

ID: 56603705

Environmental Health, Wastewater Surveillance - Host Site Description

North Carolina Department of Health and Human Services

Assignment Location: Raleigh, US-NC
North Carolina Department of Health and Human Services
Epidemiology Section

Primary Mentor: Aaron Fleischauer, PhD, MSPH
Chief Science Officer, Epidemiology Section
North Carolina DHHS

Secondary Mentor: Virginia Guidry, PhD, MPH
Branch Head, Occupational and Environmental Epidemiology
North Carolina DHHS

Work Environment

Hybrid

Assignment Description

The Fellow will have a diverse range of opportunities that include projects, data analysis and field work in climate change, wastewater surveillance, chemical hazards such as PFAS, and environmental justice. A primary assignment will be to support our Climate and Health team and create new data visualization products and enhance the user interface of North Carolina's new Environmental Health Data Dashboard (funded by the CDC Environmental Public Health Tracking Network). The Tracking Network incorporates data from environmental health indicators from asthma to climate change to private well water contaminants.

The Fellow will also have the opportunity to develop projects with the NC Wastewater Monitoring Network and the NC Well Water team. Wastewater surveillance has proven effective to monitor the community burden of COVID-19. The system is expanding to include new and underrepresented communities across North Carolina. The fellow will have the opportunity to support expansion of the system to include new pathogen targets such as influenza, RSV and antibiotic resistant organisms.

The Fellow will assist with public health response and conduct field work to emerging public health threats such as hurricanes and flooding, COVID-19 outbreaks in occupational settings, per- and polyfluoroalkyl substances (PFAS), chemical releases, and harmful algal blooms. We have several potential projects in each of these areas that can be customized to the Fellow's interests. The fellow will develop into an applied epidemiologist with knowledge and experience in surveillance, field investigation, data analytics and presenting findings to diverse audiences.

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

The AEF will have access and support to several analytic tools including SAS, R, Tableau, ArcGIS. Data access will include the North Carolina Disease Event Tracking and Epidemiologic Collection Tool (NCDETECT), our statewide syndromic surveillance platform that includes emergency department (ED) visits, hospitalizations, Emergency Medical Services (EMS) runs, and Poison Control data, and Redcap, which houses wastewater monitoring, well water test results, carbon monoxide, and pesticide poisonings. In addition to OEE, the Epidemiology Section also includes the Communicable Disease, Preparedness and Response, and Immunization branch with dozens of epidemiologists with considerable expertise in advanced analytics and biostatistics on a range of topics. The AEF may also be able to engage with students and faculty at neighboring universities (University of North Carolina at Chapel Hill Gillings School of Global Public Health, Duke Nicholas School of the Environment, North Carolina State University).

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Projects

Surveillance Activity Title: Enhancing heat-related illness surveillance

Surveillance Activity Description:

Heat-related illness (HRI) is preventable yet serious, resulting in confusion, dizziness, seizures, or even death. Climate change may exacerbate HRI incidence because of higher increasing environmental day and nighttime temperatures. In 2023, North Carolina (NC) averages had about 4,000 emergency department visits yearly for HRI, however, ED visits likely account for a fraction of likely total HRI events. A surveillance system evaluation conducted in 2023 found that stakeholders are interested in HRI surveillance data from other sources. The AEF will investigate complementary data sources to determine the added value. These data sources include EMS (ambulance run) data, occupational data, and electronic data reports from farmworker clinics and the NC farm worker health program. The latter includes outpatient clinic visits. The goal of this project is to describe a more accurate burden of HRI in NC and identify most at-risk populations in order to target interventions, including ongoing expansion of our Heat Health Alert System to include partners statewide.

Surveillance Activity Objectives:

The objectives of this project are to develop a more robust surveillance system for HRI and to define populations most at risk. Additionally, deliverables include an updated automated data visualization dashboard to showcase near real time HRI data. The dashboard will be integrated into the state's Environmental Health Data Dashboard.

Surveillance Activity Impact:

To develop and disseminate more accurate and timely data in order to inform at risk populations and implement targeted interventions (e.g., heat alert messaging).

Surveillance System Evaluation Title: Evaluation of wastewater surveillance

Surveillance System Evaluation Description:

The Fellow will work with the NC Wastewater Monitoring Network (NCWMN) Director and Epidemiologist to conduct an evaluation using the CDC's Surveillance System Evaluation Framework and Criteria. Using this mixed methods (quantitative and qualitative) approach, the purpose will be to evaluate the performance of the NC WMN for tracking respiratory pathogens (COVID-19, influenza, and respiratory syncytial virus), early detection of other emerging pathogens, and representation of vulnerable populations. The fellow will lead the first steps of the evaluation, including conducting targeted stakeholder interviews with NC DHHS Leadership, NC WMN staff, local health departments and wastewater treatment plant operators. The fellow will use interview data to assess effectiveness using qualitative characteristics like acceptability, flexibility, simplicity, timeliness, usefulness, and stability. The Fellow will also collaborate with the NC WMN team and Communicable Disease Branch to compare validity (sensitivity, specificity, positive predictive value, negative predictive value, and representativeness) of wastewater monitoring to other public health surveillance metrics, such as emergency department visits and hospitalizations. The Fellow will also lead the Recommendations section of the evaluation, with an emphasis on health equity and representation.

