ID: 75874773
Infectious Diseases - Host Site Description
Denver Department of Public Health & Environment

Assignment Location: Denver, US-CO
Denver Department of Public Health & Environment
Epidemiology and Data Science, Shared Service and Business Operations Division

Primary Mentor: Paige Andrews, PhD in Epidemiology (expected summer 2025), MS Epidemiology, BA Mathematics, BA Economics with honors
Senior Population Health Epidemiologist
Denver Department of Public Health & Environment

Secondary Mentor: Leslee Warren, MS Epidemiology, BS Molecular Biology
Epidemiology Unit Supervisor
Denver Department of Public Health & Environment

Work Environment
Hybrid

Assignment Description

This position will sit within the Epidemiology and Data Science (EDS) program under the DDPHE Shared Services and Business Operations (SSBO) division. The EDS program comprises of three units, including data science, communicable disease epidemiology, and disease intervention. The communicable disease epidemiology and disease intervention teams work in tandem, with the disease intervention team leading investigation and management of cases, and the epidemiology team supporting outbreak investigations, surveillance activities, and subject matter expertise support. The epidemiology team works with a variety of other programs/divisions across the agency to respond all communicable disease related needs, such as Environmental Quality for mosquito and vector surveillance, Denver Animal Protection for rabies and animal bite management, Public Health Investigations for outbreaks in regulated settings, Emergency Preparedness for response coordination and planning, and Workforce Development who leads the academic health department work.

The Fellow's primary mentor works within the Data Science unit of the EDS program. As the Senior Population Health Epidemiologist, Paige, leads a variety of projects that support the agency's priority areas as well as the City and County of Denver Mayoral initiatives. Most recently, Paige is leading DDPHE's firearm prevention work, supporting the Community Health Assessment, and expansion of various data sources. While the Fellow's routine day-to-day work will be communicable disease focused, they will gain experience working with Paige and other Data Science team members to support other chronic disease, behavioral health, and population health focused work.

The Fellow's secondary mentor works within the Epidemiology unit of the EDS program. The bulk of the Fellow's day-to-day work will support all communicable disease response activities, including data analysis and disease surveillance. As a communicable disease generalist, the Fellow will manage outbreaks of all pathogens and settings, lead and support complex case investigations, and engage in field work to support disease prevention (i.e. vaccination clinics, post-exposure prophylaxis clinics, educational campaigns). The Fellow will be asked to serve as an epidemiology subject matter expert for a variety of internal and external partners, represent our program on partner meetings, create communications materials, present findings, and respond to data requests. They will support disease surveillance activities, including running reports, building data visuals, evaluating and disseminating trends, identifying clusters and outbreaks, and enhancing our routine surveillance capabilities. Similar to the other communicable disease epidemiologists, the Fellow will have individual and collaborative epidemiology focused projects/data work in addition to their routine outbreak and surveillance work. They will participate in state and local training exercises, tabletops, and

preparedness activities including participating in DDPHE's Incident Management Team. If interested, the Fellow will have the opportunity to support program interns and mentor students.

Support for largescale responses for complex pathogens can include: coordinating specimen collection and testing, coordinating mass prophylaxis events, conducting contact tracking and symptom monitoring, implementing isolation and quarantine requirements, coordination of vaccine clinics, supporting education and outreach campaign, database management, and building of surveillance systems for real-time data collection. Specific examples of recent responses include: community-wide outbreak of meningococcal disease affecting persons experiencing houselessness, hepatitis A in food workers, measles contact tracing, response to rabies positive puppies, and multiple foodborne illness outbreaks of varying etiologies.

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

There several surveillance systems and data sources that the Fellow will routinely utilize in their day-to-day work. All disease investigation and outbreak reporting data lives in the statewide communicable disease database, EpiTrax. The communicable disease epidemiology team run reports from EpiTrax to monitor disease trends, identify clusters, and feed the public-facing data dashboards. To support investigations and responses, the Fellow will have access to the Colorado Immunization Information System (CIIS) for location of immunization records, the Colorado Regional Health Information Organization (CORHIO) for review of medical records from all major hospital systems in Colorado, and emergency department syndromic surveillance data through ESSENCE. The Fellow may utilize other population health sources such as The Health Kids Colorado Survey, the Behavioral Risk Factor Surveillance System (BRFSS), and the American Census Survey (ACS) data, to support their data work and other epidemiology projects. One of the benefits of working with Paige as the primary mentor is her experience and expertise in synthesizing data across multiple data sources. While this list highlights data sources routinely used by the EDS program, the Fellow would be encouraged and supported in to identifying and incorporating other relevant data sources into their projects.

Software available to the Fellow include REDCap, R, Python, ArcGIS, and Microsoft Office products including MS Excel, Forms, and Power BI. The Fellow will have multiple levels of technical support from team members in both the epidemiology and data science unit for navigating and utilizing all data sources and software. Statistical and data support can also be provided by DDPHE team members, with the ability to also seek external support from state partners and ColoradoSPH academic partners.

