

Development and use of spatiotemporal analytics to guide dynamic COVID-19 response activities



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The Rhode Island Department of Health utilized novel approaches to analytics to identify “hot” and “cold” spots for COVID-19-related outcomes in their communities. This information supported decision-making around pop-up testing, vaccination, and outreach locations.

The “What”

Not all Rhode Island communities or populations were equally impacted by COVID-19. In coordination with Brown University, the Rhode Island Department of Health’s (RIDOH) COVID-19 response effort utilized novel approaches to analytics to enhance analyses and produce higher-level insights into marginalized populations during the pandemic.

In March 2020, RIDOH and Brown University School of Public Health partnered to create tools for identifying health disparities related to COVID-19. The collaboration was named Project SIGNAL (Spatiotemporal Insights to Guide Nuanced Actions Locally). Project



SIGNAL utilizes spatiotemporal analytics to identify Rhode Island’s largest disparities in COVID-19-related outcomes (e.g., testing, diagnosis, vaccinations) at the neighborhood level.

Beginning in December 2020, data from RIDOH were routinely shared with researchers at Brown University. Census-block-group level insights were generated to highlight “cold spot” areas where vaccine (and later booster) coverage should be higher. An interactive online dashboard (signal-ri.org), guided by the principles of the Centers for Disease Control and Prevention’s (CDC) Clear Communication Index, was developed to visualize the results of Project SIGNAL. The dashboard was designed to ensure that content was understandable by an audience of community leaders, regardless of their baseline exposure to public health and surveillance concepts. Users can quickly identify areas of greatest disparity and access tailored options for taking action in their communities. Additional data stratified by race and ethnicity provide deeper insights into specific populations.



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The findings from these analyses were used to **coordinate on the ground efforts** in these areas, and to **guide strategies to best reach these specific populations disproportionately impacted by COVID-19.**

The “So What”

Since March 2020, the Project SIGNAL dashboard has provided routine updates on the latest trends in COVID-19-related outcomes. Neighborhood-level insights have been regularly shared to a network of local leaders partnered with RIDOH. The findings from these analyses were used to coordinate on the ground efforts in these areas, and to guide strategies to best reach these specific populations disproportionately impacted by COVID-19. These tailored results were used by state partners deciding where to situate pop-up testing sites, vaccine sites, and street-based outreach efforts. Results were also used by municipal and community-based partners.

The “Now What”

Ongoing efforts continue to leverage the spatiotemporal analytics used to identify “hot spots” where COVID-19 related outcomes were worse and “cold spots” where vaccine uptake was lower. Initially completed to inform real-time response work during the response, historic analyses of hospitalization “hot spots” have identified areas that were persistently “hot” compared to those that were “hot” only during the surge times, and other trends to inform ongoing equity-focused efforts.

As the response evolves, vaccine “cold spot” maps are produced less frequently but continue to provide ongoing visibility on areas with lower vaccine uptake across successive waves of the ongoing vaccine roll out. Extending the reach of this strategy beyond COVID-19, the RIDOH Office of

Immunization is looking at “cold spots” in vaccine uptake for other vaccine types, currently including human papillomavirus (HPV) vaccine in adolescents and influenza vaccine across the lifespan. Having seen multiple applications of spatiotemporal analytics within the COVID-19 response, partners across RIDOH are well poised to consider application of these methods to further equity-focused analyses and program planning efforts across other public health areas.

This effort was initially completed in coordination with partners at Brown University; ongoing funding is needed to further develop these skills in house or to continue partnering with local partners with advanced analytic skills to support both analyses and the accessible presentation of insights.

Key contributors to this project include Michele Wilson, Chief, Health Equity Institute, Rhode Island Department of Health; William C. Goedel, PhD, Assistant Professor of Epidemiology, Brown University School of Public Health; The People, Place & Health Collective, Brown University; COVID-19 Surveillance Team (Quant team), Rhode Island Department of Health.