ID: 59513636
Wastewater Surveillance, Infectious Diseases - Host Site Description
Michigan Department of Health and Human Services

Assignment Location: Lansing, US-MI
Michigan Department of Health and Human Services
Emerging and Zoonotic Infectious Disease Section, Division of Emerging and Zoonotic Infectious Diseases

Primary Mentor: Matthew Flood, Ph.D., M.S.
Wastewater Data Analyst
Michigan Department of Health and Human Services

Secondary Mentor: Susan Peters, DVM, MPH
Waterborne Disease Epidemiologist
Michigan Department of Health and Human Services

Work Environment
Hybrid

Assignment Description

The Fellow would have a truly unique opportunity to act as a member of Michigan's infectious disease epidemiology team, with special emphasis on wastewater, waterborne, zoonotic, vectorborne, and emerging infectious disease opportunities. The Fellow will work closely with mentors Dr. Matthew Flood and Dr. Susan Peters in the Emerging and Zoonotic Infectious Diseases (EZID) Section of the Bureau of Infectious Disease Prevention (BIDP), as well as other members of the Section. The mentors will oversee the training, research, and field activities of the Fellow, ensure that the Fellow is familiar with the processes and responsibilities of the Section, and encourage the overall professional development of the Fellow. The EZID Section is responsible for public health data collection, monitoring, and reporting of zoonotic, vectorborne, and infectious waterborne diseases, in addition to other water and wastewater-related projects. BIDP houses other divisions that work on enteric and respiratory pathogens, healthcare-associated infections, hepatitis and tuberculosis, immunizations, reportable disease systems and data management, and regional epidemiologists that bridge state and local communicable disease work, so there are plenty of opportunities to explore other areas outside of our section.

The Fellow will be involved in all aspects of the work of the EZID Section, including reportable disease surveillance, outbreak response, educational outreach, interagency collaborations, and response planning. Outbreak investigations may require working in multi-disciplinary teams. The EZID Section works closely with local public health staff, as well as state partners at the Departments of Agriculture and Rural Development; Environment, Great Lakes, and Energy; and Natural Resources, and federal partners including the CDC, EPA, NOAA, and USDA’s Veterinary Services and Wildlife Services Divisions. The fellow will also be involved in intra-agency waterborne work that is highly integrated with the MDHHS Division of Environmental Health within the Bureau of Epidemiology and Population Health.

Recent investigations or surveillance projects that Fellows within the Section have been involved with include: the largest known U.S. workplace-associated outbreak of Blastomycosis cases, a multistate and multinational outbreak of giardiasis associated with untreated drinking water, literature review of harmful algal bloom exposures associated with drinking water wells, analysis of giardiasis cases reported to public health, enhanced surveillance of Histoplasmosis infections, development and analysis of rabies post-exposure prophylaxis reporting protocols, a cluster of tularemia infections in falconers, Shiga-toxin producing E. coli infections associated with a local petting farm, multi-state Salmonella outbreak associated with contact with live poultry, transfusion-associated Babesiosis, outbreak of human H3N2 variant influenza associated with contact with swine at agricultural fairs, Mycobacterium tuberculosis infection in

research macaques, ongoing emergence of Lyme disease in Michigan, and the first case of plague in Michigan with exposure in an endemic area of Colorado.

While this host site application includes a major project suggestion, once the Fellow is acquainted with the activities of the EZID Section, they may choose to develop an alternate project based on their interests as well as the current activities and needs of the EZID Section. In addition to a major project, MDHHS will support the candidate's completion of the required activities related to this CSTE Fellowship, including a surveillance system evaluation. Previous fellows have completed their required activities well ahead of schedule. The CSTE Fellow will have the opportunity to support acute outbreak investigations requiring immediate public health response, under the guidance of the lead epidemiologist. This may include working first-hand with the CDC, federal, state, and local regulatory partners on local and multi-state investigations. The Fellow will learn how to communicate effectively about health risk and utilize those skills to develop and disseminate messages for a variety of audiences.

The EZID Section also provides unique opportunities for the Fellow to meet core requirements. The Fellow will be trained to develop and edit content for Michigan's COVID-19 wastewater dashboards and website and the Emerging Diseases website. The Fellow will participate in organizing and developing content for EZID's One Health webinars provided to public health partners in Michigan. The Fellow will also attend and have the opportunity to present at the annual statewide Communicable Disease Conference and/or Premier Public Health Conference; the target audience includes all Local Health Departments, as well as infection control practitioners and clinical laboratory directors from health care systems and nursing homes. Our previous Fellows have had the opportunity to present their work at this and other statewide meetings. The Fellow will be encouraged to seek out educational and training opportunities, as funding, resources, and COVID-19 restrictions allow. Fellows at our agency have traditionally participated in fieldwork for Lyme disease surveillance, including tick dragging and mammal trapping. The Fellow will also get an introduction to mosquito surveillance for the vectors of West Nile, Eastern Equine Encephalitis, and Zika viruses through our ongoing community mosquito surveillance project with select local health departments.

