

**ID: 59291219**

**Infectious Diseases - Foodborne, One Health - Host Site Description**

**Nebraska Department of Health and Human Services**

**Assignment Location:** Lincoln, US-NE  
Nebraska Department of Health and Human Services  
Division of Public Health

**Primary Mentor:** Samir Koirala, MBBS, MSc  
Emerging Infectious Disease Epidemiologist III  
Nebraska Department of Health and Human Services

**Secondary Mentor:** Jeff Hamik, MS  
Vector-Borne Disease Surveillance Coordinator & Public Health Entomologist  
Nebraska Department of Health and Human Services

**Work Environment**

100% In-person

**Assignment Description**

Because of the tremendous public health and medical burden of infectious diseases, and because of the great potential for prevention and reduction of morbidity and mortality, Nebraska public health officials have prioritized the understanding of the epidemiology and control of infectious diseases in our population. As we increasingly focus our resources on controlling and reducing health care costs, we believe that all sectors of society will need and want a thorough understanding of the distribution and determinants of infectious diseases in our population. Our agency's goal is to be the leading provider of such information. We are extremely excited about the opportunity to supplement our current One Health team with an Infectious Disease Epidemiology Fellow and believe that such a resource will enable us to advance this agenda. For the qualified applicant, the supervisory team will advocate for employment opportunities to be available at the completion of the fellowship.

The Nebraska Office of Epidemiology provides an ideal training opportunity for an Infectious Disease Epidemiology Fellow. This office is responsible for studying the epidemiology of reportable infectious diseases and investigating infectious disease outbreaks. The epidemiology team consists of State Epidemiologist, a CDC Career Epidemiology Field Officer (CEFO), Unit Administrator, and 28 epidemiologists (5 Epi III, 11 Epi II and 12 Epi I).

The Fellow will work as part of this team with particular focus on enteric, and vector-borne & zoonotic diseases. The team members are located in close proximity to each other in various parts of our integrated Health & Human Services agency. The training and skill development of the Fellow will be the primary responsibility of the primary mentor. All team members will be at the disposal of the Fellow to provide expertise in selected aspects of epidemiology and programmatic activities. The Fellow will be authorized to access, analyze, and evaluate data sets and surveillance systems in all of these areas.

The Fellow's anticipated day-to-day activities will include:

- Develop an understanding of and familiarity with enteric, vector borne, and zoonotic disease One Health surveillance datasets
- Refine data processing and data analysis skills
- Understand how to assess surveillance systems
- Analyze and interpret data
- Prepare epidemiology reports

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

The Fellow will have access to the Nebraska Electronic Disease Surveillance System (NEDSS) where laboratories and healthcare providers throughout the state are required by rules and regulations to report cases of reportable diseases to our office by ELR; Syndromic Surveillance dataset which includes inpatient and outpatient visits; and NESIIS which contains statewide immunization records. Other datasets include vital records, an E-code database derived from the hospital discharge data, and death certificate data. The agency has a wide array of statistical software options such as SAS and R, and visualization programs such as Power BI and Arc GIS. In addition, we have close relationships with the Departments of Epidemiology and Biostatistics at the UNMC College of Public Health, Omaha, Nebraska whereby statistical support is available.

**Projects**

**Surveillance Activity Title: Enteric Disease Surveillance Annual Report**

*Surveillance Activity Description:*

The Enteric Disease Surveillance Annual Report pilot project is a comprehensive initiative aimed at monitoring and analyzing the occurrence and trends of enteric disease cases and outbreaks in Nebraska over the course of the previous year. Enteric diseases primarily affect the gastrointestinal system, posing a significant public health concern. The activity involves systematic data collection from various sources, including healthcare facilities, laboratories, and local public health departments (LHD) to compile a detailed overview of the incidence and distribution of enteric diseases and outbreaks. This inaugural annual report will provide valuable insights into the epidemiology of these diseases and identifies potential risk factors to inform and improve education about foodborne illness prevention. This report will include the number of cases observed per condition, number of outbreaks investigated by the NE DHHS Enterics team and LHDs, and a breakdown of Norovirus season trends and percent positivity of laboratory tests. Nebraska participates in 3 norovirus surveillance projects funded by ELC: The National Respiratory Enteric Virus Surveillance System (NREVSS), NoroSTAT, and CaliciNet. By presenting a thorough analysis of these data, the surveillance activity will highlight notable outbreaks, both local and multistate, while informing our stakeholders about the burden of enteric diseases in Nebraska to help enhance community well-being. This first report will stand as a template for all subsequent annual enteric disease surveillance reports and will also be used to create an enteric disease dashboard.

