Lessons Learned: The Varied Responses of Massachusetts’ Local Health Departments During the COVID-19 Pandemic

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ABSTRACT

Context: Massachusetts’ decentralized public health model holds tightly to its founding principle of home rule and a board of health system established in 1799. Consequently, Massachusetts has more local health departments (n = 351) than any other state. During COVID-19, each health department, steeped in centuries of independence, launched its own response to the pandemic.

Objectives: To analyze local public health resources and responses to COVID-19.

Design: Semistructured interviews and a survey gathered quantitative and qualitative information about communities’ responses and resources before and during the pandemic. Municipality demographics (American Community Survey) served as a proxy for community health literacy. We tracked the frequency and content of local board of health meetings using minutes and agendas; we rated the quality of COVID-19 communications on town Web sites.

Setting: The first 6 months of the COVID-19 pandemic in Massachusetts: March-August 2020.

Participants: Health directors and agents in 10 south-central Massachusetts municipalities, identified as the point of contact by the Academic Public Health Corps.

Main Outcome Measures: We measured municipality resources using self-reported budgets, staffing levels, and demographic-based estimates of community health literacy. We identified COVID-19 responses through communities’ self-reported efforts, information on town Web sites, and meeting minutes and agendas.

Results: Municipalities excelled in communicating with residents, local businesses, and neighboring towns but lacked the staffing and funding for an efficient and coordinated response. On average, municipal budgets ranged from $5 to $16 per capita, and COVID-19 consumed 75% of health department staff time. All respondents noted extreme workload increases. While municipal Web sites received high scores for Accurate Information, other categories (Navigability; Timeliness; Information Present) were less than 50%.

Conclusions: Increased support for regionalization and sustained public health funding would improve local health responses during complex emergencies in states with local public health administration.

KEY WORDS: COVID-19, local public health, resiliency

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The Academic Public Health Corps was organized in April 2020 to provide municipalities with COVID-19–related assistance. The authors are members of a regional unit and represent local health department staff, board of health leadership, school and hospital nurses, regional public health staff, and 5 universities: Boston University School of Public Health, Harvard T. H. Chan School of Public Health, MCPHS University, Tufts University School of Medicine, UMass Amherst School of Public Health.

The views expressed herein are those of the authors and do not necessarily reflect the views of their affiliation. The authors declare no conflicts of interest.

Supplemental digital content is available for this article. Direct URL citations appear in the printed text and are provided in the HTML and PDF versions of this article on the journal’s Web site (http://www.JPHMP.com).

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DOI: 10.1097/PHH.0000000000001547
Massachusetts has more local health departments (LHDs), one for each of its 351 municipalities, than any other state. States determine whether public health services are delivered at the state or local (county, municipality) level. LHDs derive their authority from the state; each has the power and flexibility to determine the nature and manner of service delivery. Twenty-nine states (58%) use a decentralized public health model where local agencies, independent of state agencies, are primarily governed by local authorities. Public health agencies engage community-based organizations, health care facilities, schools, and coalitions to deliver public health services.

Massachusetts' home rule petition process assigns authority for municipal public health functions to local boards of health (LBOH)/LHDs, provided that such actions are not in conflict with Massachusetts constitutional or state law. Consequently, there is no central entity charged with monitoring or enforcing the services of local public health systems.

LHD, which predated the 1869 founding of the state's health department by 70 years, rely on municipal property taxes, septic system charges, and other local fees for funding. Limited funding streams restrict capacity to meet the Ten Essential Public Health Services, which include “investigating, diagnosing, and addressing health problems and hazards affecting the population.” The National Association of County and City Health Officials reports that between 2008 and 2019, the number of full-time employees in LHD workforces decreased by 17% while populations of residents increased. In 2016, when assessing the effectiveness and efficiency of local and regional public health systems, a Massachusetts Special Commission found municipalities only had a moderate capacity to fulfill their functions. Most municipalities performed best in the surveillance and emergency response categories.

The objective of this study was to analyze resources available to a sample of municipalities in Massachusetts and relate those resources to the nature and strength of community responses to COVID-19. We hypothesized that because pandemics do not respect geographic boundaries, a coordinated response could be challenging to execute in Massachusetts because of home rule and limited funds.

Materials and Methods

The Academic Public Health Corps (APHC) was organized in April 2020 to connect LHDs seeking assistance with COVID-19 contact tracing or COVID-related projects with groups of students, alumni, faculty, and staff from public health graduate programs in Massachusetts. APHC assigned the authors as liaisons to 9 towns in south-central Massachusetts that were staffed by a single public health nurse. The team used a variety of methods to examine municipalities’ resources and capacity to respond to a pandemic, including demographic indicators of health literacy, semistructured interviews, surveys, board of health (BOH) meeting minutes and agendas, and an evaluation of each town’s Web site. To maintain confidentiality, towns are identified by letters rather than by name.