Fellow's Anticipated Day-to-Day Activities:
1) Assist in surveillance, outbreak investigations, data analysis and reporting, and development of outreach materials and communications for wastewater targets and waterborne, zoonotic, and vectorborne diseases in Michigan. There will be a primary focus on wastewater and water-related activities.
2) Participate in regularly scheduled meetings within the EZID Section, Bureau, and Department.
3) Participate in existing state-level working groups and discussions on topics of wastewater and zoonotic and waterborne diseases, including the COVID-19 SEWER Network wastewater surveillance project, the Michigan Harmful Algal Bloom Interagency Working Group, Michigan Arbovirus Working Group, the Michigan Rabies Working Group, and the monthly Michigan One Health conference call.
4) Attend local, state, and national level meetings on topics including public health, epidemiology, infectious disease, and environmental health.
5) Assist with field investigations and outreach MDHHS may undertake to better understand the epidemiology and prevention of zoonotic, vectorborne, and waterborne diseases and wastewater surveillance in Michigan.
6) Develop the knowledge and skills necessary to field calls and questions from the public and other stakeholders on wastewater surveillance and zoonotic, vectorborne, and waterborne disease topics.

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

The Fellow will be granted access to the Michigan Disease Surveillance System, where all reportable disease case reports in Michigan are housed, and to the MDHHS Teams wastewater project site. Additionally, access to the CDC's DCIPHER and One Health Harmful Algal Bloom systems, the Michigan Care Improvement Registry (state immunization registry),

the Michigan Syndromic Surveillance System, and Laboratory Information System (containing all lab results from MDHHS Laboratories) will be available, as needed. Other specialized databases and software will be evaluated and provided as needed, based on the Fellow's projects. The Fellow will be provided with access to GIS and SAS licenses as needed. The Bureau of Infectious Disease Prevention has many staff who have expertise in SAS and other statistical software who can assist the Fellow as needed. Lately, much of the data analysis is being done in R, which is free, and training and support is available both from programmatic staff and a voluntary R user group within MDHHS that meets monthly.

Projects

Surveillance Activity Title: Wastewater Metric Development

Surveillance Activity Description:
As wastewater surveillance moves toward becoming a routine and long-lasting surveillance system in the United States and globally, understanding the effect of aggregating wastewater data beyond individual sites is necessary. This will serve to support the continued use and improvement of wastewater surveillance for public health. In Michigan, an evaluation of the implementation of large-scale regional wastewater value metrics using aggregated wastewater testing data is needed. This will be conducted through the aggregation of data from over 400 wastewater testing sites within Michigan through by grouping sites and data based on the state's defined emergency preparedness regions. The wastewater data will then be used to develop and evaluate a regional wastewater metric. These regional metrics will then be evaluated for their accuracy and usability in Michigan. The fellow will work with the wastewater data collected by MDHHS and its partners since 2020 and historical COVID-19 case and hospitalization data.

Surveillance Activity Objectives:
1) Create a large-scale regional wastewater value metric using the Michigan state defined emergency preparedness regions and the CDC's new wastewater viral activity level (Wval) as a template.
2) Evaluate the accuracy and usability of this regional wastewater value metric for Michigan. This includes identifying any limitations or necessary improvements to Michigan's wastewater surveillance program which would allow for the new wastewater metric to be implemented successfully.

Surveillance Activity Impact:
The expected public health impact of this project will be a more clearly defined and understandable wastewater metric for use by the Michigan public. This would allow for individuals in Michigan to have a better understanding of their communities' health with less effort on their part and to be able to use the data to better understand potential risk of COVID and take personal protective actions. Public health and healthcare agencies can use the data to inform a variety of interventions.

Surveillance System Evaluation Title: Evaluation of Cryptosporidiosis Cases Reported to the Michigan Disease Surveillance System

Surveillance System Evaluation Description:
The Michigan Disease Surveillance System is the statewide surveillance system used to report infectious diseases in Michigan, including Cryptosporidium. However, Cryptosporidium reports have not been analyzed at a statewide level to assess long-term trends, geographic distribution, potential transmission sources, and adherence to case definitions. In addition, no systemic evaluation of the quality and completeness of Cryptosporidium reports has been done. The Fellow will evaluate selected variables from available cases to determine completeness and areas for improvement.