*Surveillance Activity Objectives:*

The Fellow will create an annual report for enteric disease surveillance for internal and external distribution to provide a summary of enteric investigations. This initial report will be considered the template for all future reports and dashboards.

*Surveillance Activity Impact:*

This annual report will serve to highlight the burden of enteric disease in Nebraska and the trends of disease throughout the years to inform education on foodborne illnesses and public health policy. The foodborne/enterics program has not historically had a comprehensive annual report published either internally nor externally.

**Surveillance System Evaluation Title: Evaluation of Enteric Disease Exposure Questionnaires**

*Surveillance System Evaluation Description:*

The Enteric Disease Exposure Questionnaires are a new series of data collections forms in Nebraska's locally hosted REDCap software. Nebraska enteric staff developed modernized questionnaires using locally defined variables combined with CDC variables from case reports to collect enhanced exposure data for 12 enteric conditions (campylobacter,

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cryptosporidium, cyclospora, listeria, salmonella, salmonella Typhi and paratyphi, STEC, shigella, vibrio, and yersiniosis) during routine case interviews. When a new laboratory report that is positive for an enteric condition is uploaded into NEDSS, the patient demographic information will be sent into a new REDCap record which includes the expanded question set that is not available in NEDSS. Questions specific to each condition are branched to appear based on the selection of “Yes” to the patient having that condition. The interview is then conducted using the condition-specific exposure questions to allow us to collect detailed information on patient exposures. Beginning in May 2024, all 19 LHDs have been trained to use this new data collection system.

*Surveillance System Objectives:*

Evaluation of this system would require complete review and testing of all condition-specific questionnaires (both in REDCap and paper forms) for ease of use, proper questioning and language, and accurate exportation of reports for data analyses. The AEF will help develop or edit data output that is available for end users such as LHD and state enteric staff.

*Surveillance System Impact:*

A thorough evaluation of this project will be necessary to evaluate the usability and accuracy of surveillance for enteric diseases. Collecting systematic and enhanced data from sick individuals will improve outbreak detection and rapid response for local and state health departments. The ability to quickly identify sources, risk factors, and affected populations enhances the quickness of public health officials in implementing control measures, such as informing federal partners like CDC, FDA, or USDA FSIS and communicating to the public through press releases and food product recalls.

**Major Project Title: Estimate the economic burden of West Nile Virus in Nebraska**

*Major Project Description:*

Per the CDC, a total of 60,992 West Nile virus (WNV) cases have been reported in the US from 1999-2024 making it the most reported arboviral infection in the US. Of the total reported cases, 31,806 have been classified as the severe neuroinvasive form that can lead to significant morbidity and death. In Nebraska, WNV is considered hyper-endemic with the state reporting cases every summer/fall typically ranking in the top 5 states in reported cases. Since WNV was first detected in 2002 in Nebraska, a total of 4,443 cases have been reported statewide ranking fourth overall nationally. Out of these cases, >1,000 have been classified as the neuroinvasive form. Despite the number of cases reported in the US, very few studies have looked at the economic burden in different states. To better estimate the economic burden associated with WNV in Nebraska, the Fellow will conduct a retrospective study to determine long-term costs of patients hospitalized with WNV disease. Using hospital discharge data, the Fellow will first identify diagnosed cases of WNV and then use private insurance and Medicaid data to estimate the cost incurred by hospitalized WNV cases within the state. Additionally, a representative sample of the hospitalized patients will be contacted for follow-up regarding outpatient medical, home care costs, lost time of employment and/or long-term disability incurred after the initial hospitalization. All costs will be adjusted to current costs using the US Consumer Price Index.

