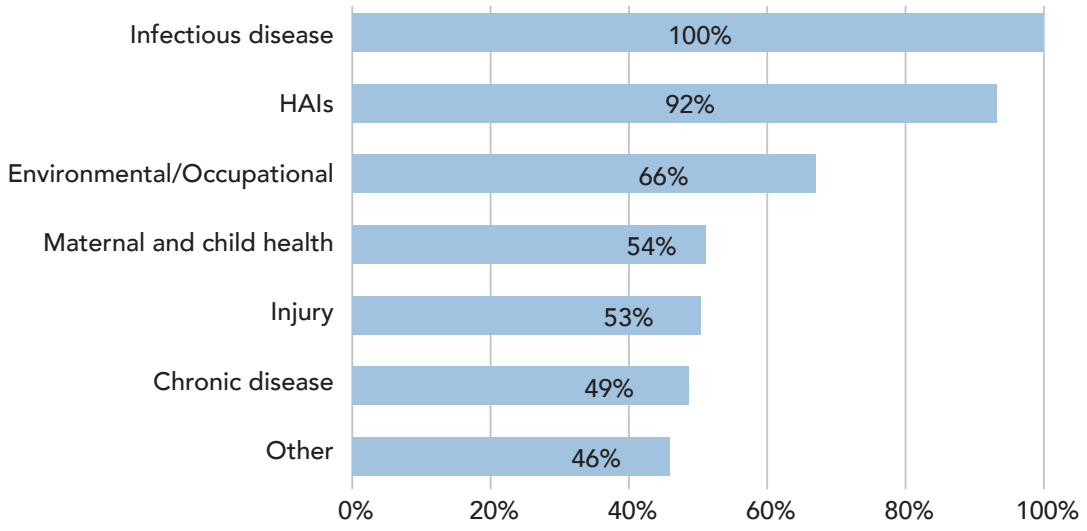


Figure 4 Percentage of State and Territorial Epidemiologists that work in select program areas, ECA 2024 (n=59)



While 15 states and territories reported that their State Epidemiologist does not serve other roles, many reported serving as the Chief of Communicable Disease (n = 14) and other assorted roles not listed, including associate commissioner, overseeing informatics director, medical director for public health responses, overseeing environmental health and laboratories, human subjects review board chair, division director, associate secretary, section chief, ELC principal investigator, chief science officer, amongst others (Figure 5).

Figure 5 Additional roles of State and Territorial Epidemiologists, ECA 2024 (n=59)

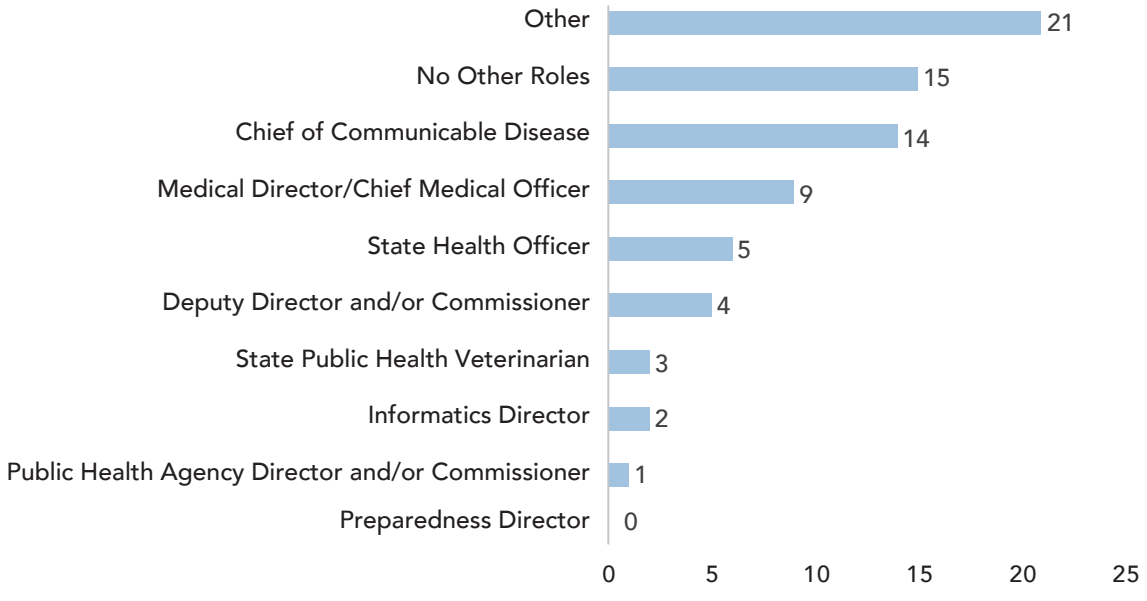
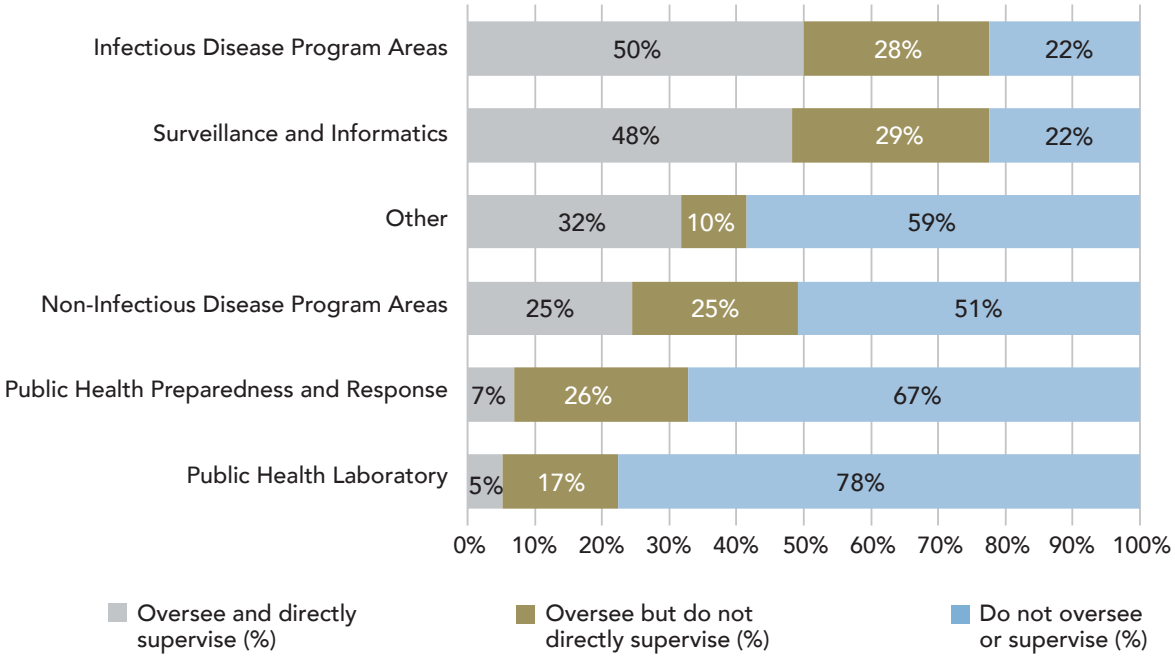


Figure 6 State and Territorial Epidemiologists program oversight, ECA 2024 (n = 58)



When asked about which areas State and Territorial Epidemiologists oversee and/or supervise, half (50%) reported overseeing and directly supervising infectious disease program areas and 48% oversee and supervise surveillance and informatics. Less than a tenth reported overseeing and supervising public health preparedness and response (7%) and public health laboratories (5%). Twelve State and Territorial Epidemiologists reported overseeing and supervising multiple program areas (Figure 6).

Program area lead epidemiologists

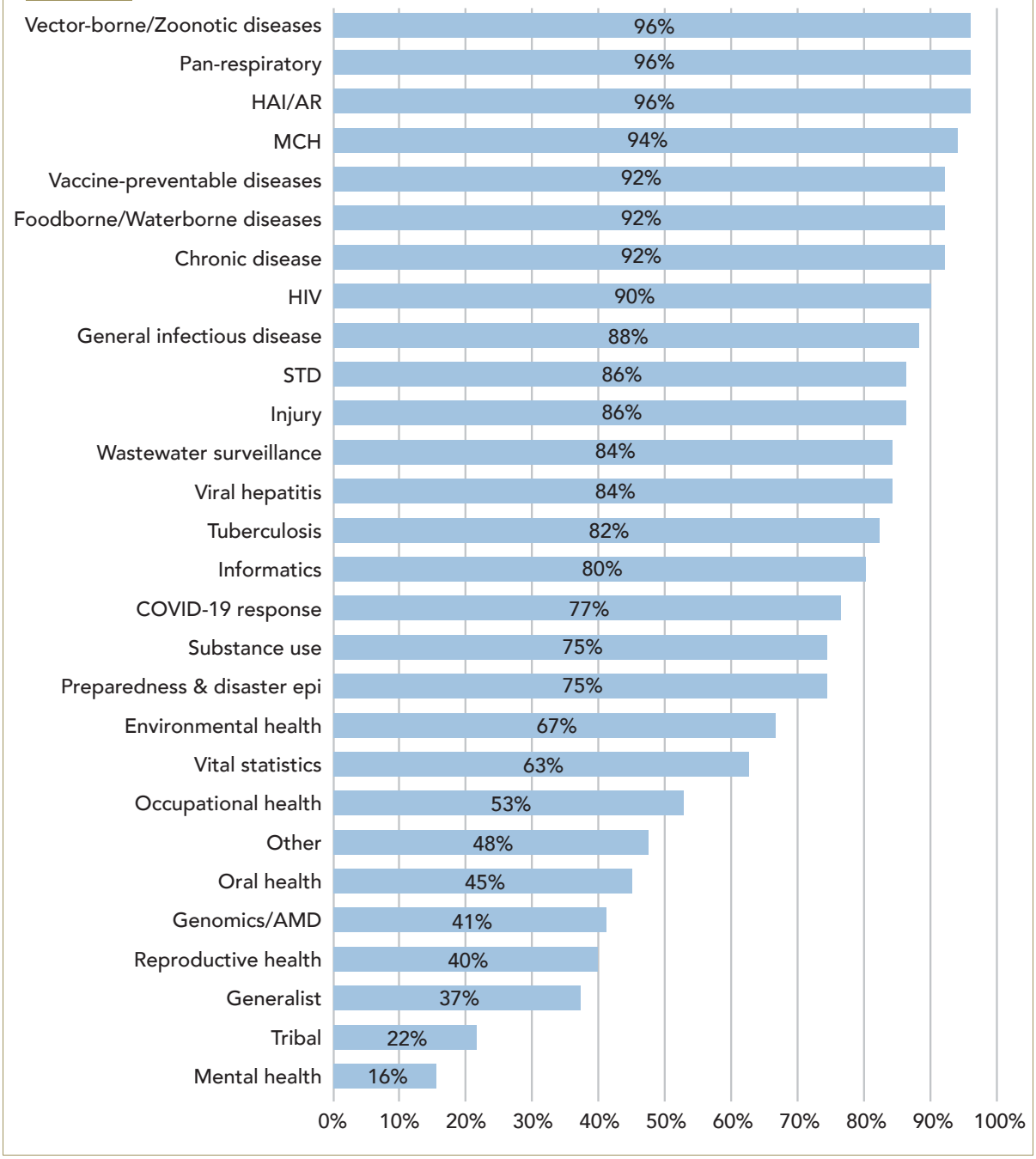
Nearly all (96%) of the 50 states and DC had a lead epidemiologist in vector-borne/zoonotic diseases, pan-respiratory and HAI/AR, and most states had leads in maternal and child health (94%), vaccine-preventable diseases, foodborne/waterborne diseases and chronic disease (92%) (Figure 7). Nearly all other program areas had coverage >50%; coverage was somewhat lower for oral health, genomics/advanced molecular detection, reproductive health, generalist, tribal and mental health. There was a significant relationship between state size (<2 million, 2-6 million, and >6 million population) and the presence of a lead epidemiologist for STD and vaccine preventable diseases. For STD, 100% of large states have a lead epidemiologist compared to 87% for small states and 71% for medium states (p = .03). For vaccine preventable diseases, 100% of large states and 100% of small states reported having a lead epidemiologist compared to 77% of medium states (p = .01).

More than half of the territories have program area leads for pan-respiratory (88%), general infectious disease (88%), vector-borne diseases (75%), COVID-19 response (75%) and preparedness and disaster epidemiology (63%). Less than half of territories have leads in the other program areas with no territories reporting leads for tuberculosis, injury, occupational health, oral health or tribal program areas (Figure 8).

Trends in the presence of program leads

The greatest percentage increase in the presence of program leads was in genomics/advanced molecular detection, where the percentage of jurisdictions with a lead epidemiologist nearly tripled, from 12% to 41% (p = .0006) (Figure 9). 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%).

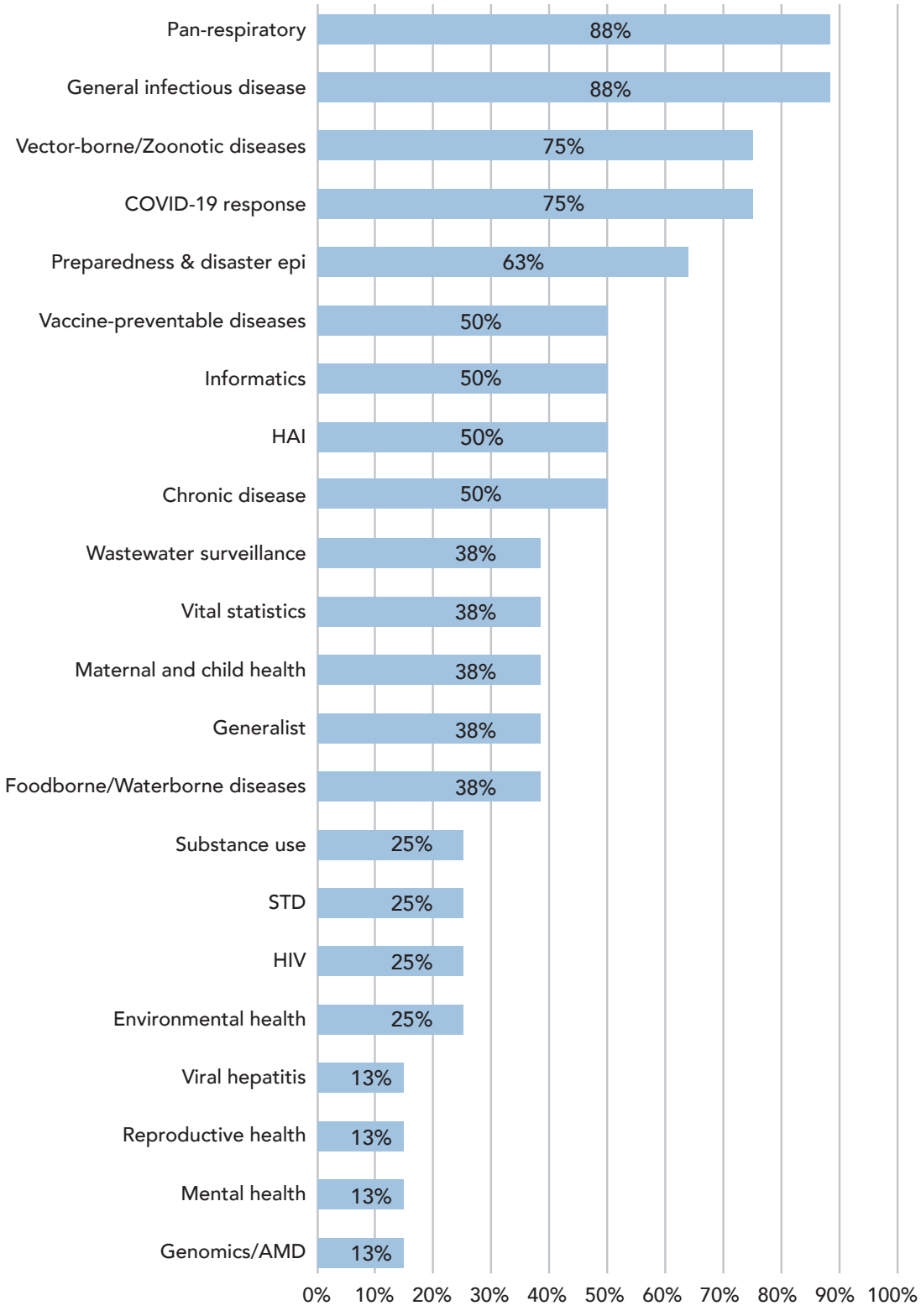
Figure 7 Presence of lead epidemiologists by program area, 50 states and DC, ECA 2024



*Other includes program areas not listed, including but not limited to: Emergency Medical Services (EMS), border health, policy and planning, local health administration, and others.

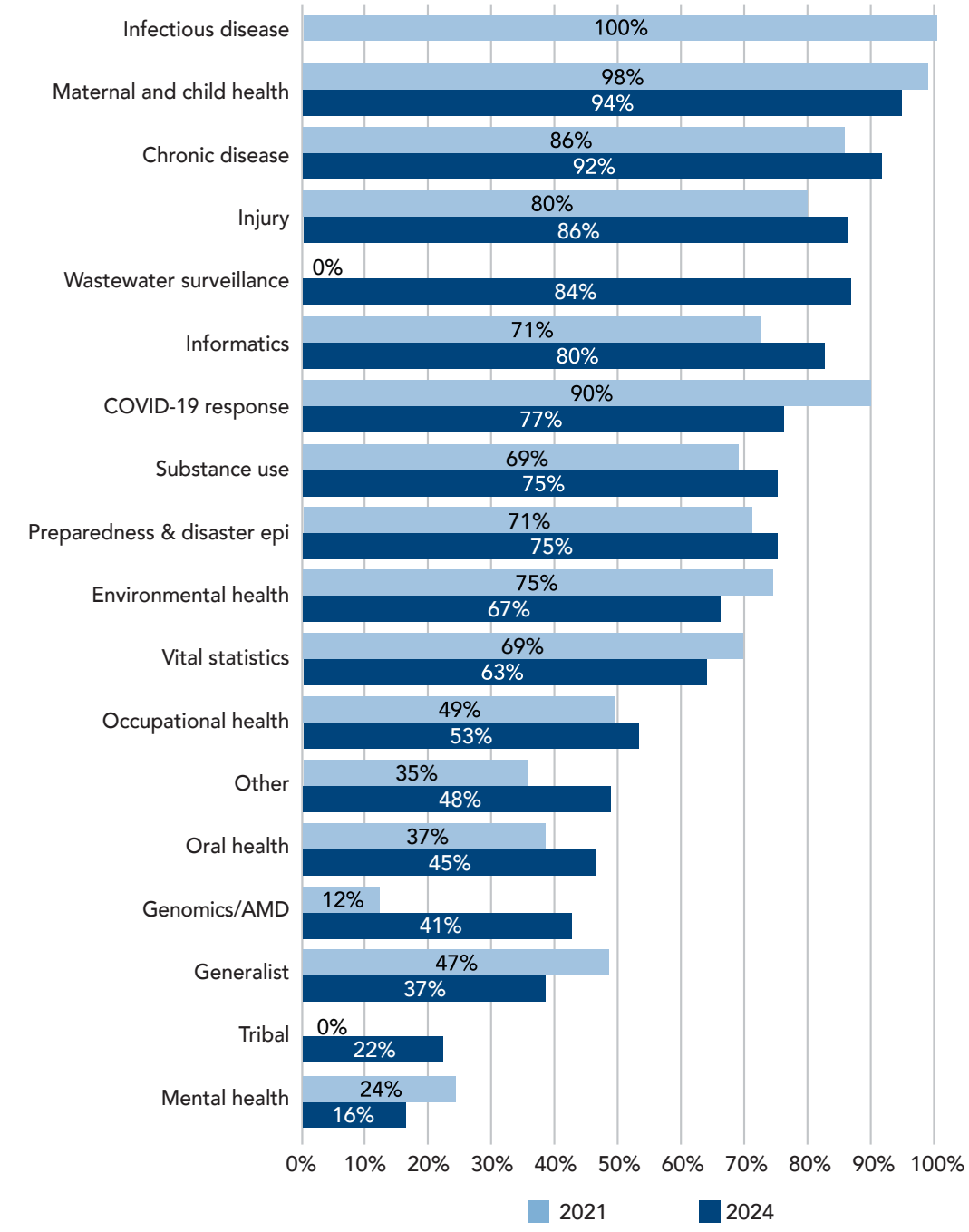
None of the decreases were statistically significant. The 2024 ECA divided the infectious disease category into several additional categories to be more representative of the field. Due to the addition of these program areas and the categorical nature of the variable, there is no comparison of lead epidemiologists in infectious disease in 2024 compared to 2021. There is no comparative data for wastewater surveillance as it was collected for the first time in 2024.