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Surveillance System Objectives:
Objectives:
1) Characterize cryptosporidiosis cases in Michigan
2) Identify any reporting gaps or areas for improvement.

Deliverables:
1) Report and presentation of findings
2) Suggestions for public health materials, education, or changes to reporting requirements to improve the quality and completeness of reported cases.

Surveillance System Impact:
This analysis will lay the foundation for future MDHHS work on cryptosporidiosis education and public health interventions, including informing educational outreach and potential environmental sampling of private drinking wells for Cryptosporidium. The analysis will allow MDHHS to improve future reporting of cryptosporidiosis cases, which will lead to a better understanding of disease transmission and patterns.

Major Project Title: Infectious Diseases in Recreational Water Venues

Major Project Description:
The Model Aquatic Health Code (MAHC) (https://www.cdc.gov/mahc/index.html) is guidance based on the latest science and best practices to help ensure healthy and safe experiences in public pools, hot tubs, and splash pads. These venues have been the source of a variety of waterborne disease outbreaks in Michigan, include norovirus, Legionella, and Cryptosporidium. The Fellow would review the MAHC for portions specific to infectious disease prevention and develop methods to highlight and communicate these interventions to appropriate audiences (could include local health departments, pool operators, water parks, etc.). In addition, the Fellow will partner with staff from the Michigan Department of Environment, Great Lakes, and Energy (EGLE) who work on recreational water venues to review the current applicable laws and to determine if changes as it relates to infectious disease prevention should be drafted.

Major Project Objectives:
Objectives:
1) Identify appropriate areas of the MAHC that address infectious diseases and develop a communication plan/materials to communicate those recommendations to stakeholders.
2) Identify areas of existing Michigan laws related to recreational water venues that may need revisions.

Deliverables:
1) Summary report on applicable areas of the MAHC and suggested stakeholders and communication materials to provide education on these topics.
2) Report listing portions of existing laws that impact recreational water venues, as it relates to infectious diseases and other MDHHS priorities, and suggestions for language changes, if applicable.

Major Project Impact:
Ultimately, safer recreational water venues for the public and a decrease in infectious diseases from exposure to recreational water venues.

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Additional Project #1 Title: Harmful Algal Bloom Program Expansions and Enhancements
Project #1 Type: Major Project

Project #1 Description:
The MDHHS EZID Section receives funding to support public health responses to harmful algal blooms (HABs), which are an increasing public health concern for freshwater recreation sites and drinking water sources in Michigan and the United States. While MDHHS has been responding to HABs for several years, additional efforts are needed to improve HAB surveillance. The fellow would be involved in efforts to improve surveillance for human and animal HAB-related illnesses, including health care provider outreach and expanding the existing relationship with Poison Control. This project would also support and improve multiple aspects of MDHHS's HAB program, including updates to local health department toolkits, creating reports, working with staff on updates to a public-facing map, developing educational materials, assisting with education and outreach efforts, and other items as identified. This may include working with stakeholders from other agencies, including the Michigan Department of Agriculture and Rural Development and the Department of Environment, Great Lakes, and Energy.

Project #1 Objectives and Expected Deliverables:
Objective: to increase awareness of HABs and reports of potential HAB-related human and animal illnesses.

Deliverables: At least 1 new communication tool/educational material about HAB-related illnesses developed for animal owners/vets and 1 for human healthcare providers. Reestablish connections with Poison Control and develop protocol for Poison Control to report illnesses to MDHHS.

Project #1 Impact:
Increased awareness of HABs and HAB-related illnesses by a variety of stakeholders. Better reporting of potential HAB-related illnesses.

Additional Project #2 Title: Evaluation of RSV and Norovirus Factors and Transmission Related to Wastewater Monitoring
Project #2 Type: Major Project

Project #2 Description:
Understanding the factors influencing respiratory syncytial virus (RSV) and norovirus spread in communities is necessary to help determine effective wastewater surveillance strategies for these pathogens. Optimizing sampling site locations and scale of population served is necessary with new wastewater targets to effectively monitor pathogens with different distributions and fecal shedding rates. This project will focus on determining community-specific vulnerabilities to these pathogens including demographics and environmental factors. Additional analysis of seasonal patterns affecting the prevalence and spread of RSV and norovirus in Michigan will be conducted. The Fellow may coordinate with subject matter experts in the Enteric and Respiratory Infectious Diseases Section as well.

Project #2 Objectives and Expected Deliverables:
Objectives:
1) Collect and compile significant factors associated with RSV and norovirus prevalence and spread in Michigan.
2) Propose insights for future preparedness, such as awareness campaigns on the state level, considering potential factors influencing the spread.