*Major Project Objectives:*

The Fellow will use hospital discharge and insurance data, along with patient interview data to estimate the costs and economic burden of WNV in Nebraska. Once completed, the Fellow will use the findings of the study to assess the cost-effectiveness of prevention and intervention strategies and help guide public health decisions.

*Major Project Impact:*

Data from this project will provide a better estimate on the economic burden associated with WNV in Nebraska. In return, the information provided will help assess cost-effectiveness of prevention countermeasures and various intervention strategies which are important in helping guide public health decisions.

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**Additional Project #1 Title: Enhanced surveillance for invasive Aedes mosquitoes**

**Project #1 Type: Surveillance Activity**

*Project #1 Description:*

Introduction of invasive Aedes mosquitoes (*Aedes aegypti* and *Aedes albopictus*) is a public health concern in Nebraska. Historically, *Aedes albopictus* was first detected in Nebraska in 1992 in an isolated scrap tire pile in rural Douglas Co. Additional detections were made in Cuming Co. in 1992-1996 and Lancaster Co. in 2000. No further reports of detections of *Aedes albopictus* in Nebraska were documented until 2013, when it was again detected in routinely used CDC light traps in Richardson Co. as part of NDHHS's WNV/mosquito surveillance network. Since this detection, *Aedes albopictus* has been detected every year onwards in Richardson Co. with additional detections in Douglas, Lancaster, Sarpy, and Jefferson Counties and is most likely established in these areas of the state. During 2019, *Aedes aegypti* was discovered for the first time in York Co., Nebraska. This led to a response effort between NDHHS and the LHD to try and eliminate the mosquito and determine how it was introduced. Two additional detections of this species occurred in 2020 in Jefferson Co. and Dawson Co., Nebraska which similarly led to public health responses between NDHHS and the LHDs. While the potential of these mosquito species to serve as local vectors for diseases like chikungunya, dengue, and Zika (among others) is low, a potential still exists. Additionally, these mosquitoes are notoriously difficult to eliminate due to their peri-domestic nature once established. Therefore, determining presence or absence of these species in new areas is important to prevent establishment within the state and reduce corresponding disease risks. As a proposed project, the Fellow will conduct enhanced invasive Aedes mosquito surveillance within areas determined to be at high risk for their introduction. This will be accomplished through GIS and mapping to identify high risk locations and field work where mosquito traps (CDC light, BG Sentinel, and Ovicups) will be set out and retrieved. Furthermore, the Fellow will also learn to identify mosquito species as part of the field work experience and coordinate with CDC and other academic collaborators to conduct genetic testing. If invasive Aedes are detected, the Fellow will also help in response activities related to vector control and attempted elimination. The data gathered from this project will be used to better determine the establish ranges and areas of risk.

*Project #1 Objectives and Expected Deliverables:*

The Fellow will learn how to use GIS and develop mapping skills as part of this project. Additionally, the Fellow will learn how to identify preferred habitat of invasive Aedes mosquito species and set traps in these areas. As part of this field work experience the Fellow will also learn mosquito identification techniques. Finally, if invasive Aedes are detected, the Fellow will help in response activities related to vector control and attempted elimination that might be implemented.

*Project #1 Impact:*

The data gathered from this project will be used to enhance understanding of areas of risk and establish range of these mosquito species within Nebraska. These data can then be utilized by state and local public health and vector control personnel in mosquito management work and help assess potential disease risk these mosquito species may pose to Nebraskans.

**Additional Project #2 Title: Norovirus Season Weekly Report**

**Project #2 Type: Surveillance Activity**

*Project #2 Description:*

The Norovirus Season Weekly Report activity is a focused and timely report dedicated to monitoring and reporting on the prevalence and patterns of norovirus infections and outbreaks in Nebraska on a weekly basis from November to April. Norovirus is a highly contagious virus that causes gastroenteritis, leading to symptoms such as vomiting and diarrhea. This project involves the systematic collection of data from healthcare facilities, childcare facilities, schools, laboratories, and LHDs to track the incidence of norovirus cases and outbreaks throughout norovirus season. The report highlights fluctuations in norovirus activity, identifies potential clusters, and assesses the burden on public health. By

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providing frequent updates to our stakeholders, the project aids in early detection of clusters, enables timely public health responses, and facilitates preventive measures through encouraged use of our Norovirus Outbreak Toolkit. The weekly nature of the report enhances its utility in real-time decision-making, contributing to overall control of norovirus infections within Nebraskan communities and facilities.