Figure 8 Presence of lead epidemiologists by program area, 8 Territories and Freely Associated States, ECA 2024



*No territories reported having a lead epidemiologist for tuberculosis, injury, occupational health, oral health, tribal or other.

Figure 9 Trends in presence of program area leads, 50 states and DC, ECA 2021 and 2024



*Infectious disease only includes general infectious disease as sub-areas could not be combined categorically.
**Wastewater surveillance and tribal epidemiology were added in 2024 and do not have comparative data.

The greatest significant increase in the percentage of states with program leads was in genomics/advanced molecular detection. By contrast, the presence of program leads decreased in generalist and mental health.

Epidemiology staffing and funding within health departments

Staffing

Number of epidemiologists and rates per 100,000 population

A total of 5706 epidemiologists were counted in the 50 states and DC. An additional 337 were reported by the 8 participating territories and freely associated states. Compared with 2021, the number of epidemiologists in the 50 states and DC increased 38%, from 4135 epidemiologists. The number of epidemiologists per state and DC ranged from 18 to 407. Overall, the number of epidemiologists per 100,000 population was 1.70, 35% higher than the rate of 1.26/100,000 obtained in 2021.

More populous states had higher median numbers of epidemiologists, although the ranges varied widely and overlapped between the 3 categories (Small, Medium, Large) (Table 1). Similar to 2021, the number of epidemiologists per 100,000 population decreased with increasing state population. Comparison of the number of epidemiologists per 100,000 by state size indicated that small states had 2.7 times as many epidemiologists per 100,000 as did the large states. While the South had the greatest number of epidemiologists, the Northeast had the highest median rate of epidemiologists, at 3.2/100,000.

Additional and ideal number of epidemiologists needed to achieve full capacity

Total additional and ideal positions

Participating epidemiologists were asked to estimate the number of additional epidemiologists needed to reach full capacity in each program area. Overall, epidemiologists from the 50 states and DC indicated a need for an estimated additional 2537 epidemiologists in all the program areas combined to provide basic public health services. The territories reported needing 139 additional epidemiologists. The greatest number of positions needed were in all infectious disease areas combined (1019), informatics (249), chronic disease (160), maternal and child health (145) and environmental health (143) (Table 2).

Table 1 Number of program area epidemiologists, medians, range and rates/100,000 by geographic area and state size, 50 states + DC, ECA 2024

Area	Number of states	Number of epidemiologists	Range, number of epidemiologists/ state	Median number/ state	Rate/ 100,000**	Median rate/ 100,000^
United States	51	5706	18-407	88	1.7	2.5
State size*						
Small#	15	672	20-81	44	3.8	3.8
Medium	17	1640	18-203	92	2.3	2.5
Large	19	3394	42-407	154	1.4	1.3
Geographic area						
Northeast	9	1099	45-278	125	1.9	3.2
Midwest	12	888	31-157	55	1.3	1.7
South	17	2311	33-407	114	1.8	2.0
West	13	1407	18-355	75	1.8	2.9

*Small: < 2 million, medium: 2-6 million; large: >6 million; see Figure 1 for map. Population figures from 2023 US Census estimates

**Based on sum of all epidemiologists within a category and total population in that category

^Median of state-specific rates/100,000

#Kruskal-Wallis for difference between median rate/100,000 = < 0.001 for small compared to large states and .0031 for small compared to medium states.

The number of epidemiologists increased by 38% from 2021 to 2024, and the number per 100,000 population increased 35%.

Three indicators were calculated to better understand the differences between the current and ideal situation:

- The ideal number of epidemiologists (current + additional positions),
- The percentage of need currently met (current/ideal positions), and
- The percentage increase in current positions needed to reach ideal levels (ideal—current positions)/current positions.

Overall, the ideal number of epidemiologists for states and DC was 8243. The percentage of currently met need was 69%, and the ideal value constitutes a 44% increase over the current number of epidemiologists (Table 3). If the 2024 ideal were to be achieved, the number of epidemiologists per 100,000 population would be 2.5/100,000. Compared with 2021, the ideal number of epidemiologists was 6331, a 53% increase over the actual number of 4135 for a rate of 1.9/100,000 population.

State population size affected need for additional positions. The percentage increase to achieve the ideal number was greater for small states (60%) than for medium (46%) and large-sized (39%) states. For the territories, a 41% increase would be needed (337 current epidemiologists versus an ideal number of 475).

Table 2 Number of epidemiologists by program area (condensed) in 2021 and 2024, 50 states and DC, ECA 2024*

Program Areas	2024	2021	Difference (N)	% Change
Chronic disease	290	250	40	16%
COVID-19 response	510	978	-468	-48%
Environmental health	262	231	31	13%
Generalist	196	81	115	141%
Genomics/Advanced molecular detection	39	5	34	684%
Infectious disease	2541	1498	1044	70%
Informatics	685	198	487	246%
Injury	145	126	19	15%
Maternal and child health	358	292	66	23%
Mental health	19	9	11	121%
Occupational health	37	34	3	10%
Oral	22	20	1	6%
Preparedness and disaster epidemiology	145	127	17	13%
Substance use	167	114	53	46%
Tribal	9	-	-	-
Vital statistics	102	117	-15	-12%
Wastewater surveillance	69	-	-	-
Other**	109	55	54	98%

*Condensed infectious disease category includes foodborne/waterborne diseases, general infectious disease, HAI/AR, HIV, pan-respiratory, STD, tuberculosis, vaccine preventable diseases, vector-borne/zoonotic diseases, and viral hepatitis.

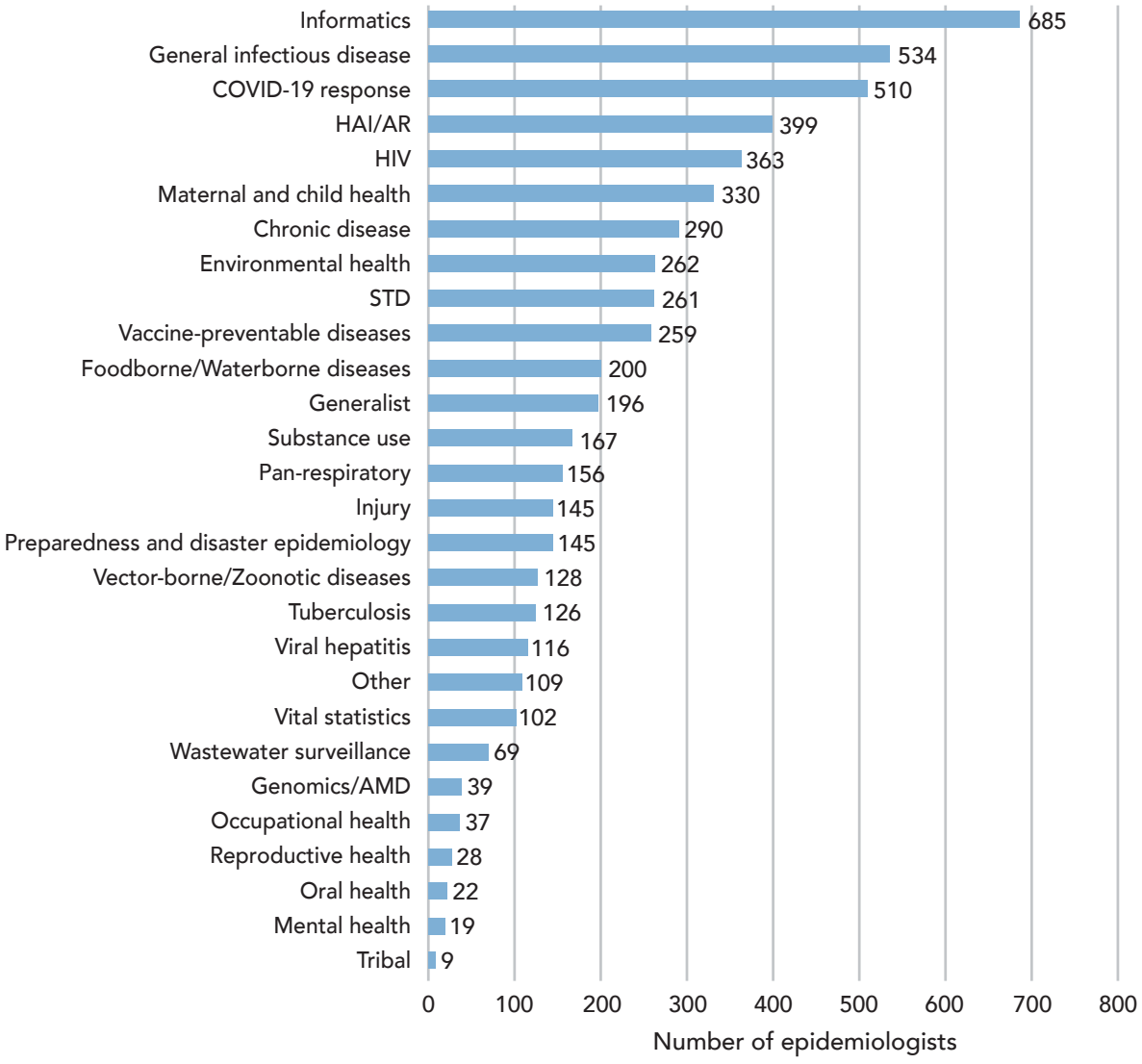
**Other includes program areas not listed, including but not limited to: Emergency Medical Services (EMS), border health, policy and planning, local health administration, and others.

Number of epidemiologists by program area

The 2024 ECA parsed out program areas under the umbrella of infectious disease for more precise enumeration. When all infectious disease program areas are combined, infectious disease accounts for 2,541 epidemiologists or 45% of the total number of epidemiologists enumerated by the states and DC*. Informatics had the second highest number of epidemiologists (685) followed by COVID-19 response (510). COVID-19 response epidemiologists were not included under infectious disease to allow for comparison with 2021 data. By contrast, wastewater surveillance, genomics/advanced molecular detection, occupational health, reproductive health, oral health, mental health and tribal combined represented 4% of the total (Figure 10).

Similar to 2021, the greatest absolute increase from 2021 to 2024 was in informatics, where 487 positions were added, a 246% increase. However, the greatest percentage increase between 2021 and 2024 was in genomics, adding 34 positions, a 684% increase. COVID-19 response, by contrast, lost 468 epidemiologists, a 48% decrease. Vital statistics also lost 15 epidemiologists, a 12% decrease since 2021.

Figure 10 Number of Epidemiologists by program area, 50 states and DC, ECA 2024



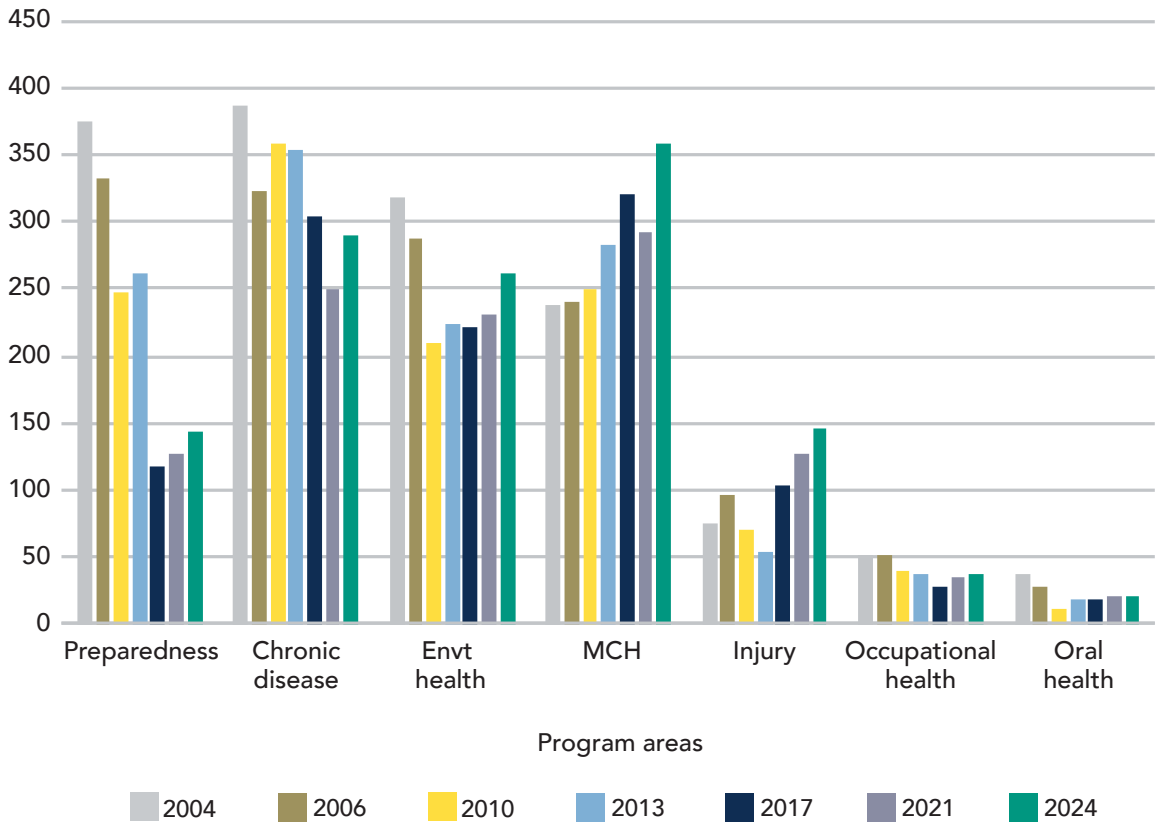
*Condensed infectious disease category includes foodborne/waterborne diseases, general infectious disease, HAI/AR, HIV, pan-respiratory, STD, tuberculosis, vaccine preventable diseases, vector-borne/zoonotic diseases, and viral hepatitis.

A total of 45% of all epidemiologists work in infectious disease. Staffing in COVID-19 response and vital statistics decreased since 2021.

Trends in the number of epidemiologists by program area

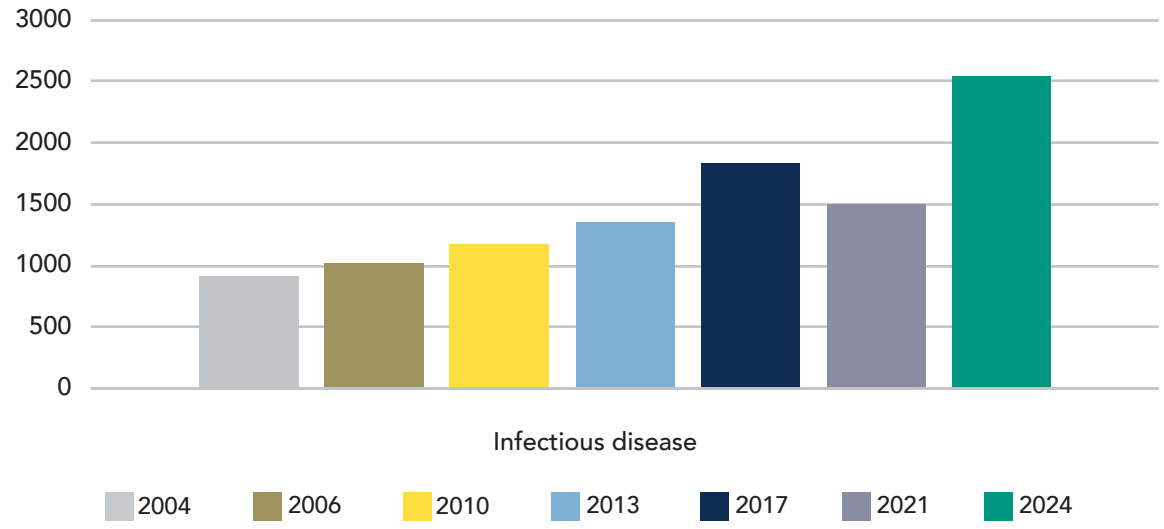
Longitudinal data were available for 8 of the program areas for which data have been consistently collected since 2004 (Figure 11 and 11.1). Despite a slight decrease between 2017 and 2021 during the COVID-19 pandemic, there was a sharp increase in infectious disease epidemiologists between 2021 and 2024 (Figure 11.1). Similarly, preparedness (now pandemic preparedness and disaster epidemiology) continued its steady increase after a sharp decline between 2013 and 2017. Like the last few years, the number of injury epidemiologists continues to steadily increase. Oral health and occupational health have experienced small increases since 2021 (Figure 11).

Figure 11 Trends in number of epidemiologists by program area, 2004 - 2024, 50 states and DC, ECA 2024



There was a sharp increase in the number of infectious disease epidemiologists enumerated in 2024 compared to 2021.

Figure 11.1 Trends in number of epidemiologists in infectious disease, 2004 - 2024, 50 states and DC, ECA 2024



Collected for the first time in 2017, informatics saw steady growth between 2017 and 2021 (from 96 to 198 epidemiologists) before experiencing a sharp increase of 487 epidemiologists between 2021 and 2024 (Figure 11.2). Similarly, genomics saw a 684% increase in the number of epidemiologists nationwide since the 2021 ECA, with the addition of 34 epidemiologists (Figure 11.3).

Figure 11.2 Trends in number of epidemiologists for informatics, 2017 - 2024, 50 states and DC, ECA 2024

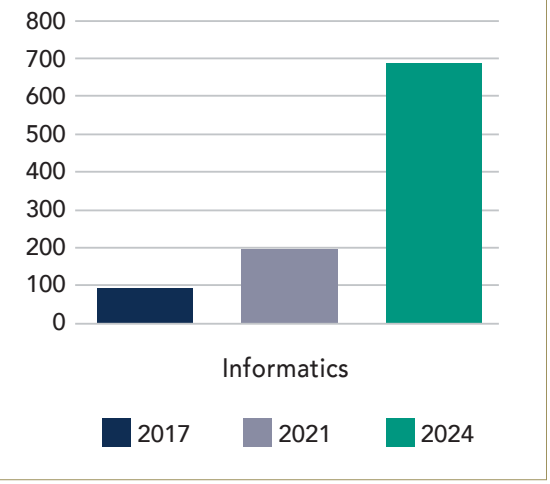
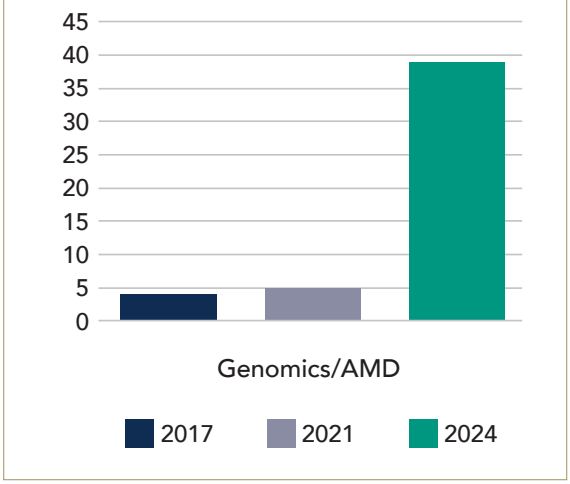


Figure 11.3 Trends in number of epidemiologists for Genomics/AMD, 2017 - 2024, 50 states and DC, ECA 2024



There was significant growth in the number of informatics and genomics epidemiologists in the workforce between 2021 and 2024.

Additional and ideal positions by program area

The greatest number of positions needed were in all infectious disease areas combined (1019), informatics (249), chronic disease (160), maternal and child health (145) and environmental health (143) (Table 3). In terms of the percentage increase over current positions needed to achieve the ideal levels of staffing, the greatest needs were in mental health (a 314% increase, from 19 to 80), tribal health (a 242% increase, from 9 to 30), genomics/advanced molecular detection (a 204% increase, from 39 to 119), occupational health (a 169% increase, from 37 to 100) and oral health (a 144% increase, from 22 to 52).

Table 3 Current, additional, and ideal numbers of epidemiologists overall and by program area (condensed), 50 states and DC, ECA 2024*

Program Area	Current	Additional	Ideal (current + additional)	Need currently met (%)†	Increase needed to reach ideal (%)‡
Chronic disease	290	160	450	64%	55%
COVID-19 response	510	38	548	93%	8%
Environmental health	262	143	405	65%	55%
Generalist	196	131	327	60%	67%
Infectious disease	2541	1019	3560	71%	40%
Genomics/Advanced molecular detection	39	80	119	33%	204%
Informatics	685	249	934	73%	36%
Injury	145	96	241	60%	66%
Maternal and child health	358	145	503	71%	40%
Mental health	19	60	80	24%	314%
Occupational health	37	63	100	37%	169%
Oral health	22	31	52	41%	144%
Preparedness and disaster epidemiology	145	58	203	71%	40%
Substance use	167	68	235	71%	41%
Tribal	9	21	30	29%	242%
Vital statistics	102	73	175	59%	71%
Wastewater surveillance	69	54	123	56%	77%
Other#	109	49	158	69%	45%
TOTAL	**5706**	**2537**	**8243**	**69%**	**44%**

*Condensed infectious disease category includes foodborne/waterborne diseases, general infectious disease, HAI/AR, HIV, pan-respiratory, STD, tuberculosis, vaccine preventable diseases, vector-borne/zoonotic diseases, and viral hepatitis.