Participants

APHC liaisons identified a convenience sample of municipalities for this study. Team members contacted each town’s health department, usually the health director, agent, or, in one case, a senior administrative assistant. Of the 9 towns in the original APHC group, 5 agreed to participate. Those that declined expressed interest but had concerns about their availability to complete the study. To achieve a larger sample, invitations to participate were extended to 16 additional municipalities of comparable size and location, which bordered participating towns. From these invitations, 5 additional towns agreed to participate. The team analyzed the demographics of all 10 towns. Web site information and BOH meeting minutes and agendas were obtained for 9; 8 participated in a semistructured interview, and 7 submitted an online survey. All towns are located in south-central Massachusetts; 7 in Worcester County, 2 in Hampden County, and one in Norfolk County.

Demographics

Health literacy is the degree to which an individual obtains, processes, and understands the information needed to make appropriate health decisions. Influenced by socioeconomic, environmental, and demographic factors, lower health literacy is associated with adverse health outcomes. Using US Census Bureau data from the American Community Survey, the team examined 5 demographic factors linked to population-level health literacy: age, race and ethnicity, language spoken in the home, level of education completed, and poverty.

Semistructured interviews

The team developed a semistructured interview composed of 25 closed and open-ended questions to collect information on prepandemic versus active-pandemic conditions, prepandemic planning efforts, resources (funding and personnel), and responses to COVID-19 (see Supplemental Digital Content Appendix A, available at http://links.lww.com/JPHMP/A969). Individuals identified as the most
knowledgeable respondent in each municipality were contacted by phone and e-mail. Representatives of 8 LHDs agreed to participate and were provided with interview questions ahead of time. Interviews were recorded June-August 2020, and responses were transcribed from the recordings. Interview transcripts were analyzed using NVivo software,* which led to the identification of 17 nodes that were further organized into 7 broad discussion themes (Table; see Supplemental Digital Content Appendix B, available at http://links.lww.com/JPHMP/A970).

### Survey

The team designed a survey in Google forms to supplement the information gathered in the interviews. The survey collected information from LBOH, including staff credentials and experience, COVID-19 funding sources and uses, and community outreach methods. One participant piloted the survey and estimated the completion time as 5 to 10 minutes. Three of the 18 questions were adapted from a survey developed by the Blueprint for Public Health Excellence.1

### Local board of health meeting minutes and agendas

To determine the effect of COVID-19 on BOH discussions, 2 team members independently reviewed LBOH meeting minutes and agendas for 6 months before and 6 months after Massachusetts’ first case of COVID-19. After independent review, the team discussed findings as a group. If minutes and agendas were not available online, respective town clerks were contacted for records via e-mail. One town’s minutes and agendas were not obtained after repeated inquiry. The following were examined for the remaining 9 towns: meeting schedule frequency, presence and topic of COVID-19 discussions, conversations about funding, and COVID-19–related votes.

### Web site

Using a health Web site grading model,11 and the categories of information most often requested of APHC members during contact tracing efforts, team members created a codebook to evaluate COVID-19 information on 9 municipalities’ Web pages. Codebook analysis in August 2020 rated Web site content (eg, modes of disease transmission, personal protection measures, isolation and quarantine, COVID-19 symptoms, testingsite locations, contact information) and quality (eg, accuracy, current (timely) material, navigability, interpretability) (see Supplemental Digital Content Appendix C, available at http://links.lww.com/JPHMP/A971).

Questions were divided into 4 grading criteria categories: Information Present, Accurate Information, Navigability, and Timeliness. A Web site that posted quality information received a total of 31 points; results were converted to percentages to allow for comparison between categories and communities. All questions were assigned a weight of 1, with the exception of question 16 (When was the information last updated?). Question 16 was deemed of particular significance, given the rate at which information evolved.

### Results

#### Demographics

Populations of municipalities ranged from 3658 to 26,084, with a median population of 14,871.

| Themes for Discussion | NVivo Nodes |
|-----------------------|-------------|
| Training, Education, and BOH Composition | Respondent’s position; training; job responsibilities; composition and education of LBOH members |
| Resources and Funding | Staffing; funding; resources |
| Schedules and Time | Prepandemic scheduling; active-pandemic scheduling; the proportion of time spent on COVID-19–related activities |
| Communication | Communication with municipalities prepandemic and during pandemic; communication with the state prepandemic and during pandemic |
| Collaboration | Collaboration with municipalities prepandemic and during pandemic; collaboration with the state; prepandemic and during pandemic |
| Perceived Successes and Challenges Encountered | Perceived successes; areas for improvement |
| Local Health Capacity and the Future | Local health capacity; and regional approaches to public health |

Abbreviations: BOH, board of health; LBOH, local board of health.

