ID: 74500528
Wastewater Surveillance, Infectious Diseases - Host Site Description
Washington state Department of Health

Assignment Location: Tumwater, US-WA
Washington state Department of Health
Environmental Public Health/Office of Environmental Public Health Sciences

Primary Mentor: Breanna McArdle, BS Statistics, MPH Epidemiology
Epidemiologist and Supervisor, Washington Wastewater-Based Epidemiology Program (WAWBE)
Washington state Department of Health

Secondary Mentor: Beth Melius, RN, MN, MPH
Senior Epidemiologist and Manger, Foodborne, Waterborne, and Enteric Disease Program and Co-director, Washington Food Safety Center of Excellence (WA FS CoE)
Washington state Department of Health

Work Environment
Hybrid

Assignment Description

This assignment is in the Office of Environmental Public Health Sciences (OEPHS) of the Environmental Public Health (EPH) Division. EPH is part of the Office of Health and Science which also oversees the Disease Control and Health Statistics Division. OEPHS serves to ensure environmental public health programs and policies are based in sound science through five programmatic sections: Climate and Health, Environmental Epidemiology, Site Assessment and Toxicology, Healthy Homes and Communities, and Built Environment. OEPHS has several epidemiologists working across various subject areas including air quality, pesticide exposure, and lead in school drinking water.

In this assignment, the CSTE fellow would sit with the Washington's Wastewater-based Epidemiology Program (WAWBE), which is housed in the Built Environment Section of OEPHS. The Built Environment Section provides a public health voice in cross-sector collaborations with transportation, ecology, fish and wildlife, and commerce. Work within the Built Environment Sections covers varying aspects of environmental health issues including identifying potential health effects of new building projects; supporting local health jurisdictions in conducting health impact assessments; consolidating and visualizing health data for those experiencing homelessness; and monitoring wastewater for pathogens and other targets of concern.

The WAWBE program facilitates the collection, testing, analysis, and reporting of pathogen levels in wastewater across varying diverse communities in Washington state. The program consists of one Program Coordinator, one Epidemiologist Supervisor, one Spatial Epidemiologist, one Informatics Epidemiologist, and a Surveillance Epidemiologist. The fellow will work closely with WAWBE epidemiologists to support the analysis, visualization, and effective interpretation and use of wastewater data to inform public health action. The program collaborates with several offices and divisions within Department of Health, including the Public Health Laboratory, the Office of Communicable Disease Epidemiology, the Office of Infectious Disease, and the Center for Analytics, Informatics, and Modernization. The program's cross-sectional nature will provide the fellow with a unique opportunity to learn about the various types and fields of applied epidemiology.

The fellow's secondary mentor is the Senior Epidemiologist overseeing the Foodborne, Waterborne, and Enteric Disease Program and is the Co-Director of the Washington Integrated Food Safety Center of Excellence, both housed under the Office of Communicable Disease Epidemiology (CD Epi). CD Epi is responsible for the prevention, surveillance, and control of communicable notifiable conditions in Washington State including vaccine preventable diseases, foodborne/enteric diseases, zoonotic and vectorborne diseases, healthcare associated infections, and emerging diseases

of public health concern. The refugee health, tuberculosis and respiratory pathogen subject matter experts are also housed within this office. The work of CD Epi therefore provides a wide range of experiences and a dynamic and challenging work environment that allows a fellow multiple opportunities for career growth in a mentored setting.

The fellow will also collaborate closely with the Rapid Health Information Network (RHINO) program through their surveillance activity and tertiary mentor. RHINO is housed in the Center for Analytics, Informatics, and Modernization (AIM), which guides agency strategy for modernization of critical public health infrastructure. RHINO oversees the collection, analysis, and dissemination of syndromic surveillance data for the state of Washington. It is the only data source in Washington state that currently provides timely ongoing and historical data for the three major respiratory conditions (COVID-19, Influenza, RSV), making it an ideal data source for validating newer data sources such as wastewater. Outside of their surveillance activity tasks, the collaboration with the RHINO program will expand the fellow's understanding of best practices for leveraging syndromic surveillance data sources to understand trends for various health conditions.