†current/ideal*100

‡{ideal-current}/current*100

#Other includes program areas not listed, including but not limited to: Emergency Medical Services (EMS), border health, policy and planning, local health administration, and others.

Table 4 Current, additional, and ideal numbers of epidemiologists by infectious disease program areas, 50 states and DC, ECA 2024

Infectious Disease Program Areas	Current	Additional	Ideal (current + additional)	Need currently met (%) *	Increase needed to reach ideal (%)†
Foodborne/Waterborne diseases	200	88	288	69%	44%
General infectious disease	534	161	695	77%	30%
HAI/AR	399	164	563	71%	41%
HIV	363	98	461	79%	27%
Pan-respiratory	156	75	231	67%	48%
STD	261	122	383	68%	47%
Tuberculosis	126	53	179	70%	42%
Vaccine-preventable diseases	259	95	354	73%	37%
Vector-borne/Zoonotic diseases	128	72	199	64%	56%
Viral hepatitis	116	91	207	56%	78%
TOTAL	**2541**	**1019**	**3560**	**71%**	**40%**

*current/ideal*100

†{ideal-current}/current*100

Note: COVID-19 was not included under infectious disease in 2024 to allow for comparisons with 2021 data.

The 2024 ECA included additional infectious disease program areas to better understand the distribution and needs of the workforce. When examining the infectious disease program areas, the areas needing the most epidemiologists were HAI/AR (164), general infectious disease (161), and STD (122).

Current civil service and contractor vacancies and intent to hire by program area

Beyond the number of positions needed, respondents also provided data on the number of current vacancies and positions for which they were actively recruiting (intent to hire) for civil service and contractor positions (Table 5). Vacancies were defined as positions for which work is available and could start within 30 days, and intent to hire added the requirement that human resources staff were actively recruiting for the position.

Participating jurisdictions were asked to report whether they used contractors to fill positions. Twenty-seven states and DC (53%) reported using contractors, as did 5 of the 8 territories. Large states were more likely to use contractors (63%) than medium-sized (47%) or small (47%) states, and Northeastern states were more likely to use them (67%) than Southern, Midwestern, or Western states (59%, 58%, and 31% respectively), but none of these differences were statistically significant.

Nationally, a total of 939 positions were vacant, including 812 civil service positions (87%) and 126 (13%) contractor positions (Table 5). Of the 939 vacancies, 685 (73%) were intended to be filled. The greatest number of vacancies were in informatics (120) and maternal and child health (80). The greatest number of vacancies in the territories were in COVID-19 response, HAI/AR and vector-borne/zoonotic diseases.

Available vacant positions were far less numerous than positions that the State Epidemiologists reported would be needed to meet full epidemiologic capacity (Table 5). Overall, the 939 vacant positions and 685 intend-to-fill positions would account for only 37% and 27%, respectively, of the perceived additional need of 2,537 positions. This demonstrates that if all vacant positions were filled, tthe number of positions filled within the workforce would increase by 37%.

Table 5 Vacant and intent-to-fill civil service and contractor positions, 50 states and DC, ECA 2024

Program Area	Civil Service		Contractor		Total vacant	Total intent to fill	% vacant with intent to fill
	Vacant (Civil)	Intent to fill (Civil)	Vacant (Contractor)	Intent to fill (Contractor)			
Chronic disease	47	38	4	3	51	41	80
COVID-19 response	23	13	17	7	40	20	50
Environmental health	36	32	4	4	40	36	90
Foodborne/Waterborne diseases	11	6	3	2	14	8	56
Generalist	39	30	2	2	41	32	78
General infectious disease	30	25	2	1	32	26	81
Genomics/Advanced molecular detection	9	5	5	3	14	8	57
HAI/AR	57	25	22	5	79	30	38
HIV	45	28	1	2	46	30	64
Informatics*	91	76	29	37	120	113	94
Injury	34	20	2	2	36	22	61
Maternal and child health	74	63	6	4	80	67	83
Mental health	11	4	0	0	11	4	38
Occupational health	30	10	5	5	35	15	43
Oral health	6	3	1	1	7	4	54
Pan-respiratory	59	40	3	3	62	43	69
Preparedness and disaster epidemiology*	32	33	1	1	33	34	103
Reproductive health	2	2	0	0	2	2	100
STD	17	10	3	2	20	12	61
Substance use	28	15	2	2	30	17	57
Tribal	1	1	0	0	1	1	100
Tuberculosis	14	11	0	0	14	11	79
Vaccine-preventable diseases	39	28	1	1	40	29	73
Vector-borne/Zoonotic diseases	22	20	0	0	22	20	91
Viral hepatitis	9	8	6	3	15	11	73
Vital statistics	14	10	3	1	17	11	65
Wastewater surveillance	4	2	4	3	8	5	63
Other*†	32	36	0	0	32	36	113
Total	**812**	**591**	**126**	**94**	**939**	**685**	**73**

*The difference in the number of vacant positions and positions they intend to fill for this program area are likely due to new positions that are going to be created versus existing vacancies.

†Other includes program areas not listed, including but not limited to: Emergency Medical Services (EMS), border health, policy and planning, local health administration, and others.

If all 939 currently vacant epidemiologist positions were filled, the number of positions filled in the workforce would increase by 37%.

Funding

Epidemiological activities

Federal funds constituted more than three quarters (83%) of funding for all epidemiologic activities in state programs (Table 6). States contributed an average of 15% (0%–49%), and other sources accounted for only a small percentage of the total in most states. Values for funding of epidemiologic personnel were virtually identical to those for epidemiologic activities. The territories and freely associated states received nearly 100% of their funding from the federal government.

Trends in funding, 2001-2021

The average percentage of federal funds for epidemiological activities increased dramatically from 2001 to 2004 with an influx of federal funding for preparedness and rose gradually from 2004 to 2013 (Figure 12). In 2017, federal funding decreased slightly for the first time in many years. While federal funding did decrease between 2021 and 2024, the state contribution increased slightly from 12 to 15%. Funding from other sources decreased slightly, although they continue to represent <5% of total funds.

Sources of funding by program area for epidemiology personnel

State Epidemiologists provided information about the source of funding for all epidemiology positions by program area. Overall, the federal government provided 80% of funding for epidemiology positions. Of the federal funding, 70% represented CDC-supported positions (e.g., positions funded by federal grants); 3% represented positions funded directly by CDC (e.g., federal assignees); and the remaining 6% represented other federal sources. Nearly one-fifth (18%) of personnel are supported by state funding. Federal funding was highest for vaccine preventable, pan-respiratory, preparedness and disaster epidemiology, HAI, mental health and COVID-19 (Figure 13). In contrast, tribal and vital statistics received 50% or more of their personnel funding from state sources.

Table 6 Funding sources for epidemiology activities and personnel, 50 states and DC, ECA 2024

	Epidemiology Activities		Epidemiology Personnel	
Funding Source	**Range (Activities)**	**Mean (Activities)**	**Range (Personnel)**	**Mean (Personnel)**
Federal	50%-100%	83%	56%-100%	84%
State	0%-49%	15%	0%-40%	14%
Other	0%-13%	2%	0%-13%	2%

Figure 12 Trends in sources of funding for epidemiology activities, ECA 2001-2024

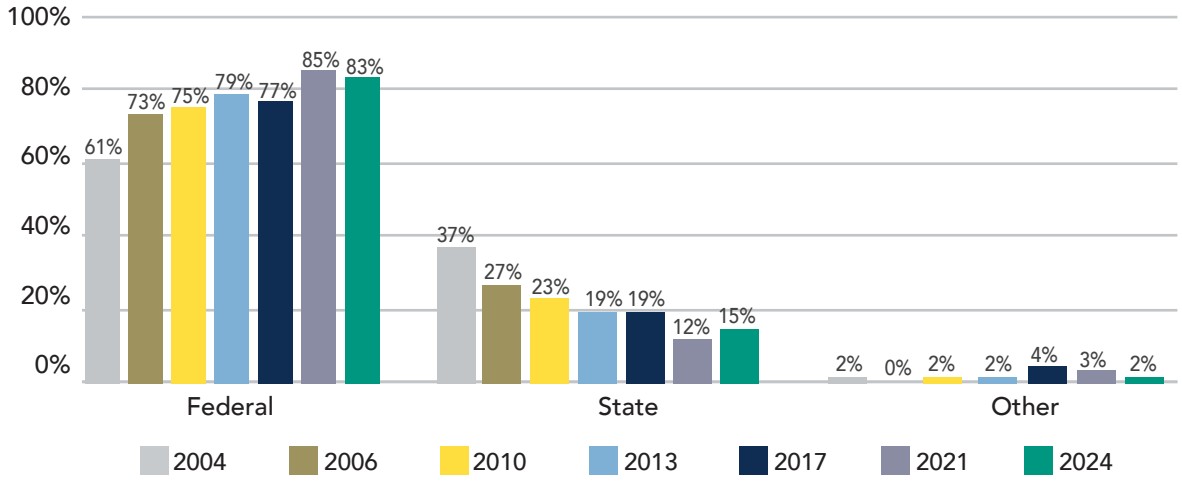
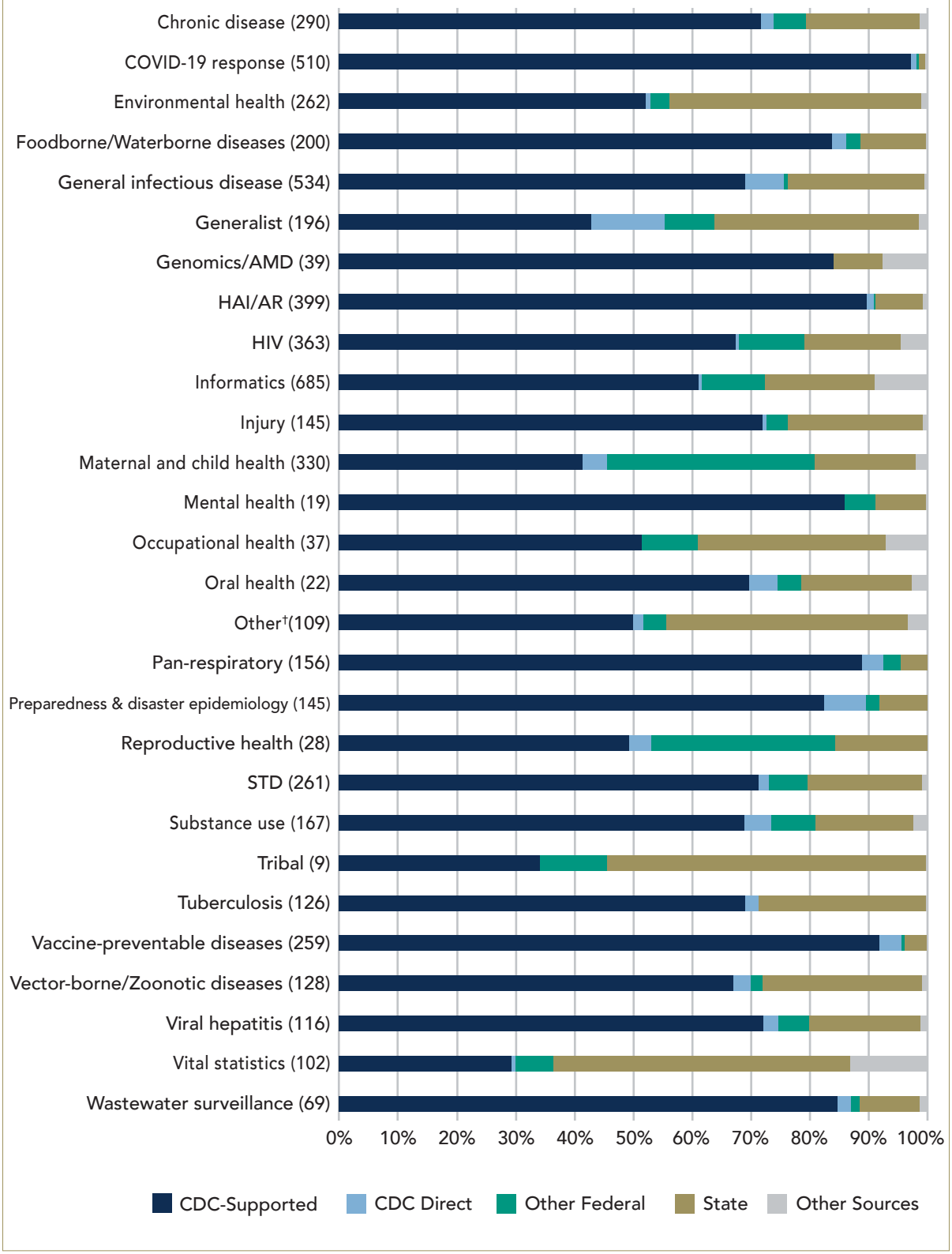
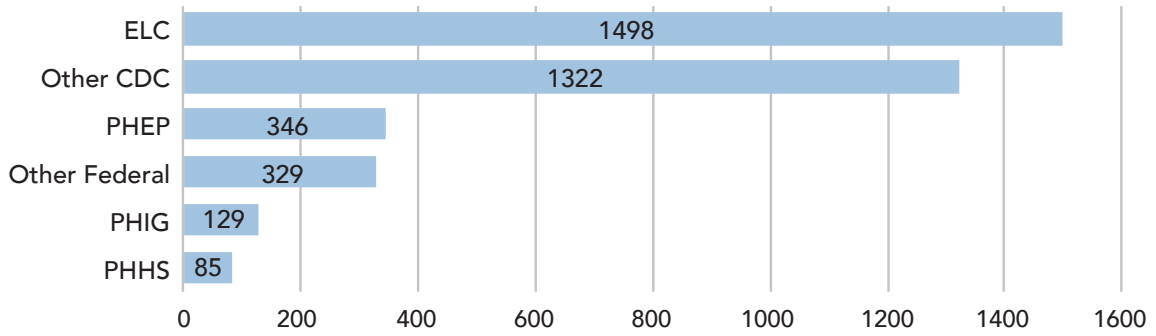


Figure 13 Source of funding by program area, 50 states and DC, ECA 2024*



*Numbers in parentheses represent total positions nationally in each program area.
†Other includes program areas not listed, including but not limited to: Emergency Medical Services (EMS), border health, policy and planning, local health administration, and others.

Figure 14 Number of epidemiologists funded by federal sources, 50 states and DC, 2024 ECA



*Public Health Emergency Preparedness Program (PHEP)

States reported that among all federal sources more than a quarter of epidemiologists in the workforce are funded directly by Epidemiology Laboratory and Capacity (ELC) funding (Figure 14). A smaller portion of the workforce is funded by the Public Health Infrastructure Grant (PHIG) and Preventive Health and Health Services (PHHS) Block grant.

State health department capacity in EPHS and access to the literature

Overall capacity

In 1994, the American Public Health Association published the 10 EPHS (CDC, 2024). The 10 EPHS were updated in September 2020. The three Essential Public Health Services (EPHS) measured in the 2024 ECA are:

- EPHS 1: Assess and monitor population health status, factors that influence health, and community needs and assets.
- EPHS 2: Investigate, diagnose, and address health problems and hazards affecting the population.
- EPHS 9: Improve and innovate public health functions through ongoing evaluation, research, and continuous quality improvement.

State and Territorial Epidemiologists were asked to rank their department's capacity to provide each of these services. Capacity was defined as "the ability to lead activities, provide subject-matter expertise, and apply for, receive, and manage resources to conduct the key activities for each EPHS."

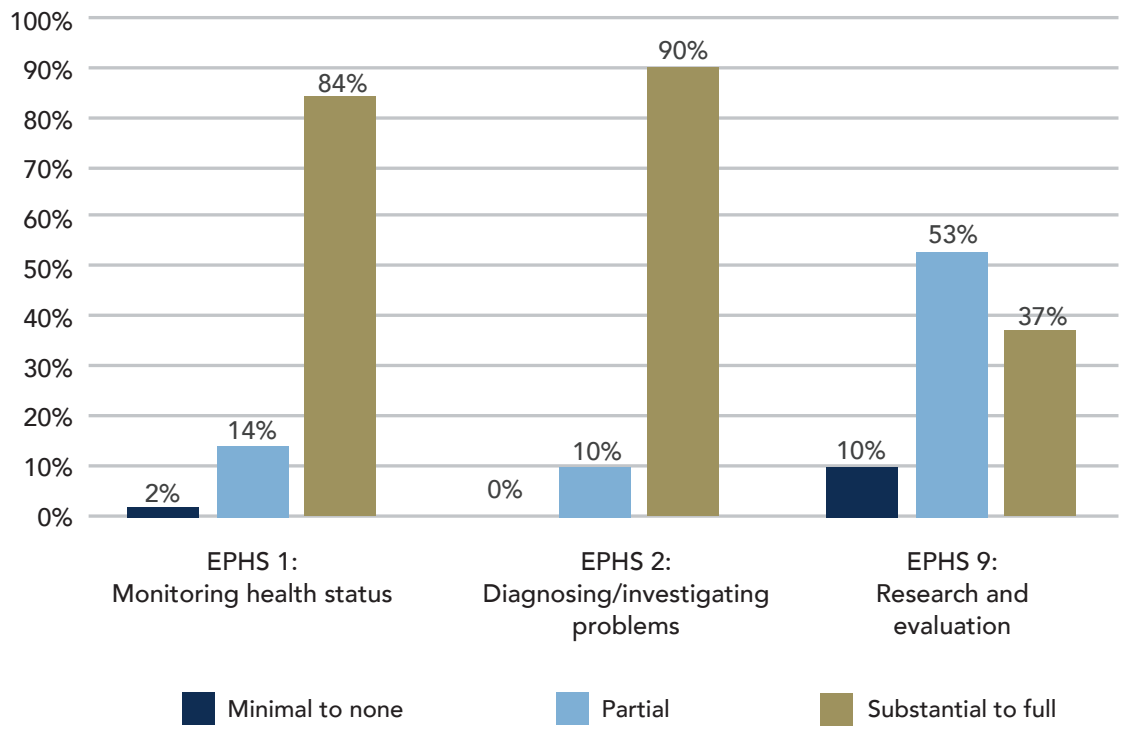
The vast majority of states reported having substantial to full capacity to conduct EPHS 1 (84%) and EPHS 2 (90%) (Figure 15). By contrast, only 37% of states reported substantial to full capacity in EPHS 9, and 53% reported partial and 10% reported minimal to no capacity. Among the 8 territories, the patterns were similar: greater capacity for EPHS 1 and 2 but lower capacity for EPHS 9.

States continue to report substantial or better capacity in monitoring health status and diagnosing and investigating health problems but more limited capacity in evaluation and research.

Compared with 2021, capacity increased for EPHS 1 (monitoring health status) from 76% to 84% reporting substantial to full capacity, and for EPHS 2 (investigating health problems and hazards), from 88% to 90%. Capacity in EPHS 9 (research and evaluation) decreased from 43% to 37% reporting substantial to full capacity. Notably, the percentage of states reporting at least partial capacity for EPHS 9 rose from 39% to 53% between 2021 and 2024. However, none of these changes were statistically significant.

There was a significant relationship between state size and substantial to full capacity for

Figure 15 EPHS capacities, 50 states and DC, ECA 2024



EPHS 9, with 58% of large states reporting capacity compared to 40% of small states and 12% of medium states (p = .04). There was no significant relationship between capacity for the EPHS and region.

Capacity in research and evaluation decreased from 2021, however more states reported at least partial capacity in 2024. Large states are significantly more likely to have capacity for research and evaluation compared to medium and small states.