*Version 12 for Mac.
Compared with the state and the nation, all towns had a larger proportion of White residents (Figure 1), a larger proportion of the population aged 35 to 64 years, and a smaller proportion aged 65+ years. All but one town had a larger proportion of residents who only speak English in the home (Figure 2). The mean proportion that did not graduate high school (6.3%) was less than state (8.7%) and national (11.4%) averages, and the mean proportion of those with bachelor’s degrees (25.0%) and graduate or professional degrees (14.1%) was higher than national averages (20.3% and 12.8%, respectively). Four towns had a larger proportion of residents above 150% of the poverty line than the state average (14.4%), but only one had a higher proportion than the country (19.8%).

When used as a proxy for health literacy, the region’s demographics indicate populations with high health literacy. These communities are more educated, have smaller proportions of elderly residents, and smaller proportions of residents whose primary language is not English.

Semistructured interviews

Training, education, and composition of LBOH

Professional credentials of board members varied greatly. Some BOHs included medical or public health professionals; some did not. All respondents reported prior training in emergency preparedness. Common examples of the training included participation in federally funded Public Health Emergency Preparedness (PHEP) initiatives, Emergency Dispensing Site (EDS)/Point of Dispensing (POD) planning, and execution of flu clinics using an EDS/POD model.

Resources and funding

All respondents applied for and received funding to assist their pandemic responses. Federal CARES Act
funding was distributed on the basis of municipality population size. FEMA and MEMA (Massachusetts Emergency Management Agency) resources were available, as was funding through regional grants or supplemental state appropriations. Respondents reported that while funding was available, it was difficult to obtain because reimbursement was retroactive, documentation requirements were substantial, and each grant had different criteria. Respondents stated that the timelines and requirements attached to applications presented significant challenges in an already stressful environment.

**Schedules and time**

Before the pandemic, LHD staff schedules varied by municipality, with the lead municipal health officer working a median of 30 hours per week. Four municipalities employed 1.0 full-time equivalent (FTE), defined as more than 35 hours per week, and the remaining 4 municipalities employed 0.5 FTE. The number of hours respondents worked did not correspond with municipality populations.

While some non-COVID responsibilities were reduced during the pandemic, the added COVID-19 workload surpassed any reductions. For example, when restaurants closed temporarily, inspection frequency declined. However, frequently changing guidelines necessitating rapid dissemination of educational information were repeatedly mentioned as a source of increased work and stress. Every respondent reported an extreme increase in hours during the COVID-19 pandemic, a constant feeling of urgent work, and an absence of work-life balance. The mean proportion of professional time reported as dedicated to COVID-19–related tasks from March to August 2020 was 75%.

Some municipalities obtained extra staffing to manage increased workloads created by COVID-19. One community’s board members volunteered significant time, one community received formal approval to increase a current, paid employee’s hours, and another reassigned municipal employees to COVID-19 tasks. Most towns reported organic staffing changes and wished they had had more help or had made staffing adjustments earlier. Several towns readily identified where resources were lacking (eg, contact tracing assistance, funding) and positions they would like to fill if funding became available.

**Communication**

Respondents were asked to compare changes in communication with other municipalities and state authorities before and 6 months into the pandemic. When asked to rate prepandemic interactions with other municipalities on a scale of 0 to 5 (0 as “none,” 5 as “excellent”), the median communication value was 3.75. When asked to answer the same question during the pandemic, the median value for communication increased to 4.75. Only one town reported a decrease in communication, attributed to being too busy addressing other COVID-19 responsibilities.

Respondents were asked to rate their interactions with state authorities on the same 0- to 5-point scale. The median score for prepandemic communication with the state was 4; however, in their narratives, multiple towns reported scant communication from the state before COVID-19. When asked to answer the same question during the pandemic, the median remained the same; however, narrative responses were more positive.

**Collaboration and regional approaches**

When respondents described the type of collaboration with other municipalities during the pandemic, results varied widely. One respondent reported no collaboration between municipalities; another said collaboration was minimal but direct requests for information were utilized. Other municipalities reported true collaboration, such as those with regional school districts or shared health inspectors. During the pandemic, all respondents reported an increase in collaborations with other municipalities.