Day-to-Day Activities
The fellow will be a functioning member on WAWBE's Epidemiology Team and incorporated into the same day-to-day activities as their peers. This fellow can expect workdays with a mix of meetings (see below for examples) and focus time to use on completion of fellowship projects or additional activities of interest to the fellow. Our goal will be to ensure that the fellow has an engaging and educating experience that will develop their epidemiological skills and assist them in determining a career trajectory. The fellow will work closely with the mentors, as well as with staff from across DOH and various topic areas. In addition to the fellowship projects and required activities, the fellow will assist with routine data analysis and reporting tasks for both the WAWBE program and the Integrated Foodborne Center of Excellence. The fellow will have the opportunity to lead some projects, and will be invited to present their work to decision makers and partners. We expect the fellow to work remotely for most of their fellowship, though they will also participate in site visits to local health jurisdictions and wastewater treatment plants.

Meetings the fellow will participate in regularly:

- EPH Division Meetings
- Built Environment Section Meetings
- WAWBE Weekly Epidemiology Team Check In
- 1:1 Check-Ins with Fellowship Mentors
- Weekly Huddle Meeting for Foodborne Outbreaks
- RHINO Community of Practice
- CDC calls including NSSP COP and NWSS Health Department COP

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

The fellow would have access to a suite of statistical software including R, Python, and ArcGIS. The fellow would have access to surveillance systems needed to perform their projects including all wastewater surveillance data, notifiable conditions, syndromic surveillance data, geospatial data, and hospital discharge data. The fellow would also have access to several resources to maintain and expand their analysis skillset including DOH-developed GitHub training, DOH's Epi Coders group, and external training options as appropriate. In addition to the several epidemiologists in our office and agency, the WA DOH has a biostatistician that is available for consultation, if needed.

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Projects

Surveillance Activity Title: Comparing wastewater surveillance to syndromic surveillance for influenza.

Surveillance Activity Description:
WA DOH currently relies on several different surveillance metrics to monitor influenza activity throughout the state including syndromic surveillance data collected by the RHINO program and submitted to the CDC National Syndromic Surveillance Program BioSense Platform. WAWBE began testing all the program's wastewater samples for influenza A in September 2023. This fellow will compare WAWBE's 2023 and 2024 influenza results to syndromic surveillance influenza measures, incorporating sewershed characteristics (population demographics, upstream hospital locations) into the analysis to better understand factors which might be associated with misalignment between wastewater results and syndromic measures of influenza activity at the sewershed and county level, respectively.

Surveillance Activity Objectives:
The objectives of this project include

- Supporting the fellow in gaining advanced knowledge of both wastewater surveillance and syndromic surveillance data sources.
- Understand how wastewater-based measures of influenza activity compare to syndromic surveillance measures of influenza activity.
- Develop standardized R code to support ongoing comparisons of wastewater surveillance data with syndromic surveillance data.
- Identify potential characteristics, including sewershed population demographics and upstream wastewater sources, that can influence the quality of influenza wastewater results.

The expected deliverables for this project include

- Wastewater Surveillance Influenza Report describing data sources, analysis methods, analysis results, and recommendations based on findings to be shared with both local and state partners.
- Well documented R code to share with Local Health Jurisdictions interested in replicating the analysis for future influenza seasons.

Surveillance Activity Impact:
Influenza is not a reportable condition in Washington state, meaning WA DOH must rely on other metrics to monitor activity during influenza season. Given that wastewater surveillance for influenza is still in its infancy in Washington state, this surveillance activity will support WA DOH and Local Health Jurisdictions in proper interpretation and use of wastewater results in tandem with other surveillance sources to inform public health action (i.e. hospital masking recommendations) and community messaging for future influenza seasons.

Surveillance System Evaluation Title: Evaluation of wastewater surveillance for enteric pathogens in Washington state.