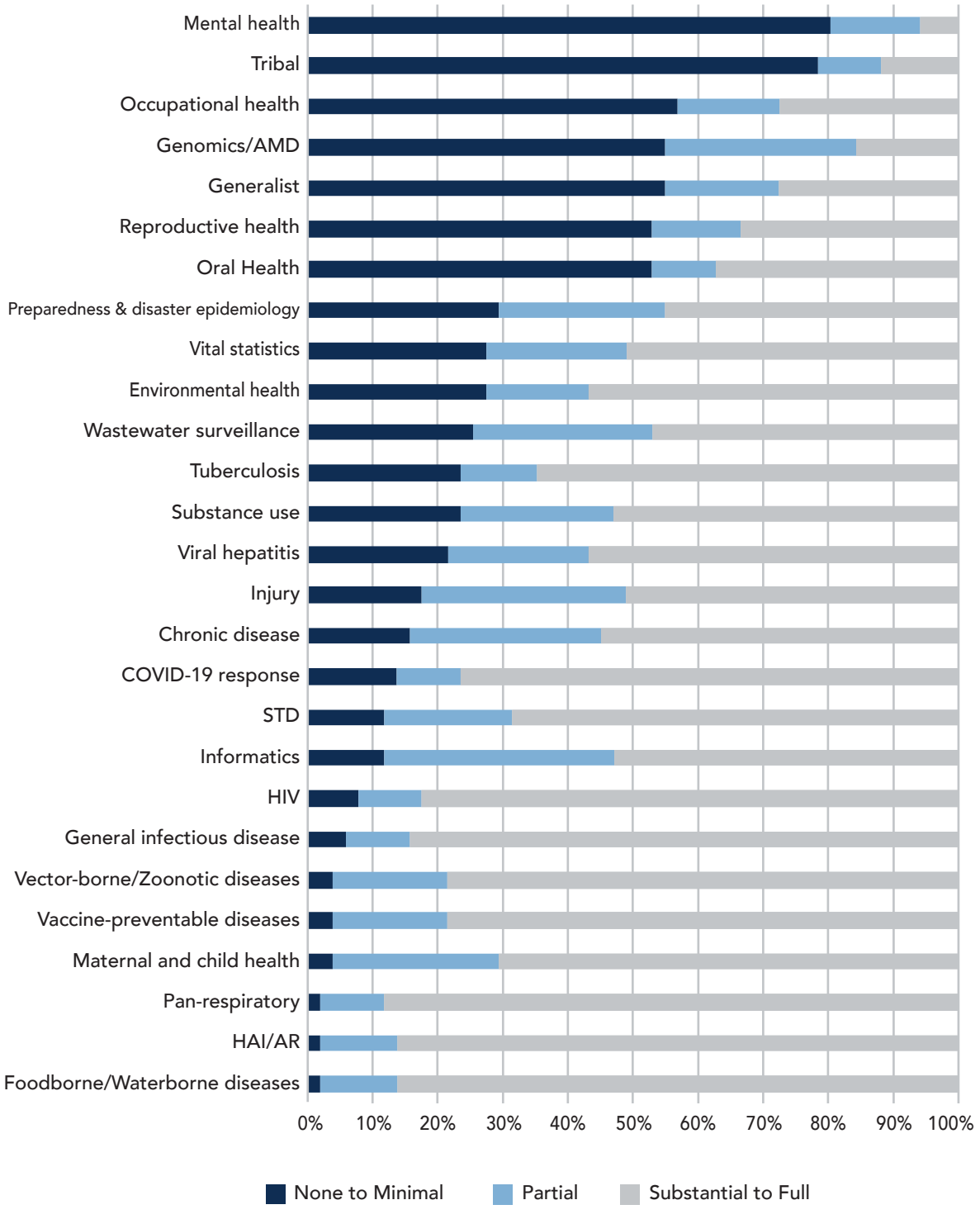
Capacity in program areas

States were asked to report on the overall current epidemiologic capacity to provide the 3 EPHS in each program area; capacity again was defined as the ability to lead activities; provide subject-matter expertise; and apply for, receive, and manage resources to conduct key activities. States that did not have programs in an area within the state health department were considered to have no capacity in that area.

The areas for which the states reported the highest percentages of minimal to no capacity were mental health (80%), tribal (78%) and occupational health (57%) (Figure 16). The percentage of states reporting substantial to full capacity was greatest for pan-respiratory (88%), foodborne/waterborne diseases (86%) and HAI/AR (86%).

From 2021 to 2024, there was a significant increase in the number of states reporting substantial to full capacity for genomics/advanced molecular detection (10%, p = .03). The largest percentage decrease in states reporting substantial to full capacity were for COVID-19 (-12%) and chronic disease (-11%), however these changes were not statistically significant (Table 7).

Figure 16 EPHS capacity by program area, 50 states and DC, ECA 2024



Capacity remains lower in mental health, tribal and occupational health program areas.

Table 7 Proportion of states reporting substantial to full EPHS capacity by program area (condensed) 2021-2024, ECA 2024

Program Area	Percentage of States with Substantial to Full Capacity, 2021	Percentage of States with Substantial to Full Capacity, 2024	Percentage Difference 2021 to 2024
COVID-19 response	88%	77%	-12%
Chronic disease	66%	55%	-11%
Mental health	14%	6%	-8%
Preparedness and disaster epidemiology	50%	45%	-5%
Generalist	32%	28%	-5%
Occupational health	31%	28%	-4%
Maternal and child health	70%	71%	1%
Substance use	52%	53%	1%
Injury	50%	51%	1%
Oral health	32%	37%	5%
Genomics/AMD	6%	16%	10%
Vital statistics	54%	65%	11%
Informatics	42%	53%	11%
Environmental health	43%	57%	14%
Infectious disease*	88%	84%	NA
Tribal**	NA	12%	NA
Wastewater surveillance**	NA	47%	NA

*Infectious disease only includes general infectious disease as sub-areas could not be combined categorically. The 2024 infectious disease category in this table only includes general infectious disease capacity.

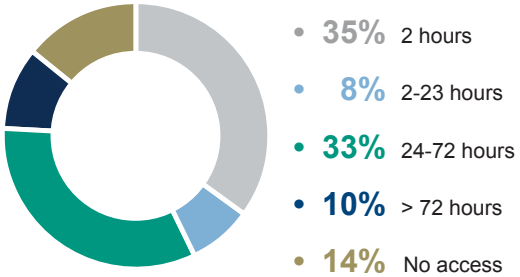
**Tribal and wastewater surveillance were added in 2024 and do not have comparative data.

Access to the literature

Having ready access to non–open access peer-reviewed literature is essential for responding to emerging and ongoing health issues and to implement evidence-based practices. State and Territorial Epidemiologists were asked whether they had access to peer-reviewed literature and, if so, how long it took to obtain requested articles. Nearly identical to 2021, a total of 86% of the states and DC reported access to the literature, although the time required varied (Figure 17).

There was no significant relationship between access to literature and state size or region. 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.

Figure 17 Time required to access literature, 50 states and DC, ECA 2024



Salaries for civil service epidemiologists

Salaries by degree and career level

Each participating jurisdiction was asked to provide a civil service salary range for epidemiologists within its agency by degree and by career level based on the AECs. A minimum and a maximum value were requested for each category (Table 8). Not all states had epidemiology positions for each degree category or career level.

Like 2021, minimum and maximum salaries increased with educational attainment, although physician pay was considerably higher than pay for PhDs, DVMs and DDS, who have a comparable number of years of education. Salaries also increased by career level; however, the more managerial positions of Deputy State Epidemiologist and State Epidemiologist had substantially higher median salary ranges than those at senior level and below. Data indicated that Western states tended to have higher maximum salary levels across all positions, compared to Northeastern, Southern or Midwestern regions. No consistent pattern emerged in minimum and maximum salary levels for the five career levels by state size or by region. Salary data was limited for the participating territories; however, the maximum median values were similar or higher for most positions compared to the states and DC.

Changes in career-level salaries, 2021 and 2024

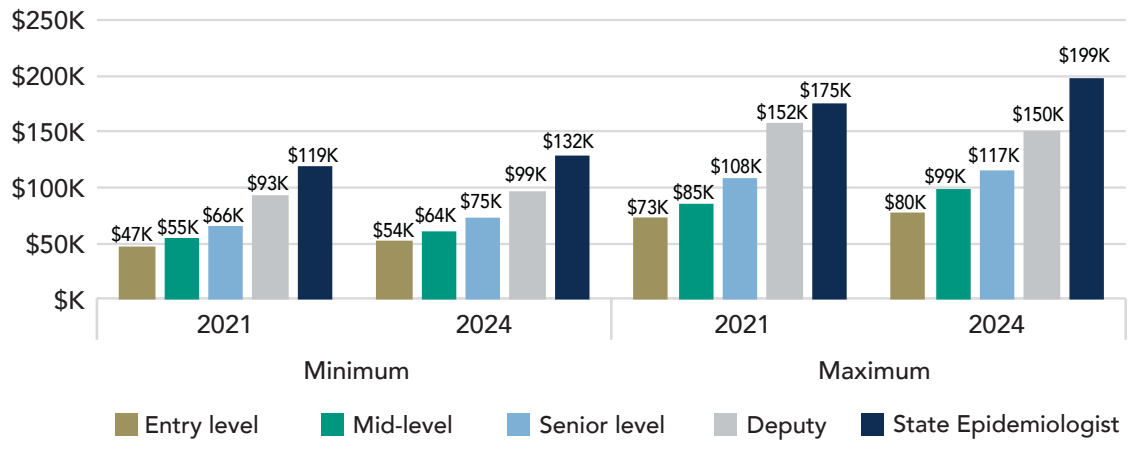
The minimum and maximum median salaries for all positions (except deputy state epidemiologists) increased between 2021 and 2024. However, when salaries are adjusted for the compound inflation rate of 16%, there was a decrease in all position salaries, except for mid-level epidemiologist which experienced a minimal (less than 2%) increase since 2021 (Figure 18). Most notably, deputy state epidemiologists experienced a 17% decrease in maximum median salaries. The total inflation rate for the US from 2021 to 2024 was 16%, with an average of 5% (Inflation tool, 2024).

Table 8 Median minimum, and maximum annual salaries and ranges, by degree title and career level, 50 States and DC, ECA 2024

	Salary			
Category*	**Median minimum**	**Range, minimum**	**Median Maximum**	**Range, maximum**
By degree title				
Associates (15)	$50K	$29K-$75K	$79K	$45K-139K
Bachelors (34)	$55K	$31K-$78K	$95K	$54K-156K
MPH (46)	$60K	$31K-$125K	$113K	$54K-$170K
PhD (44)	$61K	$45K-$153K	$131K	$92K-$225K
DVM (35)	$81K	$41K-162K	$143K	$89K-$212K
DDS (28)	$107K	$47K-$198K	$164K	$92K-$262K
MD (40)	$132K	$45K-$258K	$213K	$88K-$358K
By Career Level				
Entry level (47)	$54K	$31K-$78K	$80K	$52K-$109K
Mid level (46)	$64K	$37K-$110K	$99K	$70K-$224K
Senior level (47)	$75K	$45K-$124K	$117K	$78K-$248K
Deputy (33)	$99K	$52K-$218K	$150K	$92K-$347K
State Epidemiologist (46)	$132K	$52K-$257K	$199K	$93K-$358K

*Number of responding jurisdictions shown in parentheses.

Figure 18 Minimum and maximum median salaries by career level, 50 states and DC, ECA 2021 and 2024

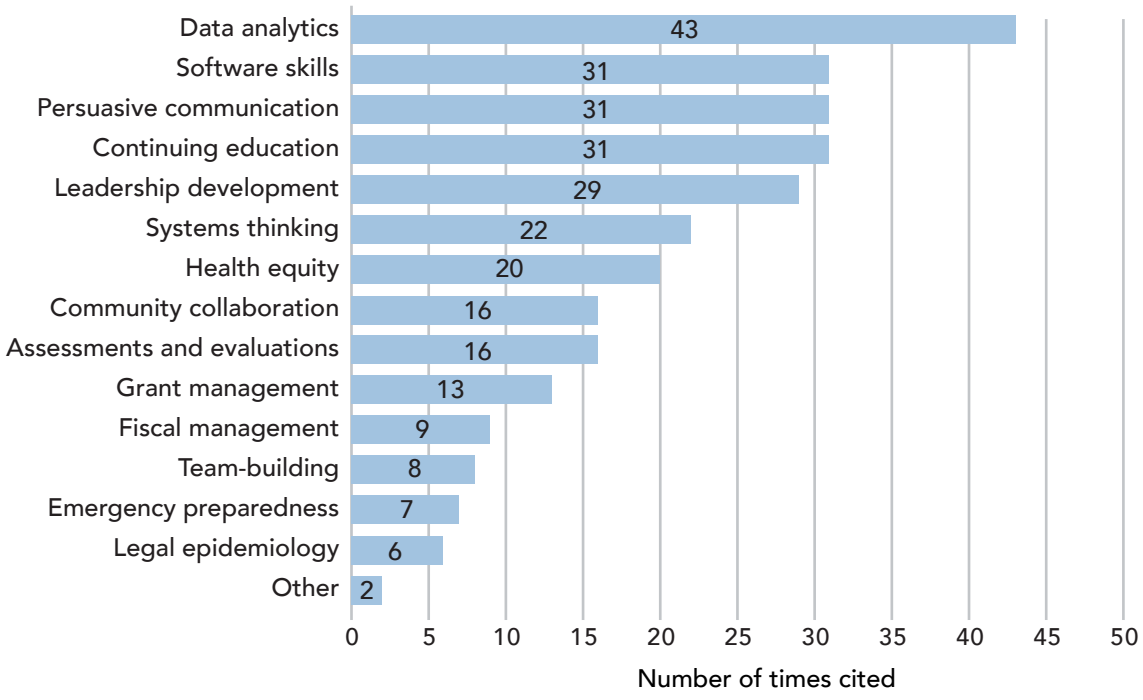


Training priorities

Each State and Territorial Epidemiologist was asked to list the top 5 most pressing staff training needs (Figure 19), such that there were 295 possible votes for the states, DC and the US territories.

Similar to 2021 (and 2017), the highest priority remains data analytics by a considerable margin (Figure 19). Data analytics was defined as informatics and applying and translating public health data. Software skills remain a priority alongside persuasive communication and continuing education. Participants also noted leadership development, systems thinking and health equity as important with 29, 22 and 20 votes, respectively. Fiscal management, team building, emergency preparedness, and legal epidemiology all received less than 10 votes.

Figure 19 Top training needs identified by State and Territorial Epidemiologists, ECA 2024 (n = 58)



Training in data analytics remains an important priority for states and territories.

Existing practices and incentives aimed at strengthening the state epidemiology workforce

Strategies for recruitment

The State Epidemiologists were asked to identify assets for recruiting epidemiologists to the department (Figure 20). The assets most frequently cited were job interests/fulfillment (like 2021), opportunity to work remotely and job benefits. By contrast, opportunities for merit increases/bonuses, opportunity for travel and opportunity for promotion were only cited once.

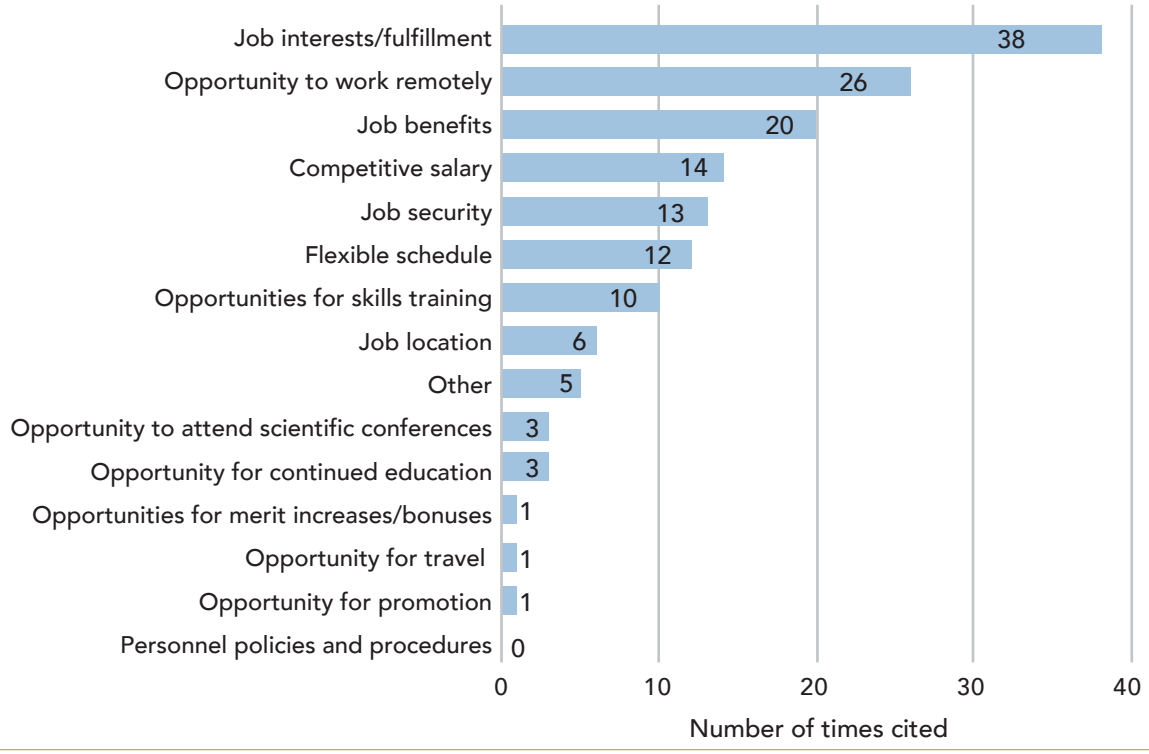
Personnel policies and procedures were not cited at all in 2024. Five of the 8 territories cited job location as an asset and 4 territories cited opportunities for travel and opportunities for skills training as recruitment assets.

Retention and continuity planning

Assets for retention

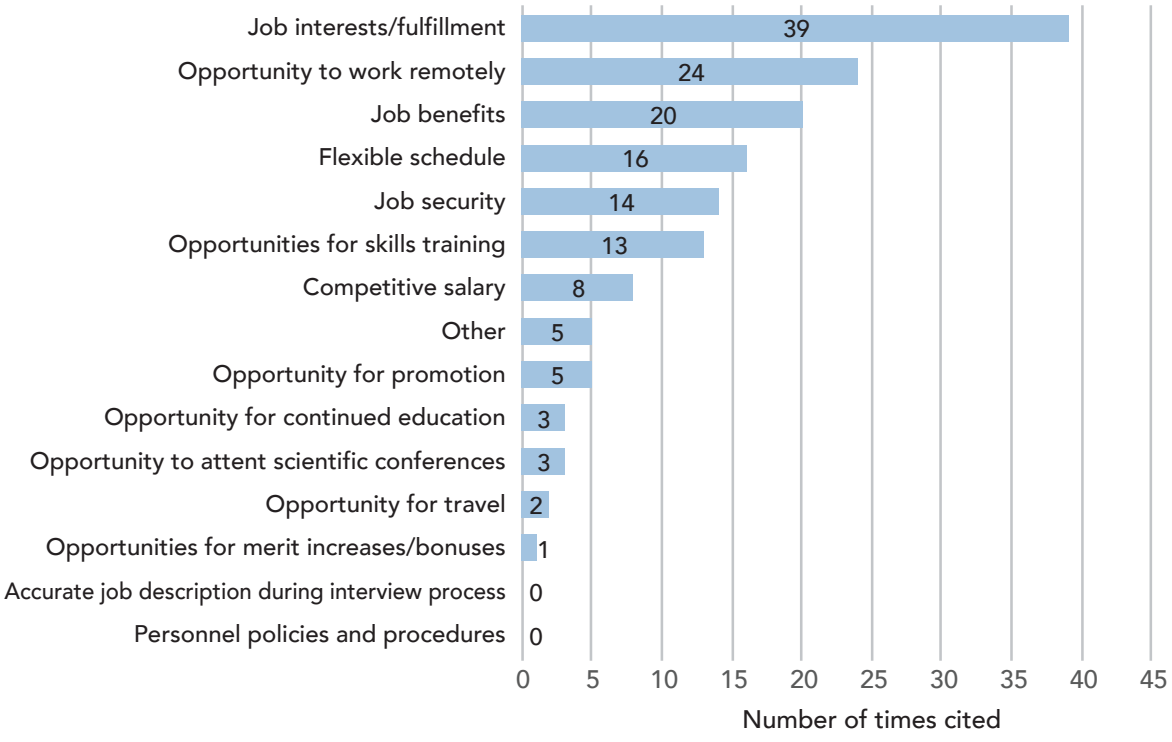
State Epidemiologists were asked to identify assets for retaining epidemiologists at the state health department. Like assets for recruiting epidemiologists, the assets most frequently cited were job interests/fulfillment, opportunity to work remotely and job benefits (Figure 21). By contrast, opportunities for promotion, opportunities for continued education, opportunity to attend scientific conferences, and opportunities for travel or merit increases/ bonuses were cited 3 or fewer times. Four of the 8 US territories cited opportunity for travel, job interest/fulfillment and opportunities for skills training as assets for retaining epidemiologists.

Figure 20 Assets for recruiting at state health departments, 50 states and DC, ECA 2024



Job fulfillment, opportunities to work remotely and job benefits were important assets for recruiting epidemologists.