*Project #2 Objectives and Expected Deliverables:*

The Fellow will create a template for a weekly norovirus report to be updated and distributed to facilities and LHDs during norovirus season (November to April). Data will be used from NEDSS, our infectious disease surveillance system.

*Project #2 Impact:*

This report will provide timely updates on the burden of norovirus in the state of Nebraska during norovirus season to inform preventative measures to reduce the occurrence of clusters in facilities.

**Additional Project #3 Title: Enteric Disease Data Dashboard**

**Project #3 Type: Major Project**

*Project #3 Description:*

The Enteric Disease Data Dashboard will be an innovative project designed to create a comprehensive and user-friendly public-facing platform for visualizing data related to enteric diseases utilizing data from our Nebraska Electronic Disease Surveillance System (NEDSS) and REDCap focused on understanding of enteric disease trends, the dashboard will serve as a valuable tool for public health officials, researchers, and the general public.

*Project #3 Objectives and Expected Deliverables:*

Learn and train on PowerBI (a data visualization tool) to build a public facing dashboard to add to NDHHS foodborne illness webpage; Work with other epi program areas who have developed public facing dashboards to learn and gain insight, work with DHHS web communications team to test and ensure the dashboard is working appropriate and data are displaying accurately; Develop a system to have data refresh on a routine basis (frequency currently unknown, either weekly or monthly).

*Project #3 Impact:*

By developing and maintaining an enteric dashboard, it will enhance public awareness and education to promote transparency and trust between the public and health officials.

**Additional Project #4 Title: Surveillance for Lineage 3 West Nile Virus in wild reptiles and amphibians in Nebraska**

**Project #4 Type: Surveillance Activity**

*Project #4 Description:*

WNV Lineage III (L3), was first identified in a human patient in Buffalo County Nebraska in 2023- the first time this strain has been found in a person in the United States. Lineage III cannot survive in warm-blooded animals (e.g., birds, mammals), so we will be testing whether coldblooded reptiles and amphibians might be serving as reservoir hosts that maintain this strain in nature and enable its transmission to mosquitoes and potentially humans. We will also collect and test mosquitoes from the study area to support our understanding of virus transmission patterns. The goal is to understand how WNV L3 circulates in Nebraska and to assess potential public health risks. The AEF Fellow will support this surveillance activity in Nebraska.

*Project #4 Objectives and Expected Deliverables:*

Amphibians and reptiles will be collected in Buffalo County, NE and other locations in the state. Blood samples will be obtained via venipuncture and tested at CDC or other partner laboratories for WNV exposure and infection.

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Seroprevalence will be determined using plaque reduction neutralization tests (PRNT), and active infections will be detected using RT-qPCR. Mosquitoes will be collected using CDC Light Traps and CDC Gravid Traps. Mosquito samples will be tested for WNV by RT-qPCR in the DVBD-ADB-EET molecular lab.

*Project #4 Impact:*

Findings will inform WNV surveillance strategies and public health guidance for this rare strain, be published in peer-reviewed journals, and presented at professional meetings. Results will help public health officials understand L3 transmission patterns and improve outbreak preparedness.

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

The Fellow will be expected to respond to acute and emergent problems related to infectious disease epidemiology, including emergency response activities related to naturally occurring or intentional events which have actual or potential impact on infectious disease morbidity/mortality. The fellow will be included as a member of the Epi Response Team that is engaged in case of any potential large-scale event or outbreak. Nebraska’s Public Health Preparedness Program offers training and exercises to ensure Nebraska’s preparedness in the event of an incident or attack involving biological, chemical, radiological or other agents of bioterrorism. The Fellow can access this training and participate in such exercises.

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

The Fellow will assist with foodborne disease outbreak investigations. Depending on the number and frequency, there will likely be opportunity for the Fellow to take the lead on an outbreak investigation which includes case identification, interviewing cases, data analysis, and writing reports.