Surveillance System Evaluation Description:
The fellow will apply CDC's Updated Guidance for Evaluating Public Health Surveillance Systems to assess the utility of wastewater surveillance for enteric pathogens within Washington state. The fellow will collect information on current surveillance sources for monitoring enteric pathogens at various geographic levels. This work will require close collaboration with DOH's Office of Communicable Disease Epidemiology and Local Health Jurisdictions to ensure both state level and local level perspectives are incorporated. The fellow will have access to a previous WA DOH EIS fellow's surveillance evaluation report completed in 2022 on wastewater surveillance and COVID-19.

ID: 74500528
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Surveillance System Objectives:
The objectives of this project include:

- Supporting the fellow in understanding how and why surveillance evaluations are used in the field of applied epidemiology.
- Identify surveillance data options for monitoring enteric pathogens in Washington.
- Aid WA DOH and Local Health Jurisdictions in identifying how wastewater surveillance can be applied to enteric pathogens.
- Understand limitations of using wastewater surveillance for enteric pathogens.

The expected deliverable for this project include:

- Written report summarizing information gained during and final conclusions from the evaluation process.
- Presentation of findings to both Integrated Food Safety Center of Excellence partners and WAWBE partners.

Surveillance System Impact:
The WAWBE Program is working on expanding their pathogen coverage to include Hepatitis A and Norovirus within the next two years. This surveillance evaluation will provide the program with crucial information on how we incorporate enteric pathogens into routine testing efforts. The work will directly inform WAWBE's development of public health action protocols for enteric pathogen wastewater results.

Major Project Title: Targeted Wastewater Sampling and Testing for World Cup 2026.

Major Project Description:
Wastewater Surveillance has been used to evaluate the impact of large events on public health issues including communicable disease spread. Seattle, Washington is one of the 11 cities in the United State that will host World Cup 2026 games. In collaboration with King County Department of Natural Resources and Parks, Public Health Seattle King County, and University of Washington academic partners, the fellow will utilize geospatial tools combined with field work to identify upstream sampling points for monitoring prioritized pathogens during the World Cup events and gatherings. The fellow will work with Public Health Seattle King County to develop a list of prioritized pathogens to include in testing for the event. The fellow will coordinate with the Public Health Lab and University of Washington academic partners to identify appropriate laboratory methods for the selected pathogens. The fellow will lead the analysis and reporting of the results, working with DOH pathogen subject matter experts to prepare and implement relevant response plans.

Major Project Objectives:
The objectives of this project include:

- Support fellow in learning about how to coordinate targeted wastewater sampling and testing efforts.
- Facilitate the collection of wastewater samples near large world cup gatherings and events by collaborating with King County Department of Natural Resources and Parks.
- Coordinate with laboratory partners (PHL, UW) to test wastewater samples for agreed upon pathogen list.
- Assess how large events can contribute to spread of communicable diseases within a local population using wastewater-based epidemiology.

The deliverables for this project include:

- Formal sampling plan documentation with identified sampling locations, sampling methods, and sample timeframe.
- Analysis report on results with relevant metrics, visualizations, and statistical processes.
- Contribution to a draft publication for potential submission to an academic journal.

- Potential additional deliverables might include oral or poster presentations at relevant conferences.

Major Project Impact:
Seattle is home to several large stadiums which host both professional sports games and large entertainment events. This project will help public health professionals in understanding how large international in-person events can contribute to the presence and spread of communicable diseases within a community. This project will also support the WAWBE program as it creates protocols and standard operating procedures (SOP) for event-specific wastewater testing.

Additional Project #1 Title: Foodborne Illness Notification System (FINS) Surveillance and Evaluation Project.
Project #1 Type: Major Project

Project #1 Description:
FINS is a statewide online, public-facing complaint intake system that captures foodborne illness and food safety reports. FINS was launched in July 2024, and in only a few short months has received over 2500 reports. FINS uses public questionnaire built in REDCap to collect self-reported complaint information, and all reports are sent directly to our Local Health Jurisdictions (LHJs) via email. The fellow will be creating a dashboard, conducting a landscape analysis, and designing and implementing a surveillance and evaluation plan based on feedback from state and local food safety teams.