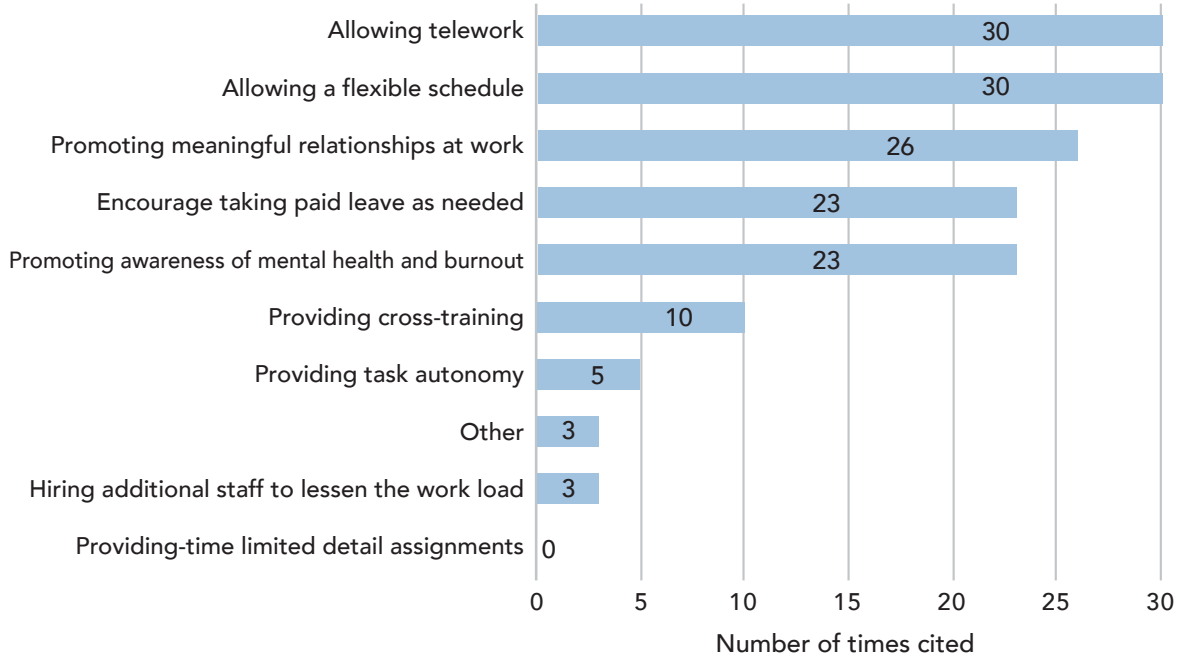
Figure 21 Assets for retaining epidemiologists at health departments, 50 states and DC, ECA 2024



Strategies to minimize staff burnout

State epidemiologists were asked about their top 3 strategies for dealing with burnout in the department. The most cited strategies were allowing telework, allowing a flexible schedule and promoting meaningful relationships at work (Figure 22).

Figure 22 Strategies for dealing with burnout, 50 States and DC, ECA 2024



Data Modernization

The 2024 ECA included new questions about available funding to support data modernization efforts and challenges to this work. 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, 92% of jurisdictions noted uncertain sustained funding and 62% of jurisdictions highlighted an inability to hire a workforce with the necessary skills (Figure 23).

Outbreak forecasting and disease transmission models

The 2024 ECA explored the presence of epidemiologists focused on forecasting and disease transmission models. More than one fifth of states and territories have at least one person dedicated to forecasting and disease transmission models in their jurisdiction (Figure 24). Across the states and territories, 29 FTEs were enumerated as serving in these roles, primarily filled by agency employees and contractors.

Figure 23 Top challenges faced by states regarding DMI, ECA 2024, (n = 50)

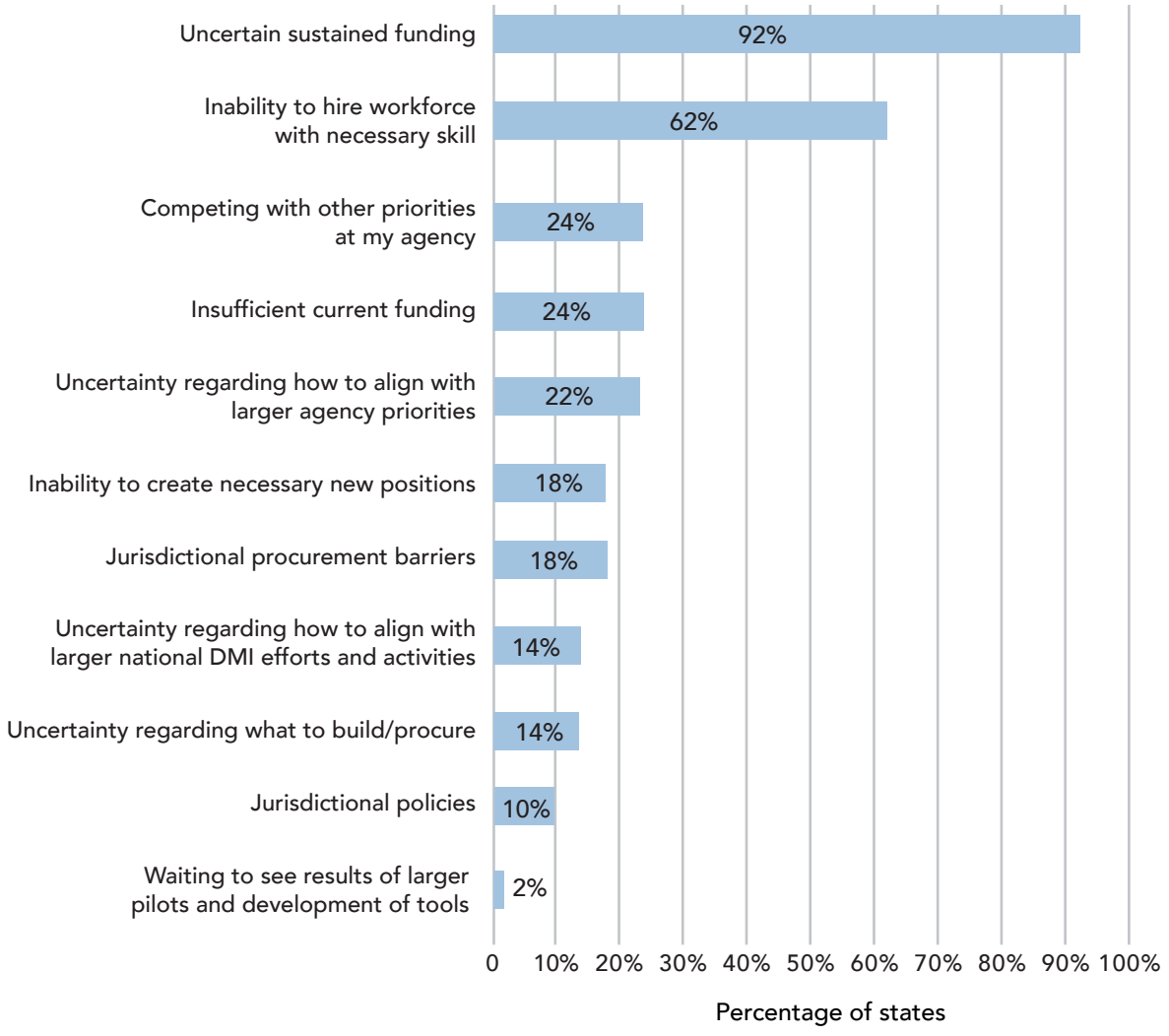
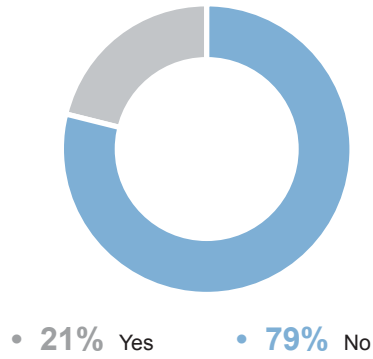
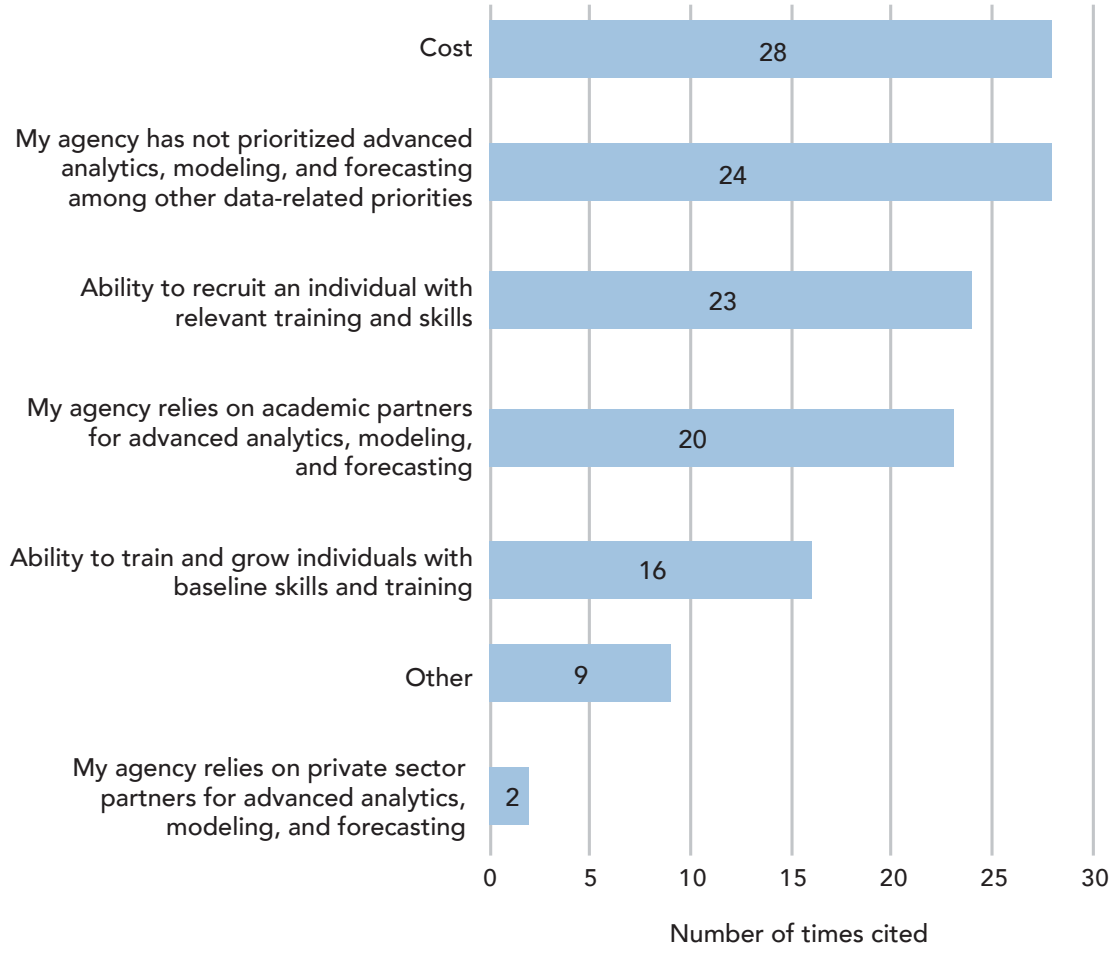


Figure 24 Percentage of health departments with a dedicated forecaster, US states and territories, 2024 ECA



More than half of states and territories indicated that they do not have staff dedicated to disease transmission modeling due to cost. This reason was followed closely by agencies not prioritizing this work and an inability to recruit an individual with the relevant skills and training for the role (Figure 25). 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. When asked about barriers to utilizing forecasting models, 43% of states and territories indicated that forecasting and models were not relevant or not representative enough of their jurisdiction. A similar percentage of jurisdictions noted that there was a 'misalignment of needs or understanding of appropriate context.'

Figure 25 Reasons that states and territories do not have staff dedicated to disease transmission models and/or outbreak forecasts, US states and territories, ECA 2024 (n=46)



Remarks from State and Territorial Epidemiologists

Although the quantitative information collected in the ECA provides objective data on the current situation and permits evaluation of trends, it does not fully illustrate the insights and concerns of State and Territorial Epidemiologists. The 2024 ECA included 4 open-ended questions to inquire about critical issues, tactics and barriers for recruiting a diverse workforce, and any additional comments from respondents. Several themes emerged from their answers, including challenges with uncertain funding, recruiting and retaining the workforce, training current staff, and navigating the politics of public health. The comments in this section reinforce the quantitative findings and provide additional details concerning the magnitude and seriousness of many of these issues. In this section, there is a summary of some of the responses and illustrative quotes.

Health departments require sustained, flexible funding that outpaces rising costs and inflation. With the looming end of pandemic funds and the uncertainty of the future, jurisdictions are concerned about maintaining capacity long-term. Due to rising costs and inflation, current funding cannot match the needs of the field and stifles growth. Departments need diverse funding that is condition agnostic and meets the needs of the communities they serve. As jurisdictions continue to rely heavily on federal funding, they encounter challenges due to its prescriptive nature and have difficulty coordinating projects in a way that is sustainable.

"[One of the most critical issues is] uncertainty in funding patterns and the fiscal cliff we are facing. Funding from CDC must keep pace with increasing year over year costs. Flat funding [equals] decreased funding."

"The lack of state funding and dependency on federal funding are challenging from a management perspective. We have direct oversight of the ELC and Immunization CoAg but not the PHEP or PHIG grants. It is difficult to plan and coordinate across programs to ensure sustainability of activities and data modernization initiatives."

"[One of the most critical issues is] inflexible funding sources and the challenge of finding sustainable, consistent funding sources that are not so condition specific."

Departments are challenged to recruit a diverse, competent and skilled workforce. Participants noted difficulty in recruiting and hiring employees with the requisite knowledge, skills and experience to do the job well and find that recruitment is hindered by the size and diversity of the applicant pool, geographic location of the position and institutional policies that restrict innovative recruitment strategies. The inability to hire the right candidate results in the need for additional supervision and on-the-job training to get new hires up to speed.

"…while some of our Epi 1s and 2s do come in with MPH or similar degrees, they are often still very green and require large amounts of on-the-job training. This results in many tasks taking longer than they "should" because staff are not able to do them in the most efficient ways possible and means that our work products are less epi-focused (e.g. a case review instead of a [true] epi summary)."

"[Our state] has a ... challenge in recruiting out of state applicants because of weather, higher rents/ cost of living, and not being a major urban center."

"State civil service hiring procedures do not currently provide mechanisms to directly address workforce diversity. Most state job series for DOH positions require, at minimum, a bachelor's degree. This limits ability to recruit potentially qualified candidates who would contribute lived experience, cultural competence, and community knowledge but lack formal education background in public health [professions]."

"Fairly rigid and prescribed recruiting practices, limitations on being [able] to pay for job postings, etc. Not sure we do the best job at reaching the right stakeholders. Also our website, work products and public facing materials need to convince potential applicants that we value diversity and equity in our workplace."

To diversify the workforce, jurisdictions are expanding promotion, utilizing PHIG dollars and reducing barriers to governmental public health positions. Participants highlighted the department's intentional use of job fairs, social media, online job boards and other resources to ensure a farther reach for position postings. When available, jurisdictions capitalize on these opportunities to ensure applicants are aware of governmental public health opportunities. Workforce Directors sponsored by the Public Health Infrastructure Grant (PHIG) have proven to be a valuable resource for collaboration and PHIG funds are being utilized to hire personnel and support diversity, equity and inclusion efforts. Jurisdictional programs also provide education on completing civil service testing and reducing other barriers to obtaining governmental roles, including navigating the hiring process, understanding the roles (FTEs vs. contractors) and more.

"The Department employs a range of activities to recruit a diverse workforce, including holding job/career fairs, open houses, maintaining internships and faculty engagement with [local institution], a Historically Black University that offers MPHs and other graduate public health degrees."

"[The diversity, equity and inclusion office] also host monthly information sessions that are free and open to anyone interested in learning more about [our state's] hiring and Civil Service examination process. They also do outreach to assist with recruitment to state agencies by customized minority media, reaching out to diverse communities, and participating in job fairs."

Academic partnerships are an important tool for enhancing the pipeline into governmental public health. Numerous participants noted relationships and collaborations with local institutions to help recruit epidemiologists to health departments, including sharing job openings and hosting internship opportunities.

"[Our department] is supported by [a diversity, equity and inclusion office] who has developed a close relationship with human resources departments at education institutions and quasi-public agencies to help set and achieve recruitment diversity goals."

"Trying to build meaningful relationships with academic institutions in our state including HBCUs."

"We also partner with local institutions and our colleges of public health to share job openings."

Public health agencies are prioritizing rebuilding trust from their communities. Since the COVID-19 pandemic, public health authority has been legally attacked which weakens the ability for public health to respond to future threats. Departments are working to regain the trust of communities, including rectifying the damage of uncoordinated health communication during the pandemic and the ongoing anti-vaccination movement. These relationships are particularly vital in anticipation of future public health emergencies.

"Trust in public health has degraded during the last few years."

"Rebuilding trust/community engagement especially as regarding masking, isolation/quarantine, and immunizations. If we want to have these tools available in the future, we must do a lot of communicating/educating/listening in the coming months and years."

On-the-job training is a top priority for the existing workforce, particularly in data analytics. States and territories emphasized the need for training to upskill the existing workforce, including both epidemiology basics and advanced methodologies. Many epidemiologists are interested in professional development but struggle to prioritize it in the current climate without dedicated time and support from leadership. Territorial health departments emphasized the need for accessible training specific to their regional needs. Upskilling the current workforce will allow departments to leverage available technologies, provide mentorship to peers and strengthen agency capacity, resulting in less reliance on contractors and greater retention of institutional knowledge.

"We have a lot of new, passionate epidemiologists to help continue to develop. To that end, more basic applied epi trainings, software skill building and working through problem solving and prioritization would be helpful."

"Strengthening the skills and knowledge of epidemiology and public health surveillance to our surveillance staff, and public health professionals at all levels is crucial for a robust public health system. This involves designing and delivering training programs, mentoring junior staff, and fostering a culture of continuous learning (weekly sessions) and improvement or incentives."

"I would emphasize the need for adequate funding and resources to support epidemiology training programs and workforce development. Investments in education, technology, and research are essential for building a capable and responsive epidemiology workforce."

The emotional toll of the pandemic and the current state of public health funding threatens workforce retention. Many epidemiology staff continue to feel the emotional toll and burnout from the COVID-19 response and with the uncertainty in public health funding and anticipated fiscal cliffs, health departments are finding it a challenge to retain staff long-term. Despite the need for training and support, resources are not always available for staff development.

"Managing general burnout within the limitations we have in our state agency (we don't always have control over things like authority to approve telework)"

"Given current looming budget challenges and unknowns, we are currently unable to recruit or hire new staff. These uncertainties limit who we are able to bring into the epidemiology workforce and can retain. Cyclic[al] funding based on emergencies puts positions in peril and we are concerned that we will be unable to sustain infrastructure and workforce gains made during COVID. In addition, it has been challenging to hire strong and skilled epidemiologists. Many opportunities exist outside of state public health that provide higher salaries."

"The ongoing challenges with finding funding to support travel for conferences, trainings, in-person workgroup events, etc. and the challenges around getting approval to travel is an ongoing barrier to recruitment, retention and job satisfaction. I consider us relatively lucky (currently) with the support we have from our current leadership but this remains a chronic problem."

DISCUSSION

Discussion

The 2024 ECA describes important issues of workforce development among State and Territorial Epidemiologists that are relevant for leaders at state and territorial health departments, public health partners, the federal government, and academic institutions. All 50 states, DC and the 8 US territories participated. Data quality was high, and the open-ended questions yielded additional richness to the quantitative findings.

Overall, the 2024 ECA demonstrates that the epidemiology workforce is growing but many health departments will lose staff positions with the end of pandemic funding. While certain program areas have grown, there remains un-met needs in both existing and emerging program areas, including infectious disease, informatics, chronic disease, maternal and child health and environmental health. Compared to 2021, there was an increase in substantial to full capacity for EPHS 1 and 2 and a decrease for EPHS 9, although the percentage of states reporting at least partial capacity for EPHS 9 (research and evaluation) rose from 39% to 53%. Participants continue to cite job interest/fulfillment, the opportunity to work remotely and job benefits as assets for recruiting and retaining a qualified workforce, however, there is still a need for a more robust pipeline and competitive salaries to boost the workforce. Like 2017 and 2021, data analytics remains a top training need. State and territorial health departments continue to rely heavily on federal funds, minimizing their flexibility to prioritize individual community needs. These issues are presented in greater detail below.

Number of epidemiologists

Although the number of epidemiologists has increased since 2021, health departments anticipate losing over 1000 epidemiologists with the end of pandemic funding. The total number of epidemiologists working in the 50 states and DC is 5706, a 38% increase over the 4135 counted in 2021 and the highest number yet observed in the ECA. An additional 337 were enumerated in the 8 participating territories and freely associated states. The number of epidemiologists per 100,000 population was 1.70, 35% higher than the rate of 1.26/100,000 obtained in 2021. Staff remain heavily concentrated in infectious disease, with 45% of the workforce situated in infectious disease program areas. Like 2021, the greatest absolute increase from 2021 to 2024 was in informatics, where 487 positions were added (a 245% increase). However, there is still a need for additional informatics epidemiologists and governmental public health must remain competitive with other industries for these roles (CSTE, 2023b). By contrast, COVID-19 response and vital statistics saw a decrease in epidemiologists. While CSTE estimated the need for an additional 8,000 epidemiologists across state, local, tribal and territorial health departments in 2021, the need is likely even greater in 2024 (Arrazola & Auer, 2023). The decrease in COVID-19 epidemiologists is likely due to reallocation after the COVID-19 response and the result of diminishing temporary funds. Despite the initial growth in the workforce, departments anticipate losing nearly one-fifth of the current workforce when pandemic funding ceases.

