

**ID: 59922569**

**Wastewater Surveillance, Environmental Health - Host Site Description  
Pennsylvania Department of Health**

**Assignment Location:** Harrisburg, US-PA  
Pennsylvania Department of Health  
Surveillance

**Primary Mentor:** Shannon McGinnis, PhD, CPH  
Epidemiologist Supervisor  
Pennsylvania Department of Health

**Secondary Mentor:** Katie Sneeringer, DrPH  
Epidemiologist Supervisor  
Pennsylvania Department of Health

**Work Environment**

Hybrid

**Assignment Description**

Within the Bureau of Epidemiology, this position will be jointly situated within the Bureau of Epidemiology's Division of Surveillance and Division of Environmental Health. The Division of Surveillance is responsible for a broad range of infectious disease surveillance and control activities in Pennsylvania and includes staff who work on enteric disease, legionellosis, informatics, hepatitis, respiratory disease, and wastewater surveillance. The Division of Environmental Health primarily focused on issues related to environmental exposures. This Division includes staff who work on environmental health tracking, environmental health assessments, lead exposure, harmful algal blooms, and other related topic areas. Responsibilities of these divisions include interactions with six PADOH regional offices and 10 County and Municipal Health Departments, outbreak and case investigations, data analysis, preparation of reports and educational materials for professionals and the public, assisting in the development of public health policy and regulations.

**Describe Statistical and Data Analysis Support, Such as Databases, Software, and Surveillance Systems Available to the Fellow**

Databases that will be available to the Fellow include: PA-NEDSS (web-based disease reporting and surveillance database), EpiCenter (syndromic surveillance database), PA Bureau of Laboratories laboratory database, and PA State Immunization Information System. The Pennsylvania Wastewater Surveillance System (PaWSS) team also has its own internal database which will be available to support the Fellow's projects. Statistical and data analysis support is available within the Division of Surveillance; IT support is available from the PADOH Bureau of Information Technology and its contractors. The Fellow will have access to SAS, SAS Enterprise Guide, R, ArcGIS, PowerBI, and survey tools.

**Projects**

**Surveillance Activity Title: Review of potential targets for future wastewater surveillance initiatives in Pennsylvania**

*Surveillance Activity Description:*

The Pennsylvania Wastewater Surveillance System (PaWSS) team receives data twice per week from 32 community wastewater treatment facilities across the Commonwealth who submit wastewater samples to partner laboratories for analysis. Currently, PaWSS receives data on concentrations of SARS-CoV-2 concentrations measured in these samples as well as a summary of SARS-CoV-2 variants of interest that are detected.

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Throughout the program, the PaWSS team has discussed plans to expand to include other pathogens and has immediate plans to include additional respiratory pathogen targets including influenza A/B and RSV. However, as the project continues to grow, there is interest in exploring additional pathogen targets or other health indicators that can be measured in wastewater in order to improve disease surveillance in Pennsylvania.

To assist the team with identifying and prioritizing additional targets for the expansion of PaWSS, the Fellow will work with the PaWSS team to create an internal survey to distribute to staff in the Bureau of Epidemiology to identify pathogen targets, environmental markers, AMR markers, or other health-related genetic markers that would be useful to integrate into the wastewater surveillance program. The survey will ask BOE staff to identify any targets of interest to their team, assess how these wastewater data may be used by their team, and describe how new wastewater targets may be used to fill existing surveillance gaps.

Next, the Fellow will conduct a detailed literature review to summarize existing information around the targets identified in the survey to assist the team with prioritizing these targets for integration into PaWSS. Information gathered as part of the literature review will include: information about whether the target has been validated for wastewater surveillance, the strength of relationships measured between wastewater data and clinical cases or other related surveillance measures, and examples of how other jurisdictions, states, or countries have used information on this target as part of their own surveillance or outbreak response activities.

*Surveillance Activity Objectives:*

Objectives of this project are to 1) create a survey to distribute to staff in the Bureau of Epidemiology to assess interest in potential wastewater targets, 2) summarize survey findings and present findings of this survey to members of the PaWSS team, 3) conduct a review of the literature to gather key information about each pathogen target identified in the survey, and 4) present findings of the literature review through a written report and presentation to the PaWSS team. Expected deliverables include a survey for distribution, two written reports, and two presentations to the PaWSS team or other Bureau staff as requested.

*Surveillance Activity Impact:*

This review would allow the wastewater team to focus on high impact targets that would improve surveillance initiatives in Pennsylvania. By gathering this valuable information, the PaWSS team can ensure that funding is being spent in a way that best improves public health in the Commonwealth.

**Surveillance System Evaluation Title: Heat-related illness syndromic surveillance evaluation**

*Surveillance System Evaluation Description:*

Pennsylvania reports approximately 200 heat-related hospitalizations per year. However, not all people who are experiencing heat-related symptoms are admitted to the hospital. Many more people with dizziness, heavy sweating, muscle cramps, nausea, etc. visit the Emergency Department or urgent care settings. Given the potential for increasingly hot summers in nearly all counties in Pennsylvania because of climate change, it is important for the Pennsylvania Department of Health (PA DOH) to establish syndromic surveillance capacity surrounding heat-related illnesses to understand and reduce the burden of these illnesses.