Surveillance System Objectives:

Surveillance Evaluation Report and collaboration on a manuscript of diagnostic surveillance metrics in wastewater.

Surveillance System Impact:

To better understand how wastewater monitoring data compares to clinical metrics for respiratory and emerging pathogens. To ensure the flexibility of the network to adapt to track emerging public health threats, understand respiratory disease trends, and ensure equitable representation in the network.

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Major Project Title: Environmental public health tracking and environmental justice - flooding risk assessment for private wells.

Major Project Description:

Coastal and inland flooding associated with sea level rise, extreme precipitation, and more intense hurricanes are projected increase in North Carolinians because of climate change. Flooding can impair drinking water quality for those who rely on private wells, which are primarily located in rural areas and may co-occur with other environmental pollution risks. Environmental justice partners, including tribal communities, have identified this topic as a concern in their communities. The AEF will use our state private well testing database and overlay private well locations with flooding risk zones developed by NC Emergency Management to identify high risk areas. These areas will also be compared with the CDC Environmental Justice Index and shared with environmental justice partners such as the NC Commission of Indian Affairs to further identify areas of greatest need. The fellow will then assist in the development of guidance and intervention strategies for owners of private wells at risk of historic and chronic flooding contamination.

Major Project Objectives:

Integrate private well data and flooding maps into the Environmental Health Data Dashboard.

Develop guidance and remediation measures for homeowners, health departments and emergency managers.

Major Project Impact:

Assess the risk of well water contamination from flooding in rural NC and measure disparities by socioeconomic status, race and other EJ factors.

Additional Project #1 Title: Improving environmental surveillance for farmworkers and migrant farmworkers

Project #1 Type: Surveillance Activity

Project #1 Description:

Work with the NC Farmworker Health program to create and pilot a new voluntary reporting form for community health workers to report pesticide poisonings and heat related illnesses among farmworkers and migrant farmworkers. The form will be built in Redcap in both English and Spanish and be accessible for use in the field on a mobile device. The NC State Ag Extension will provide guidance on design based on previous research of known barriers to reporting for farmworkers in NC. The fellow will work with the Farmwork Health program's community health workers to pilot test the form and develop educational materials to encourage farmworker injury reporting and argument or expand training/outreach on pesticide and heat safety.

Project #1 objectives and expected deliverables:

Development and pilot test of a novel surveillance data collection system for migrant farmworkers. The data collection tool modernizes existing surveillance efforts and is designed to increase confidential reporting of migrant farmworker health outcomes. Improved monitoring of farmworkers' health will inform prevention and intervention strategies for these highly mobile and vulnerable communities.

Describe the expected public health impact to be achieved from this project/activity #1:

This project has a data modernization component to automate and streamline field-based passive reporting of migrant farmworker health outcomes.

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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)

The OEE Branch plays a critical role in preparedness and response. OEE responds to hurricanes and natural disasters such as flooding and wildfires by monitoring the human health impacts, conducting risk assessments and providing guidance to local health departments. The AEF will also support the communicable disease branch with at least one infectious disease outbreak during their two-year assignment, including providing situation awareness of wastewater trend data.

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

The AEF will be involved in outbreak investigations and will team up with our EIS officer to provide a more robust learning experience. Past fellows have worked on outbreaks related to E-Cigarette or Vaping Associated Lung Injury (EVALI), carbon monoxide poisoning, and cancer investigations. OEEB addresses many emerging contaminants such as PFAS and 1,4-Dioxane. Activities Fellows have been involved in include designing and building databases for active surveillance, data reporting to CDC, case interviews, constructing epi curves and descriptive analysis, and setting up environmental sampling. This experience operating in Incident Command as part of public health response is critical for building public health preparedness capacity for trainees.

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

As described, the Fellow will assist the wastewater surveillance team in monitoring respiratory disease burden (COVID-19, Influenza and RSV) using surveillance analytic tools to monitor changes in space and time.

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

The AEF will have extensive opportunities to assist the OEE branch head (secondary mentor) with environmental justice work. The branch head serves as the NCDHHS Environmental Justice and Equity Lead and is currently co-chairing the Governor's Environmental Justice Advisory Council. As part of this work, we are developing and implementing NCDHHS Environmental Justice Goals, developing data visualizations for EJ and health, exploring options for estimating the cumulative incidence of EJ-related health impacts, and holding meetings around the state which will touch on a range of environmental justice issues.