There is a need for additional staffing across all program areas. State Epidemiologists expressed the need for nearly 2537 additional epidemiologists to reach full capacity to deliver the EPHS, representing a 44% increase over the 5706 current number for a total of 8243 epidemiologists. The greatest number of positions needed were in infectious disease program areas combined (1019), informatics (249), chronic disease (160), maternal and child health (145) and environmental health (143). The program areas with the greatest percentage increase over current positions to reach ideal levels of staffing were mental health (a 314% increase, from 19 to 80), tribal health (a 242% increase, from 9 to 30), genomics/advanced molecular detection (a 204% increase, from 39 to 119), occupational health (a 169% increase, from 37 to 100), and oral health

(a 144% increase, from 22 to 52). While still in need of additional capacity, genomics saw an increase in the number of epidemiologists nationwide from 5 to 39 between 2021 and 2024, demonstrating that dedicated genomic funding was utilized as intended and bolstered personnel and agency capacity (The White House, 2021). Genomics is the future of public health and represents important collaborations between public health labs and health departments. Though an emerging program area, wastewater surveillance, already demonstrates higher capacity than other historical program areas, including occupational health, mental health and oral health. These program areas have historically had low capacity, which can be indicative of funding priorities as opposed to the burden of disease. Occupational health and mental health are particularly relevant given the impact on public health workers and the long-term implications of the pandemic on communities' mental health and wellbeing. Although 2537 additional epidemiologists are required to fulfill basic public health needs in state health departments, a greater number of epidemiologists may be needed for transformation across state, local, tribal, and territorial health departments to bolster systems and build sustainable public health infrastructure.

Training priorities

Like previous years, data analytics remains a top training priority among states and territories. Data analytics was the top training priority mentioned by 43 states and territories, and 31 jurisdictions also mentioned software skills (statistical software like Epi Info, SPSS, and R) and persuasive communication as training needs. Jurisdictions need to train the current workforce and recruit skilled personnel into the department. The 2023 CSTE Applied Epidemiology Competencies (AECs) are a valuable workforce development tool to ensure that epidemiologists continue to grow with the profession (CSTE, 2023a).

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. States and territories with slow or limited access should consider university partnerships or participation in the National Network of Libraries of Medicine.

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.

Funding

Federal funding continues to pay for most epidemiology activities and personnel. Nearly identical to 2021, 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.
Research indicates that emerging public health graduates value the mission-driven

nature of governmental public health roles, but express concerns about limited career growth, departmental culture and non-competitive salaries (Locke et al., 2022). To recruit candidates, health departments must prioritize professional development opportunities and the growth of employees. Participating states also cited allowing telework, a flexible work schedule, and promoting meaningful relationships at work as major strategies for minimizing burnout.

Lack of competitive salaries continues to be a barrier to recruitment and retention of the workforce.
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. 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. Epidemiologists working in scientific research and development (often in the pharmaceutical industry) continue to be the highest paid in the field, with a median salary of $126K in 2024, notably higher than the maximum median salary of $99K for mid-level epidemiologists working at the state level (Bureau of Labor Statistics, 2024). In a study of private and public sector salaries, results indicate that epidemiologists experience one of the largest discrepancies in pay, receiving nearly a quarter less in governmental roles compared to private industry (Krasna et al., 2024).

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 a 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 (7%) and public health laboratories (5%). 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/ advanced molecular detection, 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%. A number of 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. Decreases in capacity for COVID-19 are likely reflective of departments anticipating the end of pandemic funding and transitioning positions to other roles. As COVID-19 is no longer notifiable, it requires less personnel capacity and is likely being transitioned into respiratory disease capacity broadly (CSTE, 2024b).

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, 90% of jurisdictions noted uncertain sustained funding and 61% of jurisdictions highlighted an inability to hire a workforce with the necessary skills. With the advent of increasingly prompt preparedness response models, like "7-1-7", health departments need to have adequate personnel capacity and infrastructure to detect and respond to public health threats (Frieden et al., 2021).

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 (78%) 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.

The territorial situation

Territories face challenges related to geographic isolation, limited access to literature and unique training needs. Many territories struggle to recruit epidemiologists with a limited workforce pipeline and remote locations. Faced with inadequate salaries, unsustainable funding and limited career ladders, territories are also challenged to retain the workforce they already have. The limited workforce also impacts the territories' ability to be included in important public health datasets, impacting response to emerging issues and the health of their communities (ASTHO, 2022; Marie McSorley et al., 2023). Territories require appropriate training programs to help staff be prepared for the public health challenges faced by their communities. Qualitative responses noted the importance of networks across the Pacific islands to collaborate and manage public health priorities with limited resources.

Limitations

The 2024 ECA has several limitations. The data included reflect the jurisdiction's needs and capacity at the time of fielding, which may not fully capture the personnel anticipated to be lost with the end of pandemic funding streams. While a new question did ask about the number of personnel anticipated to be lost with the end of COVID-19 dollars, it is possible that there are staffing losses that respondents aren't aware of yet.

Furthermore, although guidelines were provided in the questionnaire, the definition of what constitutes an epidemiologist does not necessarily align with job titles and has a subjective component to it, which might affect differences between states and in the same state over time, especially when the State or Territorial Epidemiologist completing the form has changed.

An additional potentially serious problem in making temporal comparisons rests with obtaining a comprehensive count of the number of epidemiologists in each state overall and by program area. In some states, environmental and mental health, for example, are part of separate agencies that were not included in the assessment. Perhaps more important numerically, in many states there are large city and county health departments that provide services for their local populations, and the state health agency data might not present a comprehensive picture. Although big city health departments are included in a separate ECA-like questionnaire that is now being conducted jointly with the Big Cities Health Coalition to gain a more comprehensive picture, data such as the number of epidemiologists per 100,000 population might underrepresent the reality in certain states.

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 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.
- Conduct an ECA to assess informatics capacity in a systematic manner for all states and territories.
- Monitor enumeration trends in the applied epidemiology workforce.

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APPENDIX A

Assessment Instructions

2024 Epidemiology Capacity Assessment

The Council of State and Territorial Epidemiologists (CSTE) appreciates your support in completing the 2024 Epidemiology Capacity Assessment (ECA). The ECA aims to assess the overall state and territorial health department epidemiology capacity from the perspective of the State and Territorial Epidemiologists. Your responses will be shared only in de-identified, aggregate form.

CSTE has periodically assessed epidemiology capacity in state and territorial health departments since 2001. CSTE's 2024 ECA will provide important information about the current capacity of epidemiology programs in state and territorial health departments. For more information about previous ECAs, visit the CSTE website: http://www.cste.org/group/ECA.

Why complete the ECA? The ECA provides important data to states, territories and the CSTE National Office. This information aids in our efforts to educate legislators on the needs of state and territorial health agencies and helps inform future public health funding decisions. Since 2004, CSTE has maintained a 100% response rate from all 50 states and Washington, DC.

CSTE will be hosting the following opportunities for guidance and technical assistance with the 2024 ECA:

- **"How to Complete the 2024 ECA" Webinar - January 29th at 1 PM ET**. Register here.
  - Please join us for an informational webinar on how to complete the 2024 Epidemiology Capacity Assessment (ECA). This webinar is intended for State and Territorial Epidemiologists and those who will be assisting to complete the ECA. The webinar will provide an overview of the tool and associated materials and have time for questions.
- **Office Hours Session #1 - February 7th at 12 PM ET**. Join here.
  - During office hours, CSTE staff will be available on the Zoom line to provide assistance and/or answer any questions about completing the 2024 ECA.
- **Office Hours Session #2 - February 21st at 2 PM ET**. Join here.
  - During office hours, CSTE staff will be available on the Zoom line to provide assistance and/or answer any questions about completing the 2024 ECA.

Please use the following as guidelines when completing this assessment:

We strongly recommend reviewing and completing the PDF version of the assessment before proceeding with this online form. It may be helpful to consult state health department staff, organizational charts, or other

documents to complete portions of the ECA.

Assessment Functionality: The link received by the State or Territorial Epidemiologist may be forwarded to other health department staff to complete. The assessment cannot be completed by two individuals simultaneously.

Using the Online Tool

The assessment is designed so that it can be completed in multiple sittings and/or by several people. Please keep the following in mind as you navigate through the assessment: It is possible to move back and forth throughout the assessment. Messages will appear if question(s) within a section have not been completed, and the unanswered question(s) will be highlighted in pale blue. It is still possible to move forward to the next section. For questions that require responses in multiple columns and rows, the TAB key can be used to navigate quickly from cell to cell.

It is essential that the State or Territorial Epidemiologist go through the entire assessment a final time before submission to confirm that all questions and all parts within questions have been answered.

To aid in completing the ECA, please reference the following supporting documents:

- Frequently Asked Questions
- Human Resources Worksheet
- Program Area Leads Worksheet
- Applied Epidemiology Competencies (AECs)

For questions, contact Sarah Auer at WFResources@cste.org.

The following is an outline of the eight assessment sections:

Section	Guidance
Section 1: Epidemiology leadership within the state health department	**Question 8** (training needs) has been included in the Program Area Lead Worksheet.
Section 2: Epidemiology and surveillance capacity within the state health department	**Question 10** (perceived capacity) has been included as an option in the F Area Leads Worksheet.
Section 3: Epidemiology funding sources and staffing within the state health department	**Question 20** (number of epidemiologists and source of funding by progra has been included in the Program Area Leads Worksheet and in the Hum Resources Worksheet. **Question 22** (number of epidemiologists supported by federal funding sou also included in the Human Resources Worksheet. **Question 28** (ideal number of epidemiologists by program area) has beer included in the Program Area Leads Worksheet.

Section 4: Civil service annual salary ranges for epidemiologists in your state health department	Please consult with your Human Resources or other hiring director when completing this section. **Questions 29 and 30** have been included in the Human Resources Work
Section 5: Recruiting the epidemiology workforce	All questions within this section should be completed by the State Epidem or a senior level health official within your agency. It may be helpful to con a Human Resources or other hiring director. **Question 31** (assets for recruiting epidemiologists) has been included in t Program Area Leads Worksheet and the Human Resources Worksheet.
Section 6: Vacancies and retention of the state epidemiology workforce	All questions within this section should be completed by the State Epidem or a senior level health official within your agency. It may be helpful to con a Human Resources or other hiring director. **Question 33** (number of vacancies) has been included in the Program Ar Leads Worksheet and the Human Resources Worksheet. **Question 34** (anticipated staff changes) has been included in the Prograr Leads Worksheet. **Question 35** (tactics for retaining epidemiologists) has been included in th Program Area Leads Worksheet and the Human Resources Worksheet. **Question 36** (strategies to reduce staff burnout) has been included in the Resources Worksheet.
Section 7: Leadership feedback	All questions within this section should be completed by the State Epidem or a senior level health official within your agency.
Section 8: Review of the assessment	All questions within this section should be completed by the State Epidem or a senior level health official within your agency.

The assessment must be completed in its entirety before it can be submitted. A confirmation that all parts of the assessment have been completed is required.

Please complete the entire assessment by **11:59 pm EST on Monday, March 4th.**

PH-LIFT

CSTE is partnering with the Public Health Accreditation Board (PHAB) to share 2024 ECA data and previous years enumeration data for the creation of the public health workforce database, PH-LIFT. The goal is to house multiple datasets to enumerate the public health workforce and showcase a holistic perspective of capacity through dashboards and vignettes. All ECA data will be displayed in aggregate and only state or territorial-level dashboards will be accessible to the State or Territorial Epidemiologist in the database.

Please select if your state or territory would like to 'Opt in' or 'Opt out' of having your data shared with PH-LIFT.

- ◯ My state or territory will opt in to ECA data sharing with PH-LIFT.
- ◯ My state or territory will opt out of ECA data sharing with PH-LIFT.
- ◯ I am not sure. I would like more information before I decide.

Section 1: Epidemiology Leadership within the State Health Department

Section 1: Epidemiology Leadership within the state health department (Questions 1-8)

This section can be completed by the State Epidemiologist without additional input.

Question 8 (training needs) has been included in the Program Area Leads Worksheet.

Q1. How long has the State Epidemiologist been in their current position?

Please indicate half years in increments of 0.5. Please round up or down accordingly.

Years in current position:

Q2. What areas does the State Epidemiologist work on? Check all that apply.

- ☐ Infectious diseases
- ☐ Healthcare-associated infections
- ☐ Environmental/Occupational
- ☐ Chronic disease
- ☐ Maternal and child health
- ☐ Injury

☐ Other (please specify):

Q3. What other roles does the State Epidemiologist serve? Check all that apply.

- ☐ Medical Director/Chief Medical Officer
- ☐ State Health Officer
- ☐ State Public Health Veterinarian
- ☐ Chief of Communicable Disease
- ☐ Public Health Agency Director and/or Commissioner
- ☐ Deputy Director and/or Commissioner
- ☐ Preparedness Director
- ☐ Informatics Director
- ☐ State Epidemiologist does not serve in any other roles
- ☐ Other (please specify)

Q4. As State Epidemiologist, what units within the health department do you oversee and/or supervise?

	Oversee but do not directly supervise	Oversee and directly supervise	Do not oversee or supervise
Infectious Disease Program Areas	○	○	○
Non-Infectious Disease Program Areas	○	○	○
Surveillance and Informatics	○	○	○
Public Health Laboratory	○	○	○
Public Health Preparedness and Response	○	○	○
Other (please specify)	○	○	○

Q5. In the last 6 months, have there been discussions in your jurisdiction about changing the roles and responsibilities of a State Epidemiologist?

Q6. Is there a formal lead epidemiologist for each program area below?

If the "Other" category is not relevant to your situation, please select "No."

Who should be counted as an epidemiologist? When considering who should be counted, please focus on the functions performed by the individual rather than the job title. Please utilize this definition of an epidemiologist and reference the Applied Epidemiology Competencies (AECs) for examples of epidemiology job functions if you need assistance in determining the status of an employee. Please count each epidemiologist only once.

State level epidemiologists include:

- All those employed by the state
- All those working at the state level who are either federal assignees (e.g., EISO, CEFO,PHAP), contract employees (e.g., CDC Foundation assignee, contracted from school of public health to work at or for the state health department) or fellows (e.g., CSTE trainee)
- State employees assigned to work at a local or regional level (e.g. to conduct investigations for a region of the state).

Please note that this is the same definition that was used in 2021. You may wish to review your state's individual report from the previous assessment as a point of reference. Your state's individual report will be to sent to you in a separate email.

How should we fill it out if one person is the lead epidemiologist for multiple program areas? If one person serves as the lead epidemiologist for two program areas, please indicate both as having lead epidemiologists. For example, if the same person is the lead for reproductive health and maternal and child health, please say 'YES' for both areas.

	Yes	***No***
Chronic Disease	○	○
COVID-19 Response	○	○
Environmental Health	○	○
Foodborne/Waterborne Diseases	○	○
Generalist	○	○
General Infectious Disease	○	○
Genomics/Advanced Molecular Detection	○	○
HAI / AR	○	○
HIV	○	○
Informatics	○	○
Injury	○	○
Maternal and Child Health	○	○
Mental Health	○	○
Occupational Health	○	○
Oral Health	○	○
Pan-respiratory (influenza, RSV, other respiratory illness)	○	○
Preparedness and Disaster Epidemiology	○	○
Reproductive Health	○	○
STD	○	○
Substance Use	○	○
Tribal	○	○
Tuberculosis	○	○
Vaccine-preventable Diseases	○	○

	Yes	***No***
Vector-borne/Zoonotic Diseases	○	○
Viral Hepatitis	○	○
Vital Statistics	○	○
Wastewater Surveillance		
Other (please specify):	○	○
Other (please specify)	○	○

Q7. Do epidemiologists at the state health department have easy access to peer-reviewed literature that is not open access?

Open access is defined as being available online to the reader without financial, legal, or technical barriers other than those inseparable from gaining access to the internet self.

Select Option from the dropdown scale.

Q8. From your perspective, what are the most pressing training needs among your epidemiology staff?

Please choose your top 5 most pressing training needs.

- [ ] Assessments and evaluations (development and distribution)
- [ ] Continuing education (basic epi refreshers, novel methodologies, updates to the field/literature, program specific technical training, scientific writing etc.)
- [ ] Health equity (cultural responsiveness, diversity and inclusion, improving knowledge and attitudes to promote culturally responsive work, community collaboration, etc.)
- [ ] Data analytics (informatics, translating and applying public health data, data science, etc.)
- [ ] Fiscal management (planning, budgeting, and/or monitoring resources)
- [ ] Leadership development (identifying future leaders, coaching/mentoring programs, retention of current leaders, succession planning)
- [ ] Persuasive communication (educating the public, framing and communicating public health research and data, policy engagement, risk communication, facilitation etc.)
- [ ] Systems thinking (systems development, change management, strategic planning, and/or flexibility)
- [ ] Software skills (Epi Info, SAS, SPSS, R, etc.)
- [ ] Team-building (improving interpersonal relations and collaboration among staff)
- [ ] Emergency preparedness (how epidemiologists integrate into a response, mobilizing under an Incident Command System, case investigations etc.)
- [ ] Community collaboration (partnerships with shareholders, working with community members, multi-sector collaboration)
- [ ] Legal epidemiology (study of law as a factor in the cause, distribution, and prevention of disease and injury; CDC defintion)
- [ ] Grant management (apply for, manage and implement grant funded activities)
- [ ] Other (please specify):

Section 2: Epidemiology and Surveillance Capacity

Section 2: Epidemiology and Surveillance Capacity (Questions 9-10)

This section focuses on the three key Essential Public Health Services (EPHS) that have been identified

as significant for epidemiologists. For further details on the EPHS, please click here. The 2024 ECA utilizes the updated Essential Public Health Services released on September 9, 2020.

- **EPHS 1: Assess and monitor population health status, factors that influence health, and community needs and assets**
- **EPHS 2: Investigate, diagnose, and address health problems and hazards affecting the population**
- **EPHS 9: Improve and innovate public health functions through ongoing evaluation, research, and continuous quality improvement**

If necessary, please seek the guidance of other state health department staff within program specific areas when completing this section.

Question 10 (perceived capacity) has been included as an option in the Program Area Leads Worksheet

Q9. Does your state health department have adequate epidemiological capacity to provide the following three Essential Public Health Services (EPHS), such that the department is able to lead activities, provide subject matter expertise, and apply for, receive, and manage resources to conduct key activities?

See below for a definition of scales used in this question:

None: 0% adequate epidemiological capacity to provide this EPHS.
Minimal: 1-24% adequate epidemiological capacity to provide this EPHS.
Partial: 25-49% adequate epidemiological capacity to provide this EPHS.
Substantial: 50-74% adequate epidemiological capacity to provide this EPHS.
Almost full: 75-99% adequate epidemiological capacity to provide this EPHS.
Full: 100% adequate epidemiological capacity to provide this EPHS.

Select capacity option from the dropdown scale

EPHS 1: Assess and monitor population health status, factors that influence health, and community needs and assets

EPHS 2: Investigate, diagnose, and address health problems and hazards affecting the population

EPHS 9: Improve and innovate public health functions through ongoing evaluation, research, and continuous quality improvement

Q10. What best describes the overall current epidemiological capacity to provide the three Essential Public Health Services (EPHS) in the each of the following program areas in your state health department, such that the department is able to lead activities, provide subject matter expertise, and apply for, receive, and manage resources to conduct key activities?

See below for a definition of scales used in this question:

None: 0% epidemiological and surveillance capacity to provide the three EPHS (e.g., the program area is being built or currently has no staff).
Minimal: 1-24% epidemiological and surveillance capacity to provide the three EPHS.
Partial: 25-49% epidemiological and surveillance capacity to provide the three EPHS.
Substantial: 50-74% epidemiological and surveillance capacity to provide the three EPHS.
Almost full: 75-99% epidemiological and surveillance capacity to provide the three EPHS.
Full: 100% epidemiological and surveillance capacity to provide the three EPHS.
We do not have this program area.

Select capacity option from the dropdown scale. Please ensure there is a response for each row. CSTE will follow up for any missing data.

