ASTHO Brief
Exploring critical issues in state and territorial public health.
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# Integrating Environmental Health and Electronic Health Information Using GIS Tools

ASTHO has been exploring how using GIS and data visualization tools can improve traditional public health work. In a related effort, ASTHO convened environmental health and informatics staff, and GIS leaders from state and territorial health agencies (S/THAs) to discuss these topics further with GIS subject matter experts from other public and private organizations. This brief shares several expert use cases for visualizing and integrating environmental health and electronic health information with the assistance of GIS tools to improve public health decision making. For context, "electronic health information" comprehensively covers any electronic health data or information sources, including electronic health records (EHRs).

## Expert Innovative Use Cases

### South Carolina Uses Citizen-Reported Location Data to Inform Investigation

The South Carolina Department of Health and Environmental Control collected citizen reports of odor locations using an electronic web-based form. They used GIS tools to map these reports, which informed the placement of stationary monitors for contaminant concentration quantification. The state paired this investigation with syndromic surveillance data and found no negative health outcomes associated with the reported odors.

### Esri, Partners Pilot "Near Real-Time" Data Sharing

Esri participated in a pilot project working with government, global standards organizations, and leading healthcare information technology companies. The goal was to develop standards and a workflow to extract healthcare resource utilization data from a variety of systems (including EHRs), ensure their interoperability, and make "near real-time information" available for use in various scenarios in a visual, geographic-focused format.

While this type of data sharing and visualization occurs routinely, it is through manual processes. In the future, this work will enable real-time integrations, providing a platform to combine environmental, clinical, and other social and cultural determinants of health data to inform a data-driven response by public health and emergency management authorities.

### Children's Hospital of Philadelphia (CHOP) Helps Areas with Above Average Asthma Rates

CHOP's program, Healthier Together, aims to better children's health outcomes by improving elements associated with the social determinants of health. Their Community Asthma Prevention Program Plus (CAPP+), one of the focus programs within Healthier Together, uses GIS tools to identify and visualize asthma prevalence in West Philadelphia, where "approximately one in four children…have asthma." They also use hospital emergency department data to focus CAPP+ activities.

As part of CAPP+, CHOP partners with the Philadelphia Housing Development Corporation to deliver home fixes and alterations to residents to eliminate common in-home asthma stressors, ultimately improving children's health and wellbeing.

Asthma interventions by CHOP's legacy Community Asthma Prevention Program are supporting the decrease of "hospitalizations by 48 to 50 percent," and CAPP+ hopes to facilitate further declines.

## Health Agencies Share Challenges, Barriers, and Potential Solutions

### Technical Challenges and Barriers

- Since vendors develop different solutions, there are limitations with interoperability between the information systems and technologies where environmental health and electronic health information are utilized.
- There is a lack of environmental health data standards to include data file formats, consistency in data elements collected, and a standard approach toward visualization/analytics.
- There are no universally accepted standard practices or consistent data dictionaries for electronic health information extracted and used within GIS.
- Misconceptions and limited understanding among health agencies about privacy laws and data sharing policies hinder data integration and sharing for public health purposes.
- Privacy concerns involving disaggregate geographic data on individuals (e.g., low-population rural counties, low-incidence diseases or hazards) are legitimate.
- There is limited understanding among healthcare providers on the critical role environmental health hazards play in patient well-being and how to use spatial data to inform care and diagnoses.

### Potential Solutions

- Creating and adopting common messaging and data standards for environmental health data to include consistent practices around how to integrate those data with electronic health information.
- Developing and adopting GIS standards (e.g., common data definitions, consistent map templates).
- Using the Multi-state EHR-based Network for Disease Surveillance (MENDS) model to integrate or map electronic health information and environmental health data. MENDS further supports the need for near real-time chronic disease surveillance among large and diverse populations to better plan and evaluate policy and programmatic intervention outcomes.
- Continue educating healthcare providers about the benefits of using GIS to visualize and analyze data on environmental hazards or social determinants of health to inform patient well-being.
- Continue informing S/THAs and their stakeholders about differing federal and state laws regarding protected health information. Resources developed in this space should include clear, comprehensive guidance around what data can and cannot be shared at different geographic scales for different use cases.
- Disseminating best practices and approaches for using GIS tools to visualize and/or integrate environmental health data and electronic health information.

## Conclusion

By continuing to explore innovative uses of GIS in visualizing and integrating environmental health data and electronic health information, S/THAs can better target populations or geographic areas in most need of public health interventions and ultimately improve population health outcomes.