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# Under-Funded and Under-Pressure: State Epidemiologists During the COVID-19 Response

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## Abstract

**Objectives:** We conducted interviews with state epidemiologists involved in the state-level COVID-19 response to understand the challenges and opportunities that state epidemiologists and state health departments faced during COVID-19 and consider the implications for future pandemic responses.

**Methods:** As part of a broader study on policymaking during COVID-19, we analyzed 12 qualitative interviews with state-epidemiologists from 11 US states regarding the challenges and opportunities they experienced during the COVID-19 response.

**Results:** Interviewees described the unprecedented demands COVID-19 placed on them, including increased workloads as well as political and public scrutiny. Decades of underfunding and constraints posed particular challenges for meeting these demands and compromised state responses. Emergency funding contributed to ameliorating some challenges. However, state health departments were unable to absorb the funds quickly, which created added pressure for employees. The emergency funding also did not resolve longstanding resource deficits.

**Conclusions:** State health departments were not equipped to meet the demands of a comprehensive COVID-19 response, and increased funding failed to address shortfalls. Effective future pandemic responses will require sustained investment and adequate support to manage on-going and surge capacity needs. Increased public interest and skepticism complicated the COVID-19 response, and additional measures are needed to address these factors.

State epidemiologists (**SEs**) fulfill vital roles in public health, such as conducting disease surveillance, assisting in developing policies to control and prevent disease, educating the public on health threats, and managing personnel.[1] These responsibilities extend to supporting public health responses when public health emergencies (PHEs) occur. SARS-CoV-2 and the magnitude of the COVID-19 pandemic is unlike anything that was experienced during recent infectious disease outbreaks of other coronaviruses or influenza.[2,3] Consequently, SEs were sought to play central roles in COVID-19 pandemic response at the state and federal levels.[4] This included managing unprecedented amounts of health data and sharing it with state policymakers and federal partners.[5] SEs also found themselves tasked with clearly sharing data and otherwise communicating public health information to members of the public.[6]

Notwithstanding their critical role in PHE preparedness and responses, state health departments (**SHDs**), and correspondingly the SEs they employ, have long been recognized to be under-resourced and insufficient in capacity.[7–9] This results in-part from of a lack of direct funding for SHDs. However, shortages of trained epidemiologists with the necessary skills also persist, which is linked to the underfunding of public health more generally.[10,11] Prior public health workforce research during COVID-19 has outlined some of the challenges the workforce faced during the pandemic response, including attrition, burnout, strained capacity, and public scrutiny that sometimes escalated to threats of violence.[4,12–15]

This study goes beyond describing the difficulties faced by the public health work force. Specifically, we sought to understand the contextual causes of the challenges and opportunities SEs faced during COVID-19 and consider the implications for future pandemic responses.

## Methods

This paper reports the results of a sub-set of data and analysis from a broader study.[16]

### Data Collection

Semi-structured interviews were conducted with 11 SEs and 1 state health official who was trained as an epidemiologist ($n$=12) and were involved with their state's COVID-19 response. Purposive sampling was used for recruitment and potential interviewees and contact information were identified via government websites and secondary sources. Recruitment emails were sent to a total of 45 state epidemiologists in 45 states. Contact information for state epidemiologists in 5 states could not be found. Recruiting participants was challenging. Eighteen percent of potential participants declined and most (56%) did not respond to our invitation. Interviews occurred between September and November of 2022, were conducted over Zoom, and were recorded and transcribed verbatim. In 1 instance, notes were taken instead of a recording per request by the interviewee. Eleven states are represented in the final sample, and data saturation was reached.

A semi-structured interview guide was refined during interviews to include questions related to SE and SHD support during the pandemic, staffing issues, and lessons learned from the COVID-19 response after interviewees spontaneously discussed these topics.

### Data Analysis

Interview data were coded deductively using a codebook developed on established qualitative research methods.[17] An initial code book of 126 codes based on the research questions, the interview guide, and a read-through of the transcripts was developed for the first cycle coding. The codebook was supplemented through inductive coding. Code book validation was achieved using intra-rater reliability, whereby a researcher coded 5 interview transcripts and then recoded these 5 transcripts at least 1 week later. The overall unweighted Cohen's kappa based on character was 0.82: within the target range.