Chronic Disease	
COVID-19 Response	
Environmental Health	
Foodborne/Waterborne Diseases	
Generalist	
General Infectious Disease	
Genomics/Advanced Molecular Detection	
HAI / AR	
HIV	
Informatics	
Injury	
Maternal and Child Health	
Mental Health	
Occupational Health	
Oral Health	
Pan-respiratory (influenza, RSV, other respiratory illness)	
Preparedness and Disaster Epidemiology	

Reproductive Health	
STD	
Substance Use	
Tribal	
Tuberculosis	
Vaccine-preventable Diseases	
Vector-borne/Zoonotic Diseases	
Viral Hepatitis	
Vital Statistics	
Wastewater Surveillance	
Other (please specify):	
Other (please specify):	

Section 3: Epidemiology Funding Sources and Staffing

<u>Section 3: Epidemiology funding sources and staffing within the state health department</u> (Questions 11-28)

Question 20 (number of epidemiologists and source of funding by program area) has been included in the Program Area Leads Worksheet and in the Human Resources Worksheet.

Question 20 (number of epidemiologists supported by federal funding sources) is included in the Human Resources Worksheet.

Question 28 (ideal number of epidemiologists by program area) has been included in the Program Area Leads Worksheet.

Q11. What are the funding sources for all epidemiology activities within the state health department?
Activities could include but are not limited to assessing and monitoring population health, ongoing research and

evaluation and use of surveillance systems.

Note: This question will not automatically validate total percent. Total must equal 100%. Please do not leave any box blank- if necessary, indicate 0%.

Federal Funds %	0
State Funds %	0
Other %	0
Total	0

Q12. What are the funding sources for all epidemiology personnel within the state health department?

For more information on who should be counted as an epidemiologist, please use this definition of an epidemiologist.

Note: This question will not automatically validate total percent. Total must equal 100%. Please do not leave any box blank- if necessary, indicate 0%.

Federal Funds %	0
State Funds %	0
Other %	0
Total	0

Q13. Please state your current **core** epidemiology ELC funding for Year 5.

Please enter a dollar amount. You may use up to two decimal places.

Q14. How much additional **core** epidemiology ELC funding would you ask for if there was no limit to that request?

Please enter a dollar amount. You may use up to two decimal places.

Q15. How would your jurisdiction utilize these additional funds from ELC?

Q16. How much additional funding does your jurisdiction need for non-infectious disease priorities?

Please enter a dollar amount. You may use up to two decimal places.

Q17. How would your jurisdiction utilize these additional funds?

Q18. To what extent are funds sufficient to support data modernization system capacity in your jurisdiction?

- ◯ Definitely not enough
- ◯ We are able to modernize a bit but not as much as we need to
- ◯ We are able to modernize and build new infrastructure but will need additional funding to sustain systems in the future
- ◯ We are able to modernize and anticipate having sufficient funding to sustain new infrastructure in the future
- ◯ Not applicable to our agency

○ Other (please specify): _____

Q19. What's the biggest challenge with data modernization currently in your jurisdiction?

Please choose your top 3 challenges to data modernization.

- ☐ Insufficient current funding
- ☐ Uncertain sustained funding
- ☐ Inability to hire workforce with necessary skill
- ☐ Uncertainty regarding what to build/procure
- ☐ Jurisdictional procurement barriers
- ☐ Uncertainty regarding how to align with larger agency priorities
- ☐ Uncertainty regarding how to align with larger national DMI efforts and activities
- ☐ Inability to create necessary new positions
- ☐ Competing with other priorities at my agency
- ☐ Waiting to see results of larger pilots and development of tools
- ☐ Jurisdictional policies (please specify): _____

Q20. Please indicate the total number of epidemiologists (FTEs) currently working for your state health department by program area and funding source. If an epidemiologist has responsibilities divided over more than one program area, please attribute the fraction of the time the epidemiologist works in any given program area to the nearest 0.1 FTE (e.g., 0.2 ID, 0.4 PR, 0.4 EH).

For enumeration purposes state-level epidemiologists include all those employed by the state, all those working at the state level who are either federal assignees (e.g. EISO, CEFO, PHAP), contract employees (e.g. contracted from school of public health to work at or for the state health department), fellows (e.g. CSTE trainee) and state employees assigned to work at local or regional level (e.g. to conduct investigations for a region of the state).

When considering who should be counted, please focus on the functions performed by the individuals rather than the job title. You may wish to consult the 2021 responses from your state in completing this form.

***Note:* Only numbers are accepted. Please round to one decimal place.**

To navigate across rows, use the TAB key. All cells should be completed even if you do not have a program in this area.

If the "Other" category is not relevant to your situation, please also indicate "0" for each value in that

row.

The "Total" column can be used to validate responses by program area rows.

	Number supported with federal funds from CDC	**Number directly funded by CDC (e.g., CEFO, EIS, PHAP, etc.)**	**Number supported with federal funds from other agencies**	**Number supported with state funds**	**Number supported with funds from other sources (e.g., foundations**
	0	0	0	0	0
	0	0	0	0	0
	0	0	0	0	0
	0	0	0	0	0
	0	0	0	0	0
	0	0	0	0	0
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	0	0	0	0	0
	0	0	0	0	0
	0	0	0	0	0
	0	0	0	0	0
	0	0	0	0	0
	0	0	0	0	0
	0	0	0	0	0
Chronic Disease	0	0	0	0	0

	Number supported with federal funds from CDC	***Number directly funded by CDC (e.g., CEFO, EIS, PHAP, etc.)***	***Number supported with federal funds from other agencies***	***Number supported with state funds***	***Number supported with funds from other sources (e.g., foundations***
COVID-19 Response	0	0	0	0	0
Environmental Health	0	0	0	0	0
Foodborne/Waterborne Disease	0	0	0	0	0
Generalist	0	0	0	0	0
General Infectious Disease	0	0	0	0	0
Genomics/Advanced Molecular Detection	0	0	0	0	0
HAI / AR	0	0	0	0	0
HIV	0	0	0	0	0
Informatics	0	0	0	0	0
Injury	0	0	0	0	0
Maternal and Child Health	0	0	0	0	0
Mental Health	0	0	0	0	0
Occupational Health	0	0	0	0	0
Oral Health	0	0	0	0	0
Pan-respiratory (influenza, RSV, other respiratory illness)	0	0	0	0	0
Preparedness and Disaster Epidemiology	0	0	0	0	0
Reproductive Health	0	0	0	0	0
STD	0	0	0	0	0
Substance Use	0	0	0	0	0

	Number supported with federal funds from CDC	*Number directly funded by CDC (e.g., CEFO, EIS, PHAP, etc.)*	*Number supported with federal funds from other agencies*	*Number supported with state funds*	*Number supported with funds from other sources (e.g., foundations*
Tribal	0	0	0	0	0
Tuberculosis	0	0	0	0	0
Vaccine-preventable Diseases	0	0	0	0	0
Vector-borne/Zoonotic Diseases	0	0	0	0	0
Viral Hepatitis	0	0	0	0	0
Vital Statistics	0	0	0	0	0
Wastewater Surveillance	0	0	0	0	0
Other (please specify):	0	0	0	0	0
Other (please specify):	0	0	0	0	0

Q21. Where are wastewater surveillance epidemiologists **primarily** housed in your department?

- ◯ Infectious Disease
- ◯ Environmental Health
- ◯ Laboratory Science
- ◯ Other (please specify):

Q22. Please provide the number of epidemiology positions in your department funded by the following federal sources.

Only whole numbers are accepted.

State level epidemiologists include:

- All those employed by the state
- All those working at the state level who are either federal assignees (e.g., EISO, CEFO,PHAP), contract employees (e.g., CDC Foundation assignee, contracted from school of public health to work at or for the state health department) or fellows (e.g., CSTE trainee)
- State employees assigned to work at a local or regional level (e.g. to conduct investigations for a region of the state).

	Number of Positions
Epidemiology and Laboratory Capacity (ELC) Program	
Public Health Emergency Preparedness (PHEP) Program	
Preventative Health and Health Services (PHHS) Block Grant	
Public Health Infrastructure Grant (PHIG)	
Other CDC	
Other Federal (Non-CDC)	

Q23. Which of the following federal funding sources are most critical for infectious disease outbreak support?

Please rank from 1 to 6, with 1 being the most critical and 6 being the least critical. *Please drag each option up and/or down to rank in order from 1 to 6.*

Epidemiology and Laboratory Capacity (ELC) Program

Public Health Emergency Preparedness (PHEP) Program

Preventative Health and Health Services (PHHS) Block Grant

Public Health Infrastructure Grant (PHIG)

Other CDC

Other Federal (non-CDC)

Q24. My state has at least one dedicated person focused on producing or maintaining disease transmission models and/or outbreak forecasts.

- ◯ Yes
- ◯ No

Q24.1. If yes, how many FTEs by role?

Please provide the number of FTEs down to the tenth of a decimal (e.g., .10, 1.2)

	Please indicate the number of FTEs down to the tenth of a decimal (e.g., .10, 1.2)
Contractor	
Agency Employee	
Federal employee assigned to state	
Fellow	
Other (please specify):	

Q24.2. Why doesn't your department have staff dedicated to disease transmission models and/or outbreak forecasts? *Check all that apply*.

- ☐ Cost
- ☐ Ability to recruit an individual with relevant training and skills
- ☐ Ability to train and grow individuals with baseline skills and training

- [ ] My agency relies on academic partners for advanced analytics, modeling, and forecasting
- [ ] My agency relies on private sector partners for advanced analytics, modeling, and forecasting
- [ ] My agency has not prioritized advanced analytics, modeling, and forecasting among other data-related priorities
- [ ] Other (please specify): _____

Q25. Outbreak forecasts from all sources, such as those that estimate the effective reproduction number (i.e. Reproductive time, or Rt), number of cases, or hospitalizations weeks into the future would be useful to public health decision makers in my state (i.e., those who make response-related resource allocation decisions, issue public health guidance, and/or make policy decisions during the next public health emergency.

Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree
○	○	○	○	○

Q26. What are the most prohibitive barriers to using disease transmission models and/or outbreak forecasts in public health response planning or action? **Please choose the top 3 barriers in your jurisdiction.**

- [ ] Underlying data is not relevant or representative enough of my jurisdiction
- [ ] Forecast/model results are not relevant or representative enough of my jurisdiction
- [ ] Misalignment of needs or understanding of appropriate context
- [ ] Lack of communicating about underlying modeling assumptions
- [ ] Lack of interpretability of forecasting/modeling results
- [ ] Limited buy-in from decision-makers
- [ ] Inadequate communication or visualization tools
- [ ] There are no barriers to using infectious disease forecasting/modeling results.
- [ ] Other (please specify) _____

Q27. In a future outbreak emergency, how might your agency ensure sufficient modeling and forecasting expertise to support situational awareness and decision making? **Please choose all that apply.**

- [ ] Repurpose currently employed experts
- [ ] Request staffing assistance through CDC or other federal agencies
- [ ] Contract consulting firms or other non-academic entities
- [ ] Contract academic experts
- [ ] Collaborate with academic partners (uncontracted)
- [ ] Embed academic experts in emergency response teams (full time or part time)

- [ ] Establish multi-domain task forces including academic experts
- [ ] Utilize existing or new fellows or trainings (e.g., EIS officers, Applied Epidemiology Fellows, PHAPS, etc.)
- [ ] I do not believe having modeling and forecasting expertise during a future outbreak is necessary
- [ ] Other (please specify) _____

Q28. Please estimate the ideal number of additional epidemiologists needed to reach full capacity for your state health department by program area (the number of epidemiologists in addition to the current number regardless of resources - it may be helpful to reference Question 10). Please attribute the fraction of capacity in each program area to the nearest 0.1 FTE if less than one FTE is needed.

CSTE aims to better describe the ideal personnel needs to support epidemiology activities occurring now and in the future. The provided estimate will be used to request additional funding and infrastructure to support the growth of the applied epidemiology workforce.

***Note:* Only numbers are accepted. Please round to one decimal place.**

To navigate down the column, use the TAB key. All cells should be completed even if you do not have a program in this area.

If the "Other" category is not relevant to your situation, please indicate "0" for that row.

	Estimate of ideal number of additional epidemiologists needed to reach full capacity
Chronic Disease	
COVID-19 Response	
Environmental Health	
Foodborne/Waterborne Diseases	
Generalist	
General Infectious Disease	
Genomics	
HAI / AR	
HIV	

	Estimate of ideal number of additional epidemiologists needed to reach full capacity
Informatics	☐
Injury	☐
Maternal and Child Health	☐
Mental Health	☐
Occupational Health	☐
Oral Health	☐
Pan-respiratory (influenza, RSV, other respiratory illness)	☐
Preparedness and Disaster Epidemiology	☐
Reproductive Health	☐
STD	☐
Substance Use	☐
Tribal	☐
Tuberculosis	☐
Vaccine-preventable Diseases	☐
Vector-borne Diseases	☐
Viral Hepatitis	☐
Vital Statistics	☐
Wastewater Surveillance	☐
Other (please specify): ☐	☐
Other (please specify): ☐	☐

Section 4: Civil Service and Annual Salary Ranges

Section 4: Civil service annual salary ranges for epidemiologists in your state health department (Questions 29-30)

It may be helpful to consult with your Human Resources or other hiring director for Questions 29 and 30.

Questions 29 and 30 have been included as options in the Human Resources Worksheet.

Q29. Describe the civil service annual salary range for epidemiologists working in your state health department by degree (state employees only). If you have more than one position for a given degree below, please use the low end of the lowest position in that level to the high end of the highest position in that level.

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

Please include only civil service employees.

Note: Commas are not permitted in response boxes. Only numbers are accepted. Please round to the nearest whole number.

	Salary Range (Minimum)	Salary Range (Maximum)
MD, DO, other medical degrees		
DDS, other dental degrees		
DVM, other veterinary degrees		
PhD, DrPH, other Doctoral degrees		
MPH, MSPH, other Master degrees		
BA, BS, BSN, other Bachelor degrees		
Associate or no post high school degree		

Q30. Describe the official Human Resources civil service annual salary range for epidemiologists working in your state health department by career level. If you have more than one position in a given career level below,

please use the low end of the lowest position in that level to the high end of the highest position in that level.

Please include only civil service employees.

Note: Commas are not permitted in response boxes. Only numbers are accepted. Please round to the nearest whole number.

	Salary Range (Minimum)	Salary Range (Maximum)
State Epidemiologist		
Deputy State Epidemiologist		
Senior Level Epidemiologist		
Mid Level Epidemiologist		
Entry Level Epidemiologist		

Section 5: Recruiting the Epidemiology Workforce

Section 5: Recruiting the Epidemiology Workforce (Question 31)

Question 31 (assets for recruiting epidemiologists) has been included in the Program Area Leads Worksheet and the Human Resources Worksheet.

Q31. CSTE aims to gather best practices and understand what attracts epidemiologists to your agency. What are your department's 3 best assets for recruiting epidemiologists?

- [ ] Competitive Salary
- [ ] Personnel policies and procedures
- [ ] Job benefits
- [ ] Job security
- [ ] Job location
- [ ] Opportunity for promotion
- [ ] Opportunity for travel
- [ ] Job interests/fulfillment
- [ ] Opportunity for skills training
- [ ] Flexible schedule
- [ ] Opportunity for continued education
- [ ] Opportunity to work remotely

- [ ] Opportunities for merit increases/bonuses
- [ ] Opportunity to attend scientific conferences
- [ ] Other (please specify): _____

Section 6: Vacancies and Retention

Section 6: Vacancies and retention of the state epidemiology workforce (Questions 32-36)

All questions within this section should be completed by the State Epidemiologist or a designated senior level health official within your agency. It may be helpful to consult with a Human Resources director or other state health department staff by specific program areas.

Question 33 (number of vacancies) has been included in the Program Area Leads Worksheet and the Human Resources Worksheet.

Question 34 (anticipated staff changes) has been included in the Program Area Leads Worksheet.

Question 35 (tactics for retaining epidemiologists) has been included in the Program Area Leads Worksheet and the Human Resources Worksheet.

Question 36 (strategies to reduce staff burnout) has been included in the Human Resources Worksheet.

Q32. Does your state health department utilize contractors to fill vacancies for epidemiology/surveillance positions?

A vacancy is defined as a position to be filled at the state health department that meets the following conditions: (1) there is work available for the position and (2) the job could start within 30 days.

- ◯ Yes
- ◯ No

Q33. For epidemiology/surveillance positions, please estimate the number of vacancies by program area in civil service positions (columns A and B) and contract employees (columns C and D). Please attribute the fraction of time for vacancy by program area to the nearest 0.1 FTE if there is vacancy for a position over multiple program areas.

A **vacancy** is defined as a position to be filled at the state health department that meets the following conditions: (1) there is work available for the position and (2) the job could start within 30 days. Do not include

positions that are required to be left vacant due to hiring freezes or other requirements.

To navigate across rows, use the TAB key.

Note: Only numbers are accepted. Please round to one decimal place.

Please do not leave any box blank, indicate "0" instead.

For columns C and D, if you do not use contractors, indicate "0."

	What is the number of vacant epidemiology positions at the health department for civil service employees?	How many civil service positions do you intend to fill (actively working with HR)?	What is the number of vacant epidemiology positions at the health department for contract employees?	How many contract positions do you intend to fill (actively working with HR)?
Chronic Disease	0	0	0	0
COVID-19 Response	0	0	0	0
Environmental Health	0	0	0	0
Foodborne/Waterborne Diseases	0	0	0	0
Generalist	0	0	0	0
General Infectious Disease	0	0	0	0
Genomics/Advanced Molecular Detection	0	0	0	0
HAI / AR	0	0	0	0
HIV	0	0	0	0
Informatics	0	0	0	0
Injury	0	0	0	0
Maternal and Child Health	0	0	0	0
Mental Health	0	0	0	0
Occupational Health	0	0	0	0
Oral Health	0	0	0	0

	What is the number of vacant epidemiology positions at the health department for civil service employees?	How many civil service positions do you intend to fill (actively working with HR)?	What is the number of vacant epidemiology positions at the health department for contract employees?	How many contract positions do you intend to fill (actively working with HR)?
Pan-respiratory (influenza, RSV, other respiratory illness)	0	0	0	0
Preparedness and Disaster Epidemiology	0	0	0	0
Reproductive Health	0	0	0	0
STD	0	0	0	0
Substance Use	0	0	0	0
Tribal	0	0	0	0
Tuberculosis	0	0	0	0
Vaccine-preventable Diseases	0	0	0	0
Vector-borne/Zoonotic Diseases	0	0	0	0
Viral Hepatitis	0	0	0	0
Vital Statistics	0	0	0	0
Wastewater Surveillance	0	0	0	0
Other (please specify):	0	0	0	0
Other (please specify):	0	0	0	0

Q34. How many epidemiology staff are you anticipating losing when pandemic supplemental funding expires?

Please report number of people, not FTEs.

Q35. What are your state's 3 most successful tactics for retaining epidemiologists?

Please include only civil service employees.

- [ ] Competitive Salary
- [ ] Personnel policies and procedures
- [ ] Job benefits
- [ ] Job security
- [ ] Opportunity for promotion
- [ ] Opportunity for travel
- [ ] Job interests/fulfillment
- [ ] Opportunities for skills training
- [ ] Flexible schedule
- [ ] Opportunity to work remotely
- [ ] Opportunities for merit increases/bonuses
- [ ] Opportunity to attend scientific conferences
- [ ] Opportunities for continued education
- [ ] Accurate job description during interview process
- [ ] Other (please specify):

Q36. How are you currently working to minimize burnout among staff?

Please choose your top 3 strategies.

- [ ] Allowing a flexible work schedule
- [ ] Providing task autonomy (e.g. ability to control deadlines, methodology, etc.)
- [ ] Providing time-limited detail assignments
- [ ] Promoting meaningful relationships at work
- [ ] Promoting awareness of mental health and burnout
- [ ] Encourage taking paid leave as needed
- [ ] Providing cross-training
- [ ] Allowing telework
- [ ] Hiring additional staff to lessen the workload

☐ Other (please specify):

☐ None of the above

Section 7: Leadership Feedback

Section 7: Leadership Feedback (Questions 37-40)

All questions within this section should be completed by the State Epidemiologist or a designated senior level health official within your agency.

Q37. As the State Epidemiologist, what are the most critical issues you face?

Q38. How is your jurisdiction working to recruit a diverse workforce?

Q39. What are the barriers to recruiting a diverse workforce in your jurisdiction?

Q40. What else would you like to share with CSTE about epidemiology workforce and training?

Section 8: Review of Assessment

<u>Section 8: Review of assessment</u> (Questions 41-42)

All questions within this section should be completed by the State Epidemiologist or a designated senior level health official within your agency.

Please review the previous 7 sections of the assessment prior to completing this section to confirm all questions have been answered accurately.

Q41. As the State or Territorial Epidemiologist, I confirm that all questions within this assessment have been answered.

◯ Click here to confirm

Q42. As the State or Territorial Epidemiologist, I confirm that all parts of this assessment have been completed accurately, to the best of my knowledge. I have consulted with other state health department staff as needed.