Project #1 Objectives and Expected Deliverables:
The objectives of this project include:

- Improve and finalize the internal facing PowerBI dashboard to enhance real-time monitoring for trends and patterns and early cluster detection, improve data organization and accessibility, and improve the timeliness of response and investigation.
- Support the fellow to learn about the FINS system and the REDCap tool to provide data review support for FINS.
- Conduct a landscape analysis of FINs to help evaluate its effectiveness and ensure continuous improvement, help identify gaps and challenges, describe data quality and integration, and determine whether the complaint system is functioning as intended.
- Develop an ongoing surveillance and monitoring plan. Key components of the surveillance and monitoring plan will include categorizing and prioritizing complaints, data analysis and trend monitoring (real-time dashboards), response and investigation protocols, communication and public awareness, and evaluation and continuous improvement (policy or procedural updates, best practices and new technologies).

The deliverables for this project include:

- An internal facing, real-time PowerBI data dashboard.
- Landscape analysis including executive summary, introduction and background, overview of the system, key findings and insights, and recommendations and opportunities.
- A surveillance and monitoring plan document.
- Presentation of dashboard and landscape analysis at a FINS user group meeting or monthly LHJ call.

Project #1 Impact:
Developing a dashboard and establishing a surveillance and monitoring plan for a foodborne illness complaint system can have significant public health benefits, including early detection of outbreaks, improved investigation and response, enhanced data collection and trend analysis, public awareness and education, regulatory and industry improvements, data-driven decision making, and reduction in morbidity and mortality. Overall, a robust foodborne complaint surveillance system enhances food safety, protects public health, and reduces economic burdens associated with foodborne disease outbreaks.

ID: 74500528
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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)

Washington state experiences a variety of environment-related emergencies. In 2021, a heat dome led to the death of over 100 people and in 2020, there were very large late season wildfire events that caused significant deteriorations in air quality across the state. The state also experiences drought, mudslides, floods, and harmful algal bloom events. Having a single point of contact for the surveillance and quantification of these risks and providing quick and accurate epidemiological data to our communications staff and public health partners has been lacking and would be filled by this fellow.

The fellow may also be activated into the agency's Incident Command Team structure. The fellow would be expected to provide information for daily briefings, summarize surveillance data, and make recommendations. The fellow would work closely with communications, emergency preparedness and response, and others to develop messages and response plans and activities. The fellow's work will develop WA DOH's preparedness and response capabilities, and intelligence related to climate disasters and inform Washington Tracking Network tools to be developed for future responses. The time allocation will be dependent on the length of the climate disaster and need for response but would be no more than 5-7% of the fellows time.

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

Large multi-jurisdiction foodborne outbreaks are not uncommon in Washington, and the fellow will be encouraged to lead or participate in investigation and response. Working side by side with foodborne epidemiologists, the fellow will learn cluster detection processes using Whole Genome Sequencing (WGS) data from enteric and molecular teams. Office of Communicable Disease Epidemiology (CD Epi) staff work closely with laboratories in Washington, both commercial and the laboratorians at the Washington State Public Health Laboratories (WA PHL) co-located with the CD Epi Office. In addition, the CD Epi staff partner with CDC technical experts, and the fellow will have the opportunity to participate in calls and workgroups with CDC and with staff from across the United States, on topics as varied as foodborne and enteric diseases, emerging zoonotic diseases, and waterborne pathogens.

The fellow will also have the opportunity to gain knowledge and experience in foodborne outbreak investigations by participating in a weekly foodborne epidemiologist's huddle and by attending a laboratory, epidemiology, and environmental health team training, participating fully in a foodborne outbreak from cluster identification and investigation to mitigation and communication.