

A Pilot Needs Assessment of 2 State Health Departments



Enhancing Public Health Infrastructure and Incorporating Data-Driven Tools for Outbreak Detection and Response: A Pilot Needs Assessment of 2 State Health Departments

Summary

This needs assessment conducted by the Center for Outbreak Response and Innovation (CORI) identified opportunities and challenges that state health departments experience with integrating and automating surveillance data from diverse sources, often requiring manual efforts. While epidemiological forecasting is useful for large-scale events, such as COVID-19, it is not seen as critical for smaller outbreaks. However, other advanced tools—such as GIS for outbreak detection, automated contact investigation systems, secure information-sharing platforms, and methods to quickly verify immunization history—could play roles in supporting ongoing public health program activities. Such tools would enable health departments to not only improve program performance but also build skills and maintain proficiency for use in public health emergencies. Based on the COVID-19 experience, one identified use case for forecasting and advanced analytics is to provide validation and support for public health actions, particularly when these models are developed by external sources perceived as objective. Effective collaboration, regular use of these tools, and ongoing communication between Insight Net centers and health departments are critical for successfully integrating advanced analytics into regular operations, maintaining proficiency, and improving public health responses that are built on a solid foundation of disease surveillance and data management systems.

Background

The Center for Outbreak Response Innovation (CORI) is part of the Centers for Disease Control and Prevention's (CDC) nationwide [Insight Net network](#). CORI is establishing partnerships with traditional and nontraditional public health stakeholders, including state, tribal, local, and territorial (STLT) health departments across the country, to integrate epidemiological forecasting and advanced analytics tools into decision-making at all levels of government.

As part of this effort, CORI conducted pilot needs assessment interviews with representatives from 2 state health department partners to understand their current and past use of outbreak forecasting and analytics, including during the COVID-19 pandemic; existing capabilities and limitations; and opportunities to leverage these tools to support future preparedness and response activities. This information helps to clarify how CORI can best assist these and future STLT partners with developing and integrating advanced modeling and analytics tools, including forecasting, within their routine and emergency response operations to support decision-making.

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Methods

In March 2024, CORI researchers conducted interviews with officials from 2 state health departments.¹ Interviewees (n=7) included health department leadership, epidemiologists, and field officers with expertise in surveillance systems, informatics, and a variety of pathogens, including respiratory, enteric, and sexually transmitted infections (STIs). Interviews lasted approximately 1 hour each and were conducted on a not-for-attribution basis. Audio was recorded and transcribed, with the participants' consent. A [semi-structured interview guide](#) was used, which covered specific topic areas but also enabled interviewees to discuss their own priorities. Not every question in the interview guide was addressed in each interview.

After completing the interviews, the research team reviewed all interview transcripts to identify common themes. The team discussed these themes to determine those most relevant to the objectives of the needs assessment, including possible next steps.

Findings

Key findings from these interviews include the need to strengthen the integration of surveillance and reporting data streams, challenges associated with integrating epidemiological forecasting and advanced analytics tools into routine public health program operations or during smaller-scale outbreak responses, and the importance of demonstrating the value of these tools to policymakers to secure future investments to build and maintain these capacities. Except for the COVID-19 response, interviewees had not routinely used forecasting or other forms of advanced analytics in routine or outbreak response operations; however, more traditional epidemiological analyses and models remain a core component of routine public health operations. While interviewees felt that some of the COVID-19 forecasting efforts were useful for response operations and policy decisions, they relied heavily on more traditional epidemiological analyses and statistics.

Improve Surveillance Data Integration

State health departments use a wide variety of means to collect disease data that are not often uniform across partners, within states, or between states. Public health officials also rely on myriad data sources for disease surveillance, including local health departments, public and private laboratories, and hospitals or health systems. This situation is further complicated by the absence of automated integration for reporting systems at the local, state, and national levels. State health officials often need to manually retrieve and compile data from various

¹ This research was determined to not be human subjects research by the Johns Hopkins Bloomberg School of Public Health Institutional Review Board (IRB#00028172).

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sources for response or monitoring purposes, and they manually format and submit data to CDC. Interviewees emphasized the need for disease surveillance systems that can easily or automatically collate and merge data from multiple sources and forward required data on to the federal level. Integrated databases would support routine disease surveillance efforts and outbreak responses and enable health officials to redirect limited personnel to other needs. This capacity would also provide a solid foundation that could be leveraged for advanced analytic tools and processes, such as those described below.

Interviewees highlighted several ongoing data modernization efforts within their respective health departments that would likely be helpful in the long term but are still in the early stages of development. This includes electronic case reporting (eCR), which can reduce the dependency on humans to recognize and report infectious disease cases. [According to CDC](#), eCR provides “faster, more complete data than manual reporting” and allows for improved monitoring of disease trends. Notably, eCR is a key component of CDC’s [Public Health Data Modernization Initiative](#), which aims to strengthen and align data collection and use to improve health outcomes, including detecting and responding to infectious disease outbreaks.