Projects

Surveillance Activity Title: Develop Public-facing Surveillance Dashboards Displaying Trend Data and Aggregated Demographics for Communicable Diseases Investigated by DDPHE

Surveillance Activity Description:
As one of many takeaways from the COVID-19 pandemic, DDPHE remains committed to furthering efforts towards data transparency. In 2023, the EDS team published the first iteration of public-facing data dashboards to display pathogen-specific trends and aggregate case demographics for a select number of enteric and vaccine-preventable diseases. While the dashboards are well received, the current versions require manual data cleaning and refreshing, which has limited the number of pathogens included to this point. With the switch to EpiTrax in May 2025, LPHA's now have API access and more flexibility to create more responsive and real-time dashboards. With support from the Data Science unit, the Fellow would lead the creation of the second iteration of the data dashboards, expanding the breadth of data displayed to include all pathogens investigated by DDPHE.

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Surveillance Activity Objectives:
The primary objective is to build 4 dashboards to display pathogen-specific data for 1) enteric diseases 2) vaccine-preventable diseases 3) respiratory diseases 4) zoonotic and waterborne diseases. The dashboards will include monthly and yearly reporting trends per pathogen as well as selected case demographics that have been aggregated to protect privacy. The Fellow will work with the Data Science unit to setup the API, write code to clean the data, and automatically refresh the dashboards on a weekly basis. The dashboards will be in compliance with DDPHE/CDPHE privacy standards (i.e. suppression of small counts) as well as accessibility compliance.

Surveillance Activity Impact:
The Fellow would produce data dashboards in PowerBI which update weekly and live on the public-facing Communicable Disease Epidemiology pages on the DDPHE website. The data dashboards allow for near real-time tracking of temporal trends and visual comparison of case rates and demographics, that will be utilized by the EDS program, internal partners, and external partners. Internally, the data dashboards support our program's routine surveillance work, evaluation of capacity/surge support needs, and overall awareness of disease burden in the community. Externally, anyone who may be interested in Denver-specific data including community partners, media outlets, students, etc can understand what is circulating and what DDPHE is responding to. Case rates and notable trends are also reported to DDPHE executive leadership on a monthly basis and escalated to city leadership, as needed.

Surveillance System Evaluation Title: Compare Alignment of Trends in ESSENCE Syndromic Surveillance Data to Communicable Diseases Reported to EpiTrax

Surveillance System Evaluation Description:
ESSENCE is a widely utilized database to evaluate near real-time emergency department (ED) patient data. While DDPHE interacts with ESSENCE for a variety of targeted projects (i.e. weather related injury), it's use as a surveillance tool for communicable disease has been underdeveloped, to this point. In order to integrate data from ESSENCE into DDPHE's routine disease surveillance it is critical to understand if and how ED reports are aligning with the case and outbreak rates in the community. The goal of this evaluation project is for the Fellow to determine how ESSENCE can fill in the gaps for certain communicable diseases or groups of diseases where routine disease surveillance (i.e. EpiTrax case reporting) only captures a small portion of what is truly circulating in the community. The Fellow will work with both mentors, team members from the epidemiology unit, and state and LPHA partners experienced in querying and interpreting ESSENCE data to support this work.

Surveillance System Objectives:
Following initial evaluation and understanding of working in ESSENCE, the Fellow will select communicable disease conditions and select or refine queries to identify representative ED visits. The Fellow will quantify and describe the rates, patient demographics, and geographic spread, in comparison to the case data reported into the EpiTrax database for all Denver County residents. Based on the findings, the Fellow will propose a new protocol for querying ESSENCE, comparing ED reports to select communicable disease conditions on a standard cadence. The Fellow will determine what variables to report out on and how to interpret the community trends using both of data sources.

Surveillance System Impact:
One of the primary hurdles in conducting disease surveillance are the limitations of what data is required for reporting, or in many cases not required. One such example is surveillance for norovirus. While DDPHE investigates outbreaks of norovirus, individual cases of norovirus are not reportable in the state of Colorado. The communicable disease team uses outbreaks as an indicator of seasonal transmission and trends, but may not be representative of the general population. This is similar to other respiratory illnesses (COVID-19, influenza, RSV), where only hospitalized cases and pediatric deaths are required for reporting. Utilizing additional data sources such as ESSENCE create a fuller picture of the true burden of illness in the Denver community.

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Major Project Title: Advance One Health Capacity and Data Sharing Between Denver City Agencies

Major Project Description:
DDPHE's urban landscape is host to diverse human, domestic animal, and wildlife interactions. While DDPHE has the foundation building blocks to integrate a One Health approach, zoonotic, environmental, and animal/human interaction data is spread between multiple city agencies on a variety of different databases (i.e. DDPHE Environmental Quality, Denver Animal Protection, Denver Parks & Recreation, Colorado Parks & Wildlife). Although direct communication and coordination in responding to zoonotic disease events is strong between teams, there is no data infrastructure to support proactive and sustainable surveillance activities. The city and community partners who work in the One Health space are often siloed to each individual agency, leading to potential gaps in communication, unified responses, and surveillance activities. The Fellow would lead efforts to break down these siloes to advance capacity, coordination, and data integration, for those working in the One Health space across the City and County of Denver.