Thematic analysis was utilized to examine how interviewees articulated their experience during the SHDs pandemic response.[18] Preliminary themes were identified and iterated through team discussions and further transcript analysis.

### Ethics

All procedures were approved by the Johns Hopkins Bloomberg School of Public Health Institutional Review Board.

## Results

The results are described within the themes of key challenges during COVID-19, and funding of SHDs, both historically and during the pandemic.

### SEs Were Unprepared For Increased Scrutiny and Political Pressure

SEs reported being accustomed to working on important, albeit relatively less visible, public health threats. The COVID-19 pandemic brought an increased level of scrutiny from members of the public and some governors with an associated set of challenges. As one SE stated:

*"We got accused early on, by some, [for] not being transparent. We're used to nobody caring what we do. Suddenly we're, [hearing] "Where're those daily updates and where's that daily updated website?" I'm sure you're hearing from everybody, but public health departments weren't built for that type of visibility and daily updates."*

Increased scrutiny of health departments' work

Some SEs recounted how heightened attention to and scrutiny of their work from governors' offices increased the pressure at SHDs.

*"A lot of what we did had to undergo governor's office scrutiny. We never used to have to do that. […] A lot of our work would have to go through scrutiny of the attorney general."*

Several SEs also described working within public scrutiny that sometimes became threatening. One reported that "picketing" and "demonstrations" took place during policy meetings, and that "personal attacks, death threats, etc." were directed toward SHD employees. A different SE recalled being the target of agitated public pushback in a way previously unexperienced.

*"In this day and age, everybody can get your email or your phone number, and people were angry. They felt enabled to just pick up the phone and yell at you, send nasty emails, or leave nasty voice messages. As a public health person, we were under the radar our whole careers. We weren't used to the public just finding us and letting loose."*

*Some governors took actions that mitigated the effects of public pressure*

SEs described supportive actions by governors that helped address the pressures placed on SHDs by the public. One SE remarked that they thanked "God many days that [they] had a governor who cared about health and was making sound decisions based on science not political gain." Another praised their governor who told the public the "buck stopped" with them regarding the pandemic response.

A separate SE appreciated when their governor publicly defended unpopular policies and perceived these efforts as a way of defending against the politicized backlash.

*"[The governor] made several really tough decisions that were not popular at all. I was very pleased to see that [they] did it. And when you're on camera with them, [they said;] ´we need to do this.´ And I was like, hallelujah."*

SEs also spoke favorably of governors who acknowledged the "trauma" that SHD employees were managing and acted supportively.

*"The governor really went out of his way frequently to make sure that he was sort of acknowledging the staff who were working on this. In fact, he's giving us all awards on Tuesday."*

*Governmental support for SEs and SHDs was not universal*

Receiving support from state government was by no means a universal experience for SEs and SHD officials. One SE reported that "the politics of science" at the state level led to the dismissal of health officers during the COVID-19 response.

*"Several of our health officers were fired, yes, fired due to the politics of science. That was real. That was another unexpected* [occurrence] *from* [the COVID-19 pandemic]. *We lost some good health officials."*

A separate SE recalled also that SHD employees "were getting hit from all sides and having to navigate challenging political winds." This SE felt that these employees "didn't have protected space to be the thoughtful leaders we needed them to be."

*The strain on workforce was compounded by inadequate capacity and data infrastructure*

There was a sudden and drastic increase of workload following the onset of the COVID-19 pandemic. This increased workload resulted, in part, from increased demands on SHDs to quickly provide up-to-date health data and information to leadership and the public.

*"We were definitely stressed. [We were] just learning how to do this [manage and share data], building the plane as we were coming*

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*along in terms of how you get all this data every day, process it every day, and share it with the public and everybody else every day."*

*Increased demands for data created early challenges and strained the workforce*

Early in the pandemic, inadequate data infrastructure, referred to as a "house of cards," made it difficult for SEs to quickly inform decision-making regarding "high profile" and "time-sensitive" state policy decisions.

In response to this increased demand for data, data management capacity did improve in some states. The following SE explained that early systems eventually gave way to advancements, though arrived too late to alleviate the barrage of early challenges.