Prior to the Fellow's start, the Division of Environmental Health Epidemiology, within the Bureau of Epidemiology at PA DOH, will set up a syndromic surveillance system of reports, dashboards, and alerts within Health Monitoring Systems' EpiCenter application to monitor heat-related Emergency Department visits starting in spring 2024. Then, with support from Environmental Health staff, the Fellow will be tasked with reviewing and refining the established system based on its performance during the spring/summer seasons of 2024 and 2025.

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The Fellow will propose data analyses to inform more effective reports and alerts within EpiCenter. Data will be summarized by region, patient demographics, and temperature/heat index. The Fellow will also have the opportunity to recommend ways that the data can be used by the Environmental Health staff, PADOH, and other stakeholders to support more effective education and outreach across the state. This includes, but is not limited to, making substantive changes to our internal Environmental Public Health Response Plan for Weather-Related Events. The Fellow's role will positively impact PADOH's ability to track, prepare for, and respond to extreme heat and its health implications.

*Surveillance System Objectives:*

The objective of this project will be to review and refine newly established protocols for using Health Monitoring Systems' EpiCenter application for monitoring heat-related Emergencies in Pennsylvania. Expected deliverables include, a proposed evaluation plan including a data analysis component, a report summarizing EpiCenter heat-related data by key variables of interest, and an improved draft of our Environmental Public Health Response Plan for Weather-Related Events.

*Surveillance System Impact:*

This project will enhance our team's current surveillance efforts for heat-related adverse events and improve our understanding of the burden of these events on Pennsylvania residents. This project's deliverables fill an important data gap and improve our team's ability to respond to future heat-related emergencies, which are projected to increase in Pennsylvania due to climate change.

**Major Project Title: Exploring the geographical distribution of early detections of key COVID-19 variants of interest in wastewater samples collected in Pennsylvania**

*Major Project Description:*

The PaWSS team has been gathering data on the relative abundance of SARS-CoV-2 variants of interest in wastewater samples collected through PaWSS since mid-2022. These data are summarized in weekly reports to determine which variants are currently the most abundant in wastewater samples in the Commonwealth. While these summary reports are beneficial for identifying which variants are circulating across Pennsylvania, additional analyses may be done using these data to learn more about where new variants emerge.

To explore this, the Fellow will use data on the relative abundance of SARS-COV-2 variants of interest in wastewater samples collected through PaWSS to identify wastewater treatment facilities in Pennsylvania where new variants are identified earlier than other sites. Next, the Fellow will explore factors that may impact the location of new variant emergence. These factors may include: region, urban vs rural areas, size of facilities, etc. The Fellow may also explore whether these patterns have shifted throughout the COVID-19 pandemic.

*Major Project Objectives:*

The Fellow will create a timeline of the emergence of key variants of interest in wastewater samples collected in Pennsylvania and create maps to display sites where the first detection of key variants occurred in wastewater. The Fellow may utilize GIS software training and support that is readily available through PADOH and other partners to assist with this analysis. The Fellow will also use statistical software to compare sites where new variants are frequently detected earlier to sites where variants are detected later to determine if there are any factors (size, region, urbanicity, etc.) that are associated with these patterns. Finally, the Fellow will also summarize their findings into a presentation, a report, and potentially a publication.

*Major Project Impact:*

This project will allow the team to have a better understanding of the emergence of new SARS-CoV-2 variants and may assist the team in identifying sentinel sites for new variant emergence in Pennsylvania.

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**Additional Project #1 Title: Shell cracker plant syndromic surveillance**

**Project #1 Type: Surveillance Activity**

*Project #1 Description:*

Shell's ethane cracker plant in Monaca, Beaver County, Pennsylvania is less than 30 miles north of Pittsburgh. The plant turns ethane (a shale gas component) into polyethylene (a building block for plastics) and represents the largest industrial project in Pennsylvania since World War II. Since its operations began in November 2022 and even before, the facility has sparked concern among the public primarily regarding the potential for health concerns due to high air emissions levels. As of May 2023, it was reported that the plant had exceeded its rolling 12-month total emission limitations for volatile organic compounds (VOCs) from October 2022 through April 2023. It had also exceeded limits for carbon monoxide, nitrogen oxides (NOx), and other hazardous air pollutants

(<https://stateimpact.npr.org/pennsylvania/2023/05/25/shells-air-pollution-violations-result-in-10-million-fine-for-beaver-county-ethane-cracker/>).