◯ Click here to confirm

APPENDIX B

State Epidemiologist Instructions:

1. To facilitate feedback from your human resources group, we have created this worksheet, which allows you to gather information on specific questions of your choosing. These include **(1) question 20**, which examines the numbers of FTEs in each program area by funding source, **(2) question 22**, which asks about the number of positions funded by federal sources, **(3) questions 29 and 30**, which include salary ranges by highest degree and by job category; **(4) question 31** which asks about best assets for recruiting epidemiologist to the agency; **(5) question 33**, which explores the number of vacancies by program area; **(6) question 35** which explores best assets for retaining epidemiologists in your agency, and **(6) question 36** about how you are working to minimize burnout amongst staff.

2. If you prefer not to obtain input from human resources on some of these topics, you may simply delete the individual worksheets. Question 20 might be filled out by the program area leads or by human resources. For large health departments with multiple epidemologists, the question 15 worksheet allows the development of a line listing for each epidemiologist including their program area and their funding, and provides an automatically generated table and sums the total FTEs by program area for inclusion on the actual assessment form.

3. Click the tabs at the bottom of the spreadsheet to navigate between questions. Note that some of the tabs include content outside the view from 100% zoom, so it is necessary to scroll down.

4. Please remove this tab before sending out. **Do not remove the tab marked "DO NOT DELETE"** since it contains the code to facilitate automatic entry of the program lead information.

5. If you wish to print this spreadsheet, please scale to one page to preserve formatting.

Human Resources Worksheet, Epidemiology Capacity Assessment
Identify HR Lead

HR Lead Name:	
HR Lead Email:	

Your name:	0
Your email:	0
Program Area (click cell to view list):	

Section 3, Question 20:

Please indicate the total number of epidemiologists (FTEs) currently working in your program area by funding source. Please round to the nearest 0.1 FTE.
For enumeration purposes state level epidemiologists include all those employed by the state, all those working at the state level who are either federal assignees (e.g. EISO, CEFO, PHAP), contract employees (e.g. contracted from school of public health to work at or for the state health department), state employees assigned to work at local or regional level (e.g. to conduct investigations for a region of the state) or fellows (e.g. CSTE trainee). When considering who should be counted, please focus on the functions performed by individuals rather than the job title.
Instructions for Completion:
1. Table A below should reflect the total number of epidemiologists in the program area (last column) broken down by funding source (column categories).
2. Table B below should reflect individual staff members and their amount of FTE support in each funding source category. See specific Table B instructions in the box directly above it.
3. Please make sure that the first row from Table B (TOTALS) matches that of Table A (TOTAL EPIS IN PROGRAM AREA) exactly.

TABLE A	Number supported with federal funds from CDC	Number directly funded by CDC (e.g., CEFO, EIS, PHAP, etc.)	Number supported with federal funds from other agencies	Number supported with state funds	Number supported with funds from other sources (e.g., foundations)	Total
TOTAL EPIS IN PROGRAM AREA						0

If there are multiple epidemiologists in your program area, you may wish to develop a line list with the individual names of your staff members and the amount of FTE support in each category. The sums will appear automatically in line 13 above. If there are more than 10 epidemiologists in the group, please adjust the AutoSum formula to include all.

TABLE B	Fraction of FTE supported with federal funds from CDC	Fraction of FTE directly funded by CDC (e.g., CEFO, EIS, PHAP, etc.)	Fraction of FTE supported with federal funds from other agencies	Fraction of FTE supported with state funds	Fraction of FTE supported with funds from other sources (e.g., foundations)	Total FTE
TOTALS	0	0	0	0	0	0
Name 1						0
Name 2						0
Name 3						0
Name 4						0
Name 5						0
Name 6						0
Name 7						0
Name 8						0
Name 9						0
Name 10						0

HR Lead Name:	
HR Lead Email:	

Section 3, Question 22

Please provide the number of epidemiology positions in your department funded by the following federal sources. Only numbers are accepted. Please round to one decimal place.

Instructions for Completion:

1. Click each cell to enter the number of epidemiology positions in your department funded by the following federal sources.
2. Only numbers are accepted. Please round to one decimal place.
3. Please do not leave any cell blank. Please put a zero if no positions are funded through that mechanism.

Federal Funding Source	Number of Positions
Epidemiology and Laboratory Capacity Program (ELC)	
Public Health Emergency Preparedness Program (PHEP)	
Preventative Health and Health Services Block Grant (PHHS)	
Public Health Infrastructure Grant (PHIG)	
Other CDC	
Other Federal (non-CDC)	

HR Lead Name:	0
HR Lead Email:	0

Section 4, Question 29

Describe the civil service annual salary range for epidemiologists working in your state health department by degree (State employees only). If you have more than one position for a given degree below, please use the low end of the lowest position in that level to the high end of the highest position in that level. *Example: If an entry level epidemiologist with an MD makes $75,000 to $100,000 and a senior level epidemiologist with an MD makes $125,000 to $150,000 the salary scale is: $75,000-$150,000. Please include only civil service employees.*

Instructions for Completion:

1. Click each cell to enter the minimum or maximum value of the range. Values will automatically appear as currency.
2. Only numbers are accepted. Please round to the nearest whole number.
3. Please do not leave any cell blank.

Degree	Salary Range (Minimum)	Salary Range (Maximum)
MD, DO, other medical degrees	$ -	$ -
DDS, other dentistry degrees	$ -	$ -
DVM, other veterinary degrees	$ -	$ -
PhD, DrPH, other doctoral degrees	$ -	$ -
MPH, MSPH, other Master degrees	$ -	$ -
BA, BS, BSN, other Bachelor degrees	$ -	$ -
Associate or no post high school degree	$ -	$ -

Section 4, Question 30

Describe the official Human Resources civil service annual salary range for epidemiologists working in your state health department by career level according to the Applied Epidemiology Competencies (AECs). If you have more than one position in a given career level below, please use the low end of the lowest position in that level to the high end of the highest position in that level. *Please include only civil service employees.*

Instructions for Completion:

1. Click each cell to enter the minimum or maximum value of the range. Values will automatically appear as currency.
2. Only numbers are accepted. Please round to the nearest whole number.
3. Please do not leave any cell blank.

Title	Salary Range (Minimum)	Salary Range (Maximum)
State Epidemiologist	$ -	$ -
Deputy State Epidemiologist	$ -	$ -
Senior Level Epidemiologist	$ -	$ -
Mid Level Epidemiologist	$ -	$ -
Entry Level Epidemiologist	$ -	$ -

HR Lead Name	0
HR Lead Email	0

Section 5, Question 31:
What are your state's 3 best assets for recruiting epidemiologists? Please include only civil service employees.

Instructions for Completion:
1. Select by replacing "m" with "X". Please leave the placeholder values in the options you do not wish to select.

What are your state's 3 best assets for recruiting epidemiologists? Please only include civil service employees.	
m	Competitive salary
m	Personnel policies and procedures
m	Job benefits
m	Job security
m	Job location
m	Opportunity for promotion
m	Opportunity for travel
m	Job interests/fulfillment
m	Opportunity for skills training
m	Flexible schedule
m	Opportunity for continued education
m	Opportunity to work remotely
m	Opportunities for merit increases/bonuses
m	Opportunity to attend scientific conferences
m	Other (please specify)

HR Lead Name:	0
HR Lead Email:	0

Section 6, Question 33

For epidemiology/surveillance positions, please estimate the number of vacancies by program area in civil service positions (columns A and B) and contract employees (columns C and D).

A vacancy is defined as a position to be filled at the State Health Department that meets the following conditions: (1) there is work available for the position and (2) the job could start within 30 days. Do not include positions that are required to be left vacant due to hiring freezes or other requirements.

Instructions for Completion:

1. Cells within the table are restricted to numbers only.
2. Please attribute the fraction of time for vacancy by program area to the nearest 0.1 FTE if there is vacancy for a position over multiple program areas.
3. Please do not leave any cell blank, indicate "0" instead.
4. For columns C and D, if you do not use contractors, indicate "0."

Program Area	A. What is the number of vacant epidemiology positions at the health department for civil service employees?	B. How many civil service positions do you intend to fill (actively working with HR?)	C. What is the number of vacant epidemiology positions at the health department for contract employees?	D. How many contract positions do you intend to fill (actively working with HR?)
Chronic Disease				
COVID-19 Response				
Environmental Health				
Foodborne/Waterborne Diseases				
Generalist				
Genomics/Advanced Molecular Detection				
General Infectious Disease				
HAI/AR				
HIV				
Informatics				
Injury				
Maternal and Child Health				
Mental Health				
Occupational Health				
Oral Health				
Pan-respiratory (influenza, RSV, other respiratory illness)				
Preparedness and Disaster Epidemiology				
Reproductive Health				
Substance Use				
STD				
Tribal				
Tuberculosis				
Vaccine-preventable diseases				

Vector-borne/Zoonotic diseases				
Viral Hepatitis				
Vital Statistics				
Wastewater surveillance				
Other-1				
Other-2				
Other-3				

HR Lead Name:	0
HR Lead Email:	0

Section 6, Question 35:

What are your state's 3 most successful tactics for retaining epidemiologists? Please include only civil service employees.

Instructions for Completion:

1. Select by replacing "m" with "X". Please leave the placeholder values in the options you do not wish to select.

What are your state's 3 most successful tactics for retaining epidemiologists? Please only include civil service employees.	
m	Competitive salary
m	Personnel policies and procedures
m	Job benefits
m	Job security
m	Opportunity for promotion
m	Opportunity for travel
m	Job interests/fulfillment
m	Opportunities for skills training
m	Flexible schedule
m	Opportunity to work remotely
m	Opportunities for merit increases/bonuses
m	Opportunity to attend scientific conferences
m	Opportunities for continued education
m	Accurate job description during interview process
m	Other (please specify)

HR Lead Name:	0
HR Lead Email:	0

Section 6, Question 36:

How are you currently working to minimize burnout among staff? Please choose your top 3 strategies.

Instructions for Completion:

1. Select by replacing "m" with "X". Please leave the placeholder values in the options you do not wish to select.

How are you currently working to minimize burnout among staff?	
m	Allowing a flexible work schedule
m	Providing task autonomy (e.g., ability to control deadlines, methodology, etc.)
m	Providing time-limited detail assignments
m	Promoting meaningful relationships at work
m	Promoting awareness of mental health and burnout
m	Encourage taking paid leave as needed
m	Providing cross-training
m	Allowing telework
m	Hiring additional staff to lessen the workload
m	Other (please specify)
m	None of the above

APPENDIX C

State Epidemiologist Instructions:

1. To facilitate feedback from your program area leads, we have created this worksheet, which allows you to gather information on specific questions of your choosing. These include **(1) question 8**, which examines the departments' most pressing training needs; **(2) question 10**, which concerns the capacity of each program area to achieve the four Essential Public Health Services most closely linked to epidemiology; **(3) question 20**, which examines the numbers of FTEs in each program area by funding source; **(4) question 28**, which concerns the ideal number of epidemiologists in the program area; **(5) question 31**, which enquires about best assets for recruiting epidemiologists; **(6) question 33**, which explores the number of vacancies by program area, **(7) question 34**, which concerns the number of epidemiology staff the department is expecting to lose when pandemic supplemental funding expires, and **(8) question 35**, which asks about tactics for successfully retaining epidemiologists.

2. If you prefer not to obtain input from the program leads on some of these topics, you may simply delete the individual worksheets. For large health departments or program areas with multiple epidemologists, the question 15 worksheet allows the program area leads to develop a line listing for each epidemiologist in their group and sums the total FTEs for inclusion on the actual assessment form.

3. Click the tabs at the bottom of the spreadsheet to navigate between questions. Note that some of the tabs include content outside the view from 100% zoom, so it is necessary to scroll down.

4. Please remove this tab before sending out. **Do not remove the tab marked "DO NOT DELETE"** since it contains the code to facilitate automatic entry of the program lead information, as well as code for dropdown lists.

Program Area Lead Worksheet, Epidemiology Capacity Assessment
Identify Program Area Lead

Your name:	
Your email:	
Program Area (click cell to view list):	

Your name:	0
Your email:	0
Program Area (click cell to view list):	

Section 1, Question 8:
What are the most pressing training needs among your epidemiology staff? Please choose your top 5 most pressing training needs.

Instructions for Completion:
1. This question is included so that program leads can provide input to the State Epidemiologist. The State Epidemiologist will answer in the Assessment from their perspective.
2. Select by replacing "m" with "X". Please leave the placeholder values in the options you do not wish to select.

What are the most pressing training needs amongst your staff?	
m	Assessments and evaluations (development and distribution)
m	Continuing education (basic epi refreshers, novel methodologies, updates to the field/literature, program specific technical training, scientific writing, etc.)
m	Health equity (cultural responsiveness, diversity and inclusion, improving knowledge and attitudes to promote culturally responsive work, community collaboration, etc.)
m	Data analytics (informatics, translating and applying public health data, data science, etc.)
m	Fiscal management (planning, budgeting, and/or monitoring resources)
m	Leadership development (identifying future leaders, coaching/mentoring programs, retention of current leaders, succession planning)
m	Persuasive communication (educating the public, framing and communicating public health research and data, policy engagement, risk communication, facilitation, etc.)
m	Systems thinking (systems development, change management, strategic planning, and/or flexibility)
m	Software skills (Epi Info, SAS, SPSS, R, etc.)

m	Team-building (improving interpersonal relations and collaboration among staff)
m	Emergency preparedness (how epidemiologists integrate into a response, mobilizing under an Incident Command System, case investigations, etc.)
m	Community collaboration (partnerships with shareholders, working with community members, multi-sector collaboration)
m	Legal epidemiology (study of law as a factor in the cause, distribution, and prevention of disease and injury)
m	Grant management (apply for, manage and implement grant funded activities)
m	Other (please specify)

Your name:	0
Your email:	0
Program Area (click cell to view list):	

Section 2, Question 10:

What best describes the current epidemiological capacity to provide the three Essential Public Health Services (EPHS), such that the department is able to lead activities, provide subject matter expertise, and apply for, receive, and manage resources to conduct key activities in the each of the following program areas in your State Health Department?

Instructions for Completion:

1. Please answer only for your program area.
2. The three EPHS and the capacity scale response options are listed in the two tables immediately below.
3. Select capacity option from the dropdown scale of the third table below. Click on the cell to see the dropdown list.

Essential Public Health Services:
EPHS #1 Assess and monitor population health status, factors that influence health, and community needs and assets (1)
EPHS #2 Investigate, diagnose, and address health problems and hazards affecting the population (2)
EPHS #9 Improve and innovate public health functions through ongoing evaluation, research, and continuous quality improvement (3)

Capacity scale response options:
None: 0% epidemiological and surveillance capacity to provide the three EPHS.
Minimal: 1-24% epidemiological and surveillance capacity to provide the three EPHS.
Partial: 25-49% epidemiological and surveillance capacity to provide the three EPHS.
Substantial: 50-74% epidemiological and surveillance capacity to provide the three EPHS.
Almost full: 75-99% epidemiological and surveillance capacity to provide the three EPHS.
Full: 100% epidemiological and surveillance capacity to provide the three EPHS.

Select capacity option for your program area:	None (0%)

Your name:	0
Your email:	0
Program Area (click cell to view list):	

Section 3, Question 20:

Please indicate the total number of epidemiologists (FTEs) currently working in your program area by funding source. Please round to the nearest 0.1 FTE.
For enumeration purposes state level epidemiologists include all those employed by the state, all those working at the state level who are either federal assignees (e.g. EISO, CEFO, PHAP), contract employees (e.g. contracted from school of public health to work at or for the state health department), state employees assigned to work at local or regional level (e.g. to conduct investigations for a region of the state) or fellows (e.g. CSTE trainee). When considering who should be counted, please focus on the functions performed by individuals rather than the job title.
Instructions for Completion:
1. Table A below should reflect the total number of epidemiologists in the program area (last column) broken down by funding source (column categories).
2. Table B below should reflect individual staff members and their amount of FTE support in each funding source category. See specific Table B instructions in the box directly above it.
3. Please make sure that the first row from Table B (TOTALS) matches that of Table A (TOTAL EPIS IN PROGRAM AREA) exactly.

TABLE A	Number supported with federal funds from CDC	Number directly funded by CDC (e.g., CEFO, EIS, PHAP, etc.)	Number supported with federal funds from other agencies	Number supported with state funds	Number supported with funds from other sources (e.g., foundations)	Total
TOTAL EPIS IN PROGRAM AREA						0

If there are multiple epidemiologists in your program area, you may wish to develop a line list with the individual names of your staff members and the amount of FTE support in each category. The sums will appear automatically in line 13 above. If there are more than 10 epidemiologists in the group, please adjust the AutoSum formula to include all.

TABLE B	Fraction of FTE supported with federal funds from CDC	Fraction of FTE directly funded by CDC (e.g., CEFO, EIS, PHAP, etc.)	Fraction of FTE supported with federal funds from other agencies	Fraction of FTE supported with state funds	Fraction of FTE supported with funds from other sources (e.g., foundations)	Total FTE
TOTALS	0	0	0	0	0	0
Name 1						0
Name 2						0
Name 3						0
Name 4						0
Name 5						0
Name 6						0
Name 7						0
Name 8						0
Name 9						0
Name 10						0

Your name:	0
Your email:	0
Program Area (click cell to view list):	

Section 3, Question 28:

Please estimate of ideal number of additional epidemiologists needed to reach full capacity in your program area (the number of epidemiologists in addition to the current number regardless of resources. Please attribute the fraction of capacity ito the nearest 0.1 FTE if less than one FTE is needed.

Instructions for Completion:

1. Insert estimated number into the blue cell.
2. Only numbers are accepted. Please round to one decimal place.

Estimate ideal number of additional epidemiologists needed to reach full capacity	

Your name:	0
Your email:	0
Program Area (click cell to view list):	

Section 5, Question 31:
What are your state's 3 best assets for recruiting epidemiologists? Please include only civil service employees.

Instructions for Completion:
1. Please answer only for your program area.
2. Select by replacing "m" with "X". Please leave the placeholder values in the options you do not wish to select.

What are your state's 3 best assets for recruiting epidemiologists? Please only include civil service employees.	
m	Competitive salary
m	Personnel policies and procedures
m	Job benefits
m	Job security
m	Job location
m	Opportunity for promotion
m	Opportunity for travel
m	Job interests/fulfillment
m	Opportunity for skills training
m	Flexible schedule
m	Opportunity for continued education
m	Opportunity to work remotely
m	Opportunities for merit increases/bonuses
m	Opportunity to attend scientific conferences
m	Other (please specify)

Your name:	0
Your email:	0
Program Area (click cell to view list)	

Section 6, Question 33

For epidemiology/surveillance positions, please estimate the number of vacancies by program area in civil service positions (columns A and B) and contract employees (columns C and D).

A vacancy is defined as a position to be filled at the State Health Department that meets the following conditions: (1) there is work available for the position and (2) the job could start within 30 days. Do not include positions that are required to be left vacant due to hiring freezes or other requirements.

Instructions for Completion:

1. Please complete for your program area only. Please choose program area from the drop down list.
2. Cells within the table are restricted to numbers only.
3. Please attribute the fraction of time for vacancy by program area to the nearest 0.1 FTE if there is vacancy for a position over multiple program areas.
4. Please do not leave any cell blank, indicate "0" instead.
5. For columns C and D, if you do not use contractors, indicate "0."

Program Area	A. What is the number of vacant epidemiology positions at the health department for civil service employees?	B. How many civil service positions do you intend to fill (actively working with HR?)	C. What is the number of vacant epidemiology positions at the health department for contract employees?	D. How many contract positions do you intend to fill (actively working with HR?)

Your name:	0
Your email:	0
Program Area (click cell to view list)	

Section 6, Question 34:

Please estimate the number of epidemiology staff that your program area is anticipating losing when pandemic supplemental funding expires.

IInstructions for Completion:

1. Please answer only for your program area.
2. Insert estimated number into the blue cell.
3. Only whole numbers are accepted. Please report number of people, not FTEs.

How many epidemiology staff are you anticipating losing when pandemic supplemental funding expires?	

Your name:	0
Your email:	0
Program Area (click cell to view list):	

Section 6, Question 35:

What are your state's 3 most successful tactics for retaining epidemiologists? Please include only civil service employees.

Instructions for Completion:
1. Please answer only for your program area.
2. Select by replacing "m" with "X". Please leave the placeholder values in the options you do not wish to select.

What are your state's 3 most successful tactics for retaining epidemiologists? Please only include civil service employees.	
m	Competitive salary
m	Personnel policies and procedures
m	Job benefits
m	Job security
m	Opportunity for promotion
m	Opportunity for travel
m	Job interests/fulfillment
m	Opportunities for skills training
m	Flexible schedule
m	Opportunity to work remotely
m	Opportunities for merit increases/bonuses
m	Opportunity to attend scientific conferences
m	Opportunities for continued education
m	Accurate job description during interview process
m	Other (please specify)