*"Until December or January of 2021, someone, every night, had to manually download the data - which is horrendous. We were downloading the entire data set every single day, it would take hours. […] The [data management] system we've set up in terms of reporting is now totally automated. We're able to pull all that data out every day. We're able to match it to vaccine data easily. […] I can't imagine having made that same stride without the pandemic in the periods of time that we did."*

The early demands for data sometimes exceeded the bounds of what was realistic or possible given the inadequate data systems. An interviewee recalled pressure from the governor and state leadership to gather and assimilate "untenable" amounts of health data.

*"It was crazy, the amount of information we were responsible for - the amount of work, high pressure, and the amount of demand.* […] [There was] *massive pressure and demand for information, coming down from the governor* [and] *from leadership."*

Staff began working long hours, including on nights, weekends, and holidays.

*"We didn't have to do a report on Christmas weekend, but [we did] on New Year's weekend. […] We're all super exhausted."*

*Understaffing*

Understaffing also contributed to the difficulties in meeting increased demands. SEs noted that SHDs experienced staffing issues during the pandemic response which were driven by deficits in skilled workers capable of integration at SHDs:

*"I don't know that there is any quick solution for [staffing], because public health expertise is concentrated. […] For state epidemiologists, there's just no way you can do that. We did rapidly expand contract staff and physicians, but remember there's a burden to training, onboarding, and monitoring their performance. Also, they're not always available 24/7 because they're not full-time."*

The shortage of skilled staff also led to remaining SEs having to expand their roles and take on additional work. Due to increased workloads, staff left SHDs during and after the pandemic which only exacerbated the pre-existing understaffing problem.

*"There were so many people traumatized and stressed out by the response. We lost so many people."*

*Federal support for staffing was helpful but incomplete*

Some SEs reported that there were efforts by federal partners to bolster the state-level public health workforce. However, one SE was explicit when stating *"We didn't have any help hiring. […] It was ridiculous."*

Other SEs noted that they received hiring support from the CDC Foundation, an independent nonprofit that facilitates partnerships between the CDC and philanthropic entities. Specifically, 1 SE noted that the CDC Foundation was "able to get more highly specialized, skilled people that we wouldn't be able to get because our HR process is so long."

However, SEs felt that CDC Foundation support would have been more helpful had the support occurred earlier in the pandemic.

*"When [the CDC Foundation] finally came on board to start helping with staffing, which was well into the pandemic, that [was] a godsend for us. Had that been available much earlier, I think we could have more easily brought people in."*

One SE also discussed "surge capacity" at length and conveyed that an understanding of the surge volume needed was something the "country is struggling with." They noted that a key element of surge capacity is "getting a rush of people in to help who can step in and do work at that moment."

In sum, SEs reported differing accounts of the staffing support they received. SEs also urged that the ability to surge skilled individuals into SHDs at the start of a PHE is fundamentally important for successful responses.

## Funding the Public Health Workforce

SEs discussed how understaffing among SHDs related to public health funding. Underfunding prior to COVID-19 was said to have contributed to the inadequate staffing of SHDs and, in turn, compromised their ability to manage the influx of COVID-19 relief funding which further increased the strain on SHDs. These experiences led SEs to call for sustained funding that could enable SHDs to function adequately during both crisis and non-crisis times.

*"This country got what it paid for, which was a fragmented, slow, clumsy response, because we did not invest in public health. We knew better. We have been telling the country, and our leaders, and our funders, that the public health system is fragmented, and that we knew outbreaks like this were going to occur. We just weren't ready for a pandemic."*

## A Sudden Influx of COVID-19 Funding

SEs described a sudden influx of emergency funding to increase SHD capacity from the federal government. Interviewees were supportive of the federal government's efforts, noting that these funds were distributed using existing mechanisms rather than purpose made and that states could not have responded to the pandemic without these provisions. This was especially true for 1 SE employed at an SHD in a state with limited resources.