Major Project Objectives:
The Fellow will conduct a landscape analysis of DDPHE programs, external organizations, and city agencies who work at the intersection of human, animal, and environmental health. The Fellow will lead communications with these stakeholders to gauge interest in forming a One Health partner workgroup. This workgroup will meet on a regular cadence with the goal of defining a shared vision of what One Health means in the City and County of Denver. The workgroup may explore topics to explore each partner's current data systems and surveillance work, identify gaps or barrier to current surveillance, further shared communications, and moving the needle towards building a centralized database for One Health data sharing. The feedback from the workgroup will inform building and piloting an internal, centralized surveillance system to track reports of zoonotic disease cases, wildlife die-offs, positive mosquito pools, rodent infestations, rabies exposures, animal bites, etc.

Major Project Impact:
While One Health work is happening all around us, there have been no centralized or coordinated efforts to align this framework between DDPHE's internal programs, other city agencies, and external partners. As DDPHE has recently learned through the highly pathogenic avian influenza response, the fragmented data systems and processes between groups leads to inefficiencies, duplication of efforts, and gaps in communications. With the Fellow's leading efforts to bring together the relevant partners, create opportunities to collaborate, and drive new standards of data surveillance, it will be the foundation for longer-term progress to enhance One Health capacity across the county.

Additional Project #1 Title: Improve Cluster and Outbreak Detection for Enteric Diseases Using Qualitative Data Fields
Project #1 Type: Surveillance Activity

Project #1 Description:
In 2024, DDPHE disease intervention staff conducted >800 case investigations associated with reportable enteric diseases. Enteric disease investigations comprise of questions to assess course of illness, outcomes, high-risk travel or occupational exposures, and a variety of food and restaurant exposures. Responses to these enteric case interviews can be both quantitative and qualitative. Prior to the transition to EpiTrax, the previous disease surveillance system had more limited capability to create customized reports and data exports, making it difficult to identify common exposures. While this barrier has been solved, the qualitative fields used to collect exposure information prove difficult to identify commonalities. The Fellow would lead efforts to develop a more systematic method to review case notes and qualitative data fields to compare cases and identify matching exposures.

Project #1 Objectives and Expected Deliverables:
DDPHE utilizes the software, ATLAS.ti, to evaluate qualitative responses and categorize the data into themes. The Fellow would be trained by the data science and epidemiology unit team members who are familiar with coding the data and

interpreting results in ATLAS.ti. Evaluating an individual pathogen, the Fellow would upload the qualitative data fields into ATLAS.ti to find the most common exposure themes amongst cases. Based on the prevalent themes identified by the software, they will conduct a deeper dive into the individual cases to determine how specific or accurate the overlap in exposures is. They will present their findings to the communicable disease epidemiology team, create a proposed protocol for routine review of this qualitative data, and best practices for how to interpret the themes identified by ATLAS.ti.

Project #1 Impact:
The inability to systematically review case notes and exposure data fields delays the time to identify potential clusters and outbreaks. This delay has cascading effects for initiation of further investigation, delayed interventions, and propagated spread of illness. This project would advance our program's disease surveillance capabilities and ability to respond to outbreaks in the most timely manner possible. Additionally, the findings may inform improvements or help standardize the way investigators complete the qualitative data fields, potentially improving the likelihood of catching common exposures between cases.

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

As part of their fellowship, this person would participate in DDPHE preparedness and response efforts in two ways: First, they would fill a specific role on the DDPHE incident management team (IMT), which is managed by the Emergency Preparedness and Response team. The IMT includes representatives from every division and requires members to participate in quarterly meetings and trainings related to emergency response and their specific roles on the IMT. Involvement on the IMT would also require participating in "EPR 101" type trainings to ensure they're up to speed on emergency preparedness principles.

The communicable disease epidemiology unit consistently collaborates with DDPHE's Emergency Preparedness and Medical Operations division to plan and respond to communicable disease threats in the community. This includes reviewing and updating response plans, evaluating processes with partners such as Denver International Airport, CDC Port Health, paramedics, and first responders, and planning and participating in exercises or tabletops. Their role would likely include leveraging EMS and hospital data to conduct surveillance and analysis, as well as taking on other data-related projects as needed. They would also have many opportunities to work alongside the public health nursing team during responses, especially those requiring urgent vaccine clinics, health education, or guidance, supporting as the epidemiology subject matter expert.

The Fellow's time allocation will be dependent on current responses and activations, but on average can expect to participate in preparedness activities about ~10 hours per month. The Fellow will be required to complete the basic Incidence Command Structure training courses (ICS 100, ICS 700), but will have the opportunity to take the more advanced courses as interested. The Fellow will be N95 fit-tested in order to participate in field work that may require higher levels of PPE.

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

DDPHE investigates and responds to >150 outbreaks per year, varying in etiology, population, and outbreak settings. In addition to their project work, the Fellow's primary role will be supporting cluster and outbreak investigation working on the communicable disease epidemiology team, as described above. The Fellow will be trained in outbreak management, in order to independently investigate clusters, lead outbreak management, and participate in largescale program/agency responses to complex pathogens.