When asked about the level and type of collaboration with the state, respondents provided a median collaboration rating of 3 on a 0- to 5-point scale. Six towns identified zoonotic disease information and/or surveillance planning as the primary topic communicated. One town reported multiple significant past collaborations, including epidemiology and toxicity studies, and one municipality reported no previous state collaboration. At the time of the survey, the median value for collaboration between municipalities and the state increased to 4; every respondent reported increased collaboration with the state.

**Perceived successes and challenges encountered**

Respondents were asked about successes and challenges during the pandemic. Overwhelmingly, municipalities reported successful communication with constituents. Respondents used various communication techniques to target audiences, including social media, weekly newsletters, and multilingual and low literacy formats. Municipalities also leveraged community leaders, sent automated phone calls via emergency broadcast systems, and posted information
and education online. Other successes included the use of APHC to conduct contact tracing, create risk communication materials, provide translation services, and improve emergency preparedness plans.

Although respondents identified successes, they also expressed disappointment and frustration with pandemic guidance, unclear divisions of labor, and their ability to respond. Notable challenges included frequently changing guidelines, insufficient notification from state or federal partners prior to those changes, inadequate funding to meet needs, and a general lack of resources. Respondents reported resources were difficult to obtain, and some towns had more success than others. Complaints included chronic understaffing, lack of personal protective equipment (PPE), outdated departments without professional advancements for many years, and insufficient and expensive nursing staff for contact tracing.

Local health capacity and the future

The majority of respondents remarked that LHD employees rose to the occasion and provided quality services to their communities. However, participants were clear that such expectations are unrealistic over a prolonged period. A common theme was the perceived disconnect between what was requested of their departments and what resources were at their disposal.

All but one respondent expressed interest in a regionalized approach. The single respondent who raised concerns over broad regionalization still believed it was necessary during a pandemic. Respondents reported that if they banded together, they would have more resources, more consistent messaging and implementation of public health policy, and more standardized training for public health professionals.

Survey

Seven communities completed the online survey. All municipalities have 3-person boards; 86% elect BOHs. Most (71%) communities reported at least one LBOH member with advanced education in public health, medicine, or environmental science.

Regarding integration into existing emergency and public health infrastructures, 86% of respondents reported having a PHEP representative, either on the board or staff, who attends regular, regional PHEP meetings. Most (86%) towns reported having someone with access to the Massachusetts Viral Epidemiologic Network, MAVEN. All municipalities participated in weekly Interagency COVID-19 webinars. As for outside assistance, one town reported assistance from community organizations, and half of respondents reported utilizing an APHC graduate student; others primarily sought financial support.

Responses to questions about funding were varied, but all municipalities sought COVID funds to supplement their annual budgets. Annual town budgets ranged from $65,000 to $467,000. The largest budget was associated with the smallest population, a per capita expenditure of $78; all other municipalities had budgets of $5 to 16 per capita. The smallest budget was associated with a mid-sized population. All municipalities received Massachusetts Department of Public Health (MDPH) round 1 funding, while some received additional funding from sources such as MDPH round 2, CARES Act, FEMA, and/or regional grants. This funding was used for contact tracing, surveillance, public education, reopening planning, overtime for nonsalaried employees, EDS supplies, and follow-up on enforcement and education.

All communities reported increased communication during the pandemic. All but one community reported coordinating their responses with the town manager, police, and fire departments. One town also reported coordination with other municipal employees such as Department of Public Works, inspection services, and a finance committee. All communities were in contact with their senior centers, schools, and local businesses; 86% communicated with long-term care facilities and local libraries; 71% communicated with health care facilities, low-income housing, and day care centers. Only one community reported communication with non–English-speaking populations.

All municipalities utilized their town Web sites, emergency notification systems, and telephone calls as outreach channels. Two-thirds of respondents also reported using social media and community television, and a third used an e-newsletter, pamphlets, and flyers.

Meeting frequency, minutes, and agendas

Using information from municipal Web sites, the team examined changes in meeting frequency before and after Massachusetts’ first confirmed COVID-19 case on February 1, 2020.12 Of the 10 municipalities included in this study, one did not provide enough information online to ascertain meeting frequency or content. In 2019, LBOHs met between 4 and 27 times per year, with a mean of 14 meetings. After the first COVID-19 case, 7 towns (78%) met with increased frequency, one town decreased its meeting frequencies, and one failed to meet 7 times due to a lack of quorum.

A review of LBOH meeting minutes revealed frequent discussion topics included PPE, mask mandates, closing and reopening, disclosure of incidence statistics, and enforcement of COVID-19 guidelines and
protocols. Prior to the statewide mandate, most boards voted in favor of the Centers for Disease Control and Prevention’s recommendation to wear masks in public spaces and adopted a mask-wearing ordinance.