Project #2 Impact:
This project will provide insights for future preparedness, and effective sampling strategies which can be further adopted by other new wastewater pathogen surveillance targets. Additionally, the information compiled from this

project will be used for awareness campaigns on the state level along with dissemination to local health departments and communities.

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

Michigan has an established Bureau of Emergency Preparedness, EMS, and Systems of Care, which has drawn staff from both the epidemiology and laboratory programs of the health department and thus maintains close ties with both of these programs. In addition, during public health emergencies, the Bureau of Infectious Disease Prevention helps to staff the Emergency Coordination Center. In addition, the EZID Section that the Fellow will be housed in has an epidemiologist with extensive experience in preparedness and response epidemiology, which will allow for cross linkage with various opportunities. The Fellow would have many opportunities to participate in trainings, tabletop exercises, discussions, and projects with this Bureau. It is anticipated that this would be about 5% of the Fellow's time. Among these opportunities would be:

Incident Command Training: The availability and completion of Incident Command System training for better integration with the National Incident Management System structure employed throughout Michigan's public health community in response to emergent public health issues. This structure is mandated for incident response at the federal, state, and local levels. Both virtual and in-person trainings are available for ICS classes.

Bioterrorism Education: The Fellow would also be encouraged to take advantage of the many Bioterrorism Preparedness education opportunities and regional exercises offered through a variety of sources, including the MI-TRAIN portal (http://www.train.org/mi-train), a learning resource for professionals who protect the public's health.

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

It is expected that the Fellow will be actively involved in cluster and outbreak investigations for zoonotic and vectorborne diseases that fall within the activities of the EZID Section, which could include a large variety of pathogens. This could also include investigations of unusual wastewater monitoring results. Past investigations that Fellows within the Section have been involved with include: the largest known U.S. workplace-associated outbreak of Blastomycosis cases, a multistate and multinational outbreak of giardiasis associated with untreated drinking water, a cluster of tularemia infections in falconers, Shiga-toxin producing E. coli infections associated with a local petting farm, multi-state Salmonella outbreak associated with contact with live poultry, transfusion-associated babesiosis, an outbreak of human H3N2 variant influenza associated with contact with swine at agricultural fairs, Mycobacterium tuberculosis infection in research macaques, and the first case of plague in Michigan with exposure in an endemic area of Colorado. Activities related to these investigations could include active case finding, conducting case interviews, collating and analyzing case data, creating summaries and reports, participating in multiagency calls, presenting findings, and participating in site visits, if applicable. The activities will depend on the size, scope and type of pathogen involved. It is anticipated that the Fellow would spend up to 25% of their time on these activities.

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

While it is hard to anticipate what MDHHS's COVID-19 response will be for the next two years, given the changing nature of the public health response, if the current response continues at similar levels, there will be many opportunities for the Fellow to become involved with COVID-19 responses. In particular, given the fellowship's focus on wastewater surveillance, the Fellow would be directly and highly involved with wastewater monitoring as it relates to COVID-19. In addition, the EZID Section has been involved with certain zoonotic and environmental health aspects of the COVID-19

response, including a zoonotic outbreak at a mink farm and human cases with potential exposures to an animal shelter. In addition, EZID staff have participated in various One Health COVID-19-related initiatives and have served in various surge capacity roles. There are opportunities for the Fellow to become more involved in routine COVID-19 case and outbreak responses that are housed in other areas of the agency if that is desired. It is anticipated that the Fellow will spend approximately 50% of their time on wastewater activities related to COVID-19, with a minimal amount of additional time in other COVID-19 areas unless desired by the Fellow or if MDHHS requires epidemiologic support for another COVID-19 wave.

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

MDHHS houses an internal Office of Race Equity, Diversity and Inclusion (REDI) to address racial, health, social and wealth disparities, that impact both internal and external partners and aligns with the MDHHS core values of (HOPE) Human Dignity, Opportunity, Perseverance and Ease. REDI leads with race and intersectionality to identify and address the policies and practices that have resulted in systemic oppression that impacts all marginalized groups. REDI is responsible for setting the strategic direction for the department to identify and address issues of inequities due to systemic marginalization and to create a culture of Diversity, Equity, and Inclusion in both its practices and policies. REDI hosts a variety of health equity and DEI presentations and workshops throughout the year, which the Fellow would be encouraged to attend. In addition, the various Bureaus throughout MDHHS provide representatives to an agency DEI workgroup, which the Fellow could participate in if interested. Other ways that the EZID Section incorporates DEI into our work is ensuring that our outreach and publication materials meet the necessary requirements for a variety of stakeholder populations.