Integrate Analytics Into Routine Public Health Activities and Outbreak Response

While interviewees acknowledged that there is a role for epidemiological forecasting for state- and national-level preparedness for outbreaks and epidemics, it is not necessarily something they viewed as critical for routine public health activities. They noted that disease outbreaks in which forecasting could support response efforts are infrequent. Most outbreaks tend to be smaller in scale and shorter in duration, which does not necessitate the use of forecasting or other advanced analytics to effectively contain transmission. Interviewees indicated that they largely can monitor and control these more routine outbreaks by using more traditional epidemiological analysis and public health interventions. They did highlight some opportunities for analytics or data-related tools to support monitoring and response efforts for diseases that occur on a more regular basis, including vaccine-preventable diseases (eg, measles, mumps, pertussis), STIs, or foodborne illnesses. Example tools and capabilities requested by participants included:

- Increased access to and use of geographic information systems (GIS) to support aberration detection to identify outbreaks as quickly as possible
- Automated contact investigation data collection and monitoring tools; for example, a system that can send out automated text messages to notify contacts of a potential exposure or conduct follow-up monitoring

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- Secure platforms to share information with non-health department partners (eg, health systems, private sector laboratories)
- Improved ability to quickly verify immunization history, including to better understand risk during outbreaks of vaccine-preventable diseases

Interviewees also emphasized that advanced forecasting and analytics capacities cannot be developed solely with pandemic-level threats in mind. Without regular use, skills wane, and these tools and techniques become too cumbersome to use during an emergency, so health officials must be able to leverage these capabilities for routine purposes. For example, they noted that a suite of R or Stata workflows or scripts could support analysis on a variety of current disease threats, particularly if health officials could produce automated analytic outputs by simply inputting the required data. This would streamline analyses across multiple diseases and disease types and address current needs. Crucially, these tools could be easily adapted and integrated into future emergency response operations, reducing the need to rely on “just-in-time training” for new and unfamiliar tools.

Use Forecasting and Analytics to Support Decision-Making

Interviewees discussed their experiences using forecasting and other advanced analytic tools during responses to COVID-19 and other outbreaks, including to characterize disease incidence, estimate vaccine effectiveness, and evaluate healthcare system strain. While these tools and models have been used in a range of outbreaks, opinions on their utility were mixed. One interviewee stated that much of their decision-making during COVID-19 was based on traditional epidemiology and basic statistical analyses; however, they did find some of the forecasting and advanced analytics products helpful in justifying certain actions, such as setting up alternate care sites to reduce the strain on hospitals. Another stated that having forecasting and analytics partners external to the health department was beneficial during the COVID-19 response. Removing health officials from the modeling processes helped deflect political opposition when actions were implemented based on the results of those models.

When looking beyond the COVID-19 pandemic, one interviewee believed the most impactful part of advanced analytics was not the model outputs themselves but rather their ability to articulate the impacts of public health actions. For example, epidemiological forecasts and other advanced analytics could be effective tools for demonstrating the value of public health investments, including using practical examples to demonstrate the merits and successes of public health programs (eg, demonstrating the economic implications of stepping down or eliminating a public health intervention). Interviewees also emphasized current limitations in understanding the full burden of vector-borne diseases, including high-risk geographic areas, and believed that advanced analytics could provide valuable insight for decision-makers to implement interventions effectively and efficiently.

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Discussion and Conclusion

This initial state needs assessment provides the reasoning to not only address state health departments' current needs but also to build on efforts to develop novel forecasting and advanced analytics tools in preparation for future epidemics and disease threats. Importantly, interviewees highlighted many existing gaps and challenges in infectious disease surveillance and informatics—including associated skills, resources, and infrastructure—that could hinder the current or future use of advanced forecasting and analytics tools.

Building and strengthening these existing capacities will support a more seamless integration of these capacities that are critical to the future success of Insight Net and its health department partnerships.

Crucially, efforts to establish forecasting and other advanced analytics capacity cannot function in a vacuum. Rather, the work must advance in parallel with efforts to form a solid foundation of disease surveillance, reporting, and data management systems. Additionally, it is critical that new analytics tools are not designed solely for pandemic-level responses; STLT partners must be able to utilize the capabilities on a regular basis and integrate them into routine operations both to maintain proficiency and improve performance in ongoing public health programs. Improved communication between STLT officials and Insight Net partners—specifically those tasked with developing new and innovative tools—is critical to ensuring that health officials receive the support they need. Finally, close collaboration between Insight Net centers and STLT health departments is fundamental to raising awareness among STLT partners regarding the suite of tools available to them. Importantly, CORI is in a prime position to facilitate these conversations as an Insight Net implementer.

Authors:

Diane Meyer, PhD, RN, MPH, Lead Investigator, CORI State Partnerships

Matthew Shearer, MPH, Co-Investigator, CORI State Partnerships

Alexander Linder, MSc, MA, Senior Analyst, CORI

Alison Kelly, Chief of Staff, CORI

Sarah Schneider-Firestone, MSW, Program Manager, CORI

Crystal Watson, DrPH, MPH, Deputy Director, CORI

Caitlin Rivers, PhD, MPH, Director, CORI

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