*"[The funding] was huge for a poor state like [state removed], such a poor state, you know? That was super, helpful, to be able to utilize those resources and get them out the door."*

Despite these benefits, the influx posed challenges. SEs recalled that their state's pre-pandemic procedures were not adequate to cope with sudden escalations of funding and that management of this funding created added pressure on state-level workers. Moreover, it was recognized that translating funding to infrastructure and capacity required time.

*"So, the funding is great, but it takes time to then build the staff that can manage all the funds that are being provided."*

One SE compared an underfunded public health system to a starving person, noting that a sudden influx of funding is not a sufficient substitute for sustained investment.

*"It's just like [when] you have somebody who's starving, literally starving, malnourished. All of a sudden, you give him a buffet; you cannot expect a person who's [malnourished] to all of a sudden eat all [they] want and then get back to the best state of health."*

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### Calls for Sustained Investment and Commitments

As the previous quote illustrates, SEs disapproved of the "feast or famine" approach to public health funding. Many SEs expressed the need for sustained federal funding of public health to deliver foundational services and/or mount effective responses during future PHEs.

*"The federal government needs to invest in the public health system.* […] *We say it like this: public health is like a 3-story house. We keep getting money based on the event, whether it's anthrax, COVID, [Mpox] or whatever, to essentially remodel the third-floor bedroom or the bathroom on the second floor. But the foundation of this house is crumbling. What we need is an investment in the foundation of public health so that we can add, when these events happen, to a functional system."*

However, SEs also noted that sustained funding was only part of the solution and there needed to be a general commitment to public health.

*"We really need that sustained commitment because that will make the next time better and will allow us to keep doing what we've done. […] If we don't have that commitment, not just funding, but a commitment to public health, we're not gonna be able to make this better next time."*

One SE was especially explicit when noting their skepticism concerning the future.

*"No one's going to fund you, [not] the federal government, nobody, state government. They're not going to give you what you need to be prepared for the next pandemic."*

## Discussion

Our results illustrate that SEs faced difficult challenges during the COVID-19 pandemic that went well beyond increased workload demands. While some challenges were the legacy of chronic underfunding, others related to the prominent role and new demands placed on SEs and SHDs. Due in part to pressure from political actors and the public, SEs were compelled to deliver and process unprecedented data under tight timelines using inadequate data management infrastructure. These factors combined to increase SE workloads. These increased demands on under-resourced SHDs were coupled with levels of publicity and public scrutiny of a kind that SEs were largely unaccustomed to. Data systems did improve, though these improvements came at the cost of significant time and effort, ultimately arrived too late to mitigate early challenges. It should also be noted that our findings don't speak to whether improvements occurred in all states. The pandemic brought an unexpected and beneficial surge of funding to SHDs. However, strained SHDs often struggled to absorb and utilize surge funding during the COVID-19 crisis period. Ultimately, financial resources were but a partial cure for the shortages in capacity and skills of SEs.

The results of this study confirm previous work highlighting the constrained capacity of SHDs ahead of the COVID-19 pandemic.[8,9] Once the COVID-19 response began, the public health workforce started experiencing additional anxiety, depression, burnout, and decreased physical health.[4,12–15] Additional stress was caused by public scrutiny, up to and including death threats, directed at state health officials.[15] Our findings show that SEs were impacted by these challenges, though these findings also illuminate how a wider and more complex interplay of factors underpinned and caused challenges.

This study also illustrates how short-term investment in public health during a PHE is insufficient to repair the consequence of longstanding neglect.[19] SEs reported how the rapid influx of emergency funding, while helpful, created additional pressures on SEs and SHDs and was not able to address workforce shortages. Thus, our results reinforce what public health researchers have cautioned for decades – that building resilient and responsive public health infrastructure, and a workforce to staff that infrastructure, requires sustained and ongoing investment and commitments.[7]

There is a need for creation and sustainment of health systems surge capacity and, based on our findings, this should include outside epidemiologists and other experts prepared for integration at SHDs during PHEs.[20] If implemented correctly, this measure could bolster SHD capacity and may alleviate workplace burnout at SHDs by providing ready support during a PHE.