The PADOH does not currently have a surveillance system to monitor health symptoms near the cracker plant. The creation of this type of surveillance system will ensure that PADOH is responsive to community concerns, by being proactive in identifying symptom patterns. Thus, the Fellow will start by reviewing the literature on potential health symptoms arising from acute and chronic exposure to harmful air pollutants, such as VOCs and NOx. Then, with mentor support, the Fellow will analyze prior syndromic surveillance data to identify any elevations since the plant became operational. It may be assumed that the cracker plant's emissions due to faulty systems and other errors would be worse in the first few years of operation. Finally, based on the literature review and preliminary data analyses, the Fellow will establish and maintain ad hoc reports in EpiCenter, and regularly analyze the syndromic surveillance data to describe the acute health symptom consequences of living near the cracker plant. As part of this work, the Fellow will design and execute an annual or semi-annual report to be included on the PADOH Environmental Health website and will present the findings to environmental community groups and other stakeholders. Given the plant's proximity to a large population center (about 55,000 people live within 5 miles of the plant, and about 157,000 people live within 10 miles according to the 2020 Census [data from Missouri Census Data Center, 2023]) and its prior air emissions violations, establishing these internal and public-facing resources will improve the public's trust in PADOH and inform interventions, if needed.

*Project #1 Objectives and Expected Deliverables:*

Objectives of this project are to improve the team's current understanding of the potential health effects due to exposure to pollutants, particularly those produced in areas with high industrial activity such as that of the Shell ethane cracker plant in Pennsylvania. Expected deliverables include a literature review describing symptoms arising from acute and chronic exposure to harmful air pollutants related to this potential exposure and a summary report of existing syndromic surveillance data in locations surrounding the cracker plant to identify changes that occurred after the plant became operational. Finally, the last deliverable will include a protocol for a continual syndromic surveillance of the areas surrounding the cracker plant utilizing EpiCenter which includes an annual or semi-annual report to be included on the PADOH Environmental Health website, and a presentation to stakeholders.

*Project #1 Impact:*

This project will establish a new surveillance tool in Pennsylvania surrounding this cracker plant. Findings may be used to guide communications, emergency preparedness plans, and create recommendations for reducing adverse health effects of those living in close proximity to the plant.

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**Please Describe the Fellow's Anticipated Role in Preparedness and Response Efforts – Include Activities and Time Allocation (Required Competency of Fellowship)**

Preparedness activities range from investigations of cases and outbreaks of CDC category A, B, and C agents (<http://www.cdc.gov/mmwr/preview/mmwrhtml/mm5042a1.htm>); novel influenza A ([http://www.cdc.gov/mmwr/preview/mmwrhtml/mm6035a6.htm?s\\_cid=mm6035a6\\_w](http://www.cdc.gov/mmwr/preview/mmwrhtml/mm6035a6.htm?s_cid=mm6035a6_w)), and preparedness and response for all-hazards -- for public health emergencies not limited to bioterrorism and infectious disease outbreaks. Flooding is the most common disaster in Pennsylvania. Preparedness and response for other public health emergencies are within the purview of other offices of the PADOH and other Pennsylvania state agencies. Numerous opportunities will arise for training provided by partner agencies and stakeholders, including human and animal health agencies, regional preparedness task forces, emergency medical services, emergency management, law enforcement (FBI), U.S. Department of Homeland Security, and the National Guard.

The Fellow will have the opportunity to work closely with the Bureau of Public Health Preparedness and the Division of Community Epidemiology's Community Preparedness Section throughout the course of their fellowship. Opportunities for participation in regional preparedness conferences as well as training exercises and workgroup meetings are frequently available.

**Please Describe the Fellow's Anticipated Role in Cluster and Outbreak Investigations – Include Activities and Time Allocation (Required Competency of Fellowship)**

PADOH conducts at least seventy disease outbreak investigations each year. The Department also works closely with CDC. CSTE Fellows have continuous opportunities to provide public health consultation and to investigate disease outbreaks. The mentors for this Fellow are heavily involved in enteric outbreaks which lend themselves to investigation opportunities for Fellows. The plan is for the Fellow to become progressively more involved in outbreak investigations over the course of the Fellowship, from participating in an outbreak investigation under someone else's lead all the way up to leading an investigation themselves. Outbreak investigation needs can vary depending on the year or the circumstances, but there has historically been a good balance between working on core competencies like a major project and responding to emergent situations like outbreaks.

**Please Describe the Fellow's Anticipated Role in the COVID-19 Response – Include Activities and Time Allocation**

The Fellow's involvement with the PaWSS project will directly involve surveillance of COVID-19 in Pennsylvania. Additionally, one of the Fellow's projects is focused on gathering new information on COVID-19 transmission and the emergence of new variants in Pennsylvania. If the Fellow has an interest in other aspects of the COVID-19 response or different COVID-19 datasets, those aspects could certainly be explored.

**Please Describe Opportunities for Fellows to Work in Health Equity as well as Incorporating Diversity, Equity, and Inclusion into their Work**

Health equity and diversity, equity, and inclusion (DEI) continue to be areas of focus for PADOH across subject matters. PADOH has relationships with Keystone Health, a Federally Qualified Healthcare Center, that provides healthcare for many of the seasonal labor farm workers. Previous Fellows have had the opportunity to investigate outbreaks and participate in providing outreach and education in this population. There are also continued opportunities for Fellows to take trainings on topics that include person-first language, developing materials for a low literacy audience, and others. Finally, Fellows are encouraged to attend and participate in PADOH's Health Equity Action Team which meets regularly to share information and ideas to improve health equity in Pennsylvania. Members of the PaWSS and environmental health team regularly attend and present at these meetings.