ID: 59950445
Environmental Health, Chronic Disease - Host Site Description
Minnesota Department of Health

Assignment Location: Saint Paul, US-MN
Minnesota Department of Health
Environmental Health

Primary Mentor: Jessie Carr, DrPH, MPH
Epidemiologist Supervisor Senior
Minnesota Department of Health

Secondary Mentor: Tess Konen, MPH
Principal epidemiologist
Minnesota Department of Health

Work Environment
Hybrid

Assignment Description

The Minnesota Department of Health is in the Twin Cities Metro area, which has a population of about 4 million and was voted one of the most diverse cities, with the largest Hmong population in the US, a large Somali population, and home to Little Earth, a residential housing area for American Indians. Minnesota has a lot of outdoor activities to offer with lakes built into the city, voted the most bike-friendly city in the US, and beautiful hiking in the local parks. Minnesota has a wonderful arts scene with dozens of theaters in Minneapolis; Northeast Minneapolis is one of the country's greatest art districts with more than 400 artists.

The fellow will work on applied epidemiology projects to understand and address environmental health disparities. This CSTE fellowship offers hands-on experience applying epidemiology to real-world environmental health challenges, from analyzing statewide biomonitoring data in young children to assessing air pollution, climate, and housing-related health impacts. The fellow will build strong analytic and surveillance skills while translating findings into action for communities facing environmental health disparities

The fellow will join our environmental epidemiology unit at the Minnesota Department of Health. This unit includes two programs: the MN Biomonitoring program and the MN Environmental Public Health Tracking (EPHT) program. The MN Biomonitoring program measures levels of chemicals in Minnesotans and whether chemical exposures differ between groups and over time. The Healthy Kids Minnesota program is working to better understand and take action to prevent children's exposures to chemicals that may harm development. In partnership with school districts, local public health, and tribal nations, the program uses biomonitoring to measure chemicals in preschool-age kids across the state.

The Environmental Health Division inspects and monitors the environment to ensure it is safe for the public. They collect environmental data on water quality, air quality, and lead poisoning that we utilize for our surveillance work. Our environmental epidemiology unit is within the Environmental Health Division, and we coordinate and collaborate with numerous programs such as indoor air, lead poisoning, and climate and health. We work collaboratively across many programs not only in this division, but across the health department to provide epidemiology support for analyzing, interpreting, and conducting on-going surveillance. There are many data scientists to support the fellow as they apply their training, to share resources, and to teach them how to analyze, interpret, and display data for public health use.

ID: 59950445
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Day-to-day activities: Day-to-day activities will include independent work and analysis time, team meetings, communities of practice, and professional development resources, relationship building and communications with partners, and socializing with co-workers. Day-to-day work responsibilities include reviewing, summarizing, and collating data; project planning; collaborative meetings; and data formatting and coding analysis.

The fellow will meet with their mentors weekly to discuss priorities, progress, and to get any feedback and direction. Each project will have a mentor to support and collaborate with them. We have monthly epidemiology team meetings to share our work and get feedback on analyses. They will also join our weekly biomonitoring team meetings and our unit meetings.

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

A broad range of tools are made available to the fellow through the standard MDH operating environment. The Office suite of products offers access to analytic tools like Microsoft Excel and Access. Additional software can be purchased or licensed and installed for the Fellow workstation (Endnote, Power BI, SAS, ESRI ArcGIS, etc.). Analysis can be done in SAS and/or R with Power BI as a visualization tool.

Many opportunities for training on the tools are available including classes, community of practice groups, university trainings, and hands on training from mentors and staff. Our program works with many datasets and works closely with data stewards and users across the agency.

Projects

Surveillance Activity Title: Conducting Routine Surveillance on Chronic Disease Indicators

Surveillance Activity Description:
The fellow would be responsible for analyzing, interpreting, and displaying data on