The politicization of COVID-19 sometimes negatively impacted the mental health of employees.[4,13] Our findings offer context for *why* SEs struggled with this increased scrutiny from politicians and the public. SEs were accustomed to working on important, though smaller scale and less polarizing, public health issues in relative obscurity, and with minimal political exposure. During the pandemic, novel demand for and scrutiny of epidemiological data grew rapidly among governors and the public, and SEs were ill-equipped to meet these demands or effectively manage this scrutiny. As noted by Mello et al. (2020), these demands occurred amid fierce polarization and repeated threats of violence from some members of the public.[15] However, our study provided examples of how specific approaches to public communication and other supportive actions taken by governors helped to alleviate political pressures and other challenges experienced by SEs.

## Recommendations

Interviews with SEs form the basis for several recommendations. To begin, our findings reiterate the importance of perennial calls for increased, sustainable investment in the public health workforce and the infrastructure at SHDs particularly from the federal government. Critically, the experiences of SEs during the COVID-19 response demonstrate that these investments must include the modernization of data systems across each individual state's SHD. The nation should also establish and sustain clear commitments, financial and otherwise, to promoting and protecting public health along with a clear understanding of the scope and functions of public health and state health departments. Together, strong, sustainable commitments and clearly defined roles increase the likelihood that SEs will have the necessary tools, understanding, and workforce capacity to meet the well-defined demands placed on them during future PHEs and in the interim.

There is also a pressing need to design and implement measures capable of filling the sudden and sporadic gaps in context-specific expertise and training of a kind that may not be necessary at SHDs during non-emergency situations. We recommend implementing a coordinated surge capacity approach capable of enabling SHDs to right-size their expert workforce capacity during any type and scale of PHE by drawing on skilled experts from academic institutions, industry, or elsewhere. Several surge capacities models exist in the US, including Federal Emergency Management Agency (FEMA) and Department of Homeland Security (DHS) which is managed by FEMA. These models may be lacking in public health expertise and have other limitations. For example, only certain federal employees are eligible for the DHS surge capacity force, and the force has only been deployed twice in the aftermath of hurricane landings since its inception in 2006.[21]

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In addition to investments, SEs and SHD leadership should develop measures, such as media training and simulated scenarios, that will assist them in preparing for and grappling with increased scrutiny of their work from the public. While constructive criticism may be appropriate and worthy of consideration at times, it is crucial to note that SHDs and government leaders should work with enforcement agencies to establish and enforce firm boundaries against harassment, threats, or violence directed at the public health workforce.

Lastly, leadership in state governments, particularly governors, should take actions to support the public health workforce, such as taking public responsibility for pandemic policies, including their consequences, that they themselves enact as the ultimate decision maker. Or, in other words, emphasizing to the public that the "buck stopped" with them.

## Limitations

This analysis includes limitations. Despite repeated attempts to recruit a larger and more representative sample, generalizability may be limited. However, we reiterate that SEs from several states participated in interviews, and that data saturation was reached. Interviews with SEs occurred between September and November of 2022. We acknowledge that recall completeness and accuracy may have been negatively impacted by this timing.

## Conclusion

During qualitative interviews, SEs indicated that resource shortages, increased workloads, and unprecedented scrutiny were among the challenges they faced during the COVID-19 pandemic. Sustained commitments to public health, investment in resources, and the ability to bolster PHE-specific expertise are needed to effectively support future PHE responses. Methods of anticipating and managing scrutiny of SHDS in highly polarized emergency contexts and supportive measures from state leadership, particularly governors, stand to improve future PHE responses and require further attention.

**Author contribution.** Mr. Jeff Jones, Conceptualization, conducting and analyzing interviews, led manuscript writing and editing, participant identification and recruitment; Dr. Saufra Adbool-Karim Conceptualization, analyzing interviews, manuscript writing and editing; Dr. Ruth Faden Conceptualization, project development, grant acquisition and management, manuscript editing; Dr. Katie Esmonde Conceptualization, conducting and analyzing interviews, manuscript editing; Dr. Brian Hutler Conceptualization, analyzing interviews, and manuscript editing; Ms. Michaela Johns Conducting interviews, transcript management, coding interview data and analyzing interview data, manuscript editing; Dr. Anne Barnhill Conceptualization, project development, grant acquisition management, conducting and analyzing interviews, manuscript writing and editing.

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