In May 2020, one BOH member raised concerns over the number of people not wearing masks and requested an increase in messaging. The same BOH also discussed “pressure” from constituents “to challenge the governor’s orders and open businesses.” Later that month, one town passed a motion to appoint police officers as BOH agents to enforce pandemic mandates and restrictions.

**Web site evaluation**

Using 16 questions, divided into 4 categories, the team evaluated COVID-19 information on municipal Web sites. Of a possible 31 points, the highest score was 27 (Figure 3). The mean total score for all towns was 17.1 (54%); the median was 15 (IQR = 11-19). Towns scored highest for Accuracy, earning an average of 97% of all points possible for the category (Figure 4). In contrast, the categories of Navigability, Timeliness, and Information Present each scored 50% or less (see Supplemental Digital Content Appendix D, available at http://links.lww.com/JPHMP/A972).

Of note, question 16 caused many towns to lose points for Timeliness. This question asked whether the information on COVID-19 symptoms, spread, testing, and personal protective measures on municipality Web sites matched the most up-to-date information on MDPH’s Web site. Five of 9 towns received a score of zero. The mean for all towns was 2.2 out of 5 possible points for that category, indicating that much of the COVID-19 health information on town Web sites was outdated.

**Discussion**

Our data demonstrate that LHDs have a foundation of capable and trained individuals with the skills to respond to a crisis but are impeded by funding and staffing limitations. Hiring personnel requires long-term investment, not the single-use short-term grants common in Massachusetts. Increasing health department budgets with sustained revenue streams would better support staffing efforts.

Community demographics indicated areas with high health literacy, yet LBOH meeting minutes document “pressure” from constituents “to challenge the governor’s orders and open businesses.” Despite such hurdles, LHDs repeatedly remarked on successful communication that was necessary to increase community education and optimize resident outcomes; however, such successes were overshadowed by excessive overtime and budgetary crises.

When subjected to quality tests, most towns’ Web sites received low scores, with the lowest scores for Timeliness. While most LBOHs met more often
Implications for Policy & Practice

- Creating a body of academic, public health volunteers by universities with MPH programs helped alleviate workload strain on local public health.
- Structured collaboration, supported by peers (local and state), is needed to prepare for other protracted or severe crises.
- During policy making and programmatic planning, local public health’s connections to communities should be leveraged to improve health outcomes during a response.
- Bureaucratically encumbered applications for grant money should be streamlined to ease workload burdens during crises and should pass through existing regional or county-level coordinating coalitions to reinforce the use of these structures.
- Sustained funding streams are necessary for local public health resilience and should aim to equalize human and fiscal resource availability and usage.
- Regional mechanisms for communication, technical assistance, and funding should be utilized during extraordinary situations such as pandemics and natural disasters to reinforce public health infrastructure, improve efficiencies, and increase resiliency.

During the pandemic, some met less frequently or were unable to achieve a quorum, and LHDs report an acute lack of staffing. Without more boots on the ground, local public health has insufficient human and fiscal resources to weather the next crisis, regardless of magnitude.

Inefficiencies in public health have been documented historically. In 1988, an Institute of Medicine committee found public health was not organized coherently along federal, state, or local lines. This finding is echoed in the more recent Blueprint and this study. Fractioning public health makes it difficult to create and deliver broad public services and education campaigns during nonpandemic conditions, and even more so during an acute or prolonged crisis.

To realize the Blueprint’s recommendations and in response to community needs during the pandemic, Massachusetts allocated spending across 2 grant opportunities: one for shared health services and one for contact tracing/case investigation. As of February 2022, the shared health services grant has funded 79% (277) of municipalities statewide through 34 collaboratives. Data are not available yet for the expanded epidemiological services grant.

All participants in our study agreed: siloed infrastructure is brittle; we are stronger when we work together. In the future, ensuring that all municipalities have similar per capita resources, rather than funding only those that apply for and receive grants, would support stronger, more efficient, and more coordinated responses. As outlined in the Blueprint, implementation of sustained funding and policies that encourage partnerships would improve local health responses.

Limitations

The largest limitation in this study is its small sample size. In this pandemic setting, many health departments reported not having the bandwidth for additional work. Subjective data were obtained from semistructured interviews by self-report and may have been affected by frustration and unsustainable workloads.

While Massachusetts’ system of 351 individual health departments is unique, the lack of efficiency, subsequent hardships, and divided political climate experienced by these health departments are experienced in other independent health departments in places using mixed governance systems and to the United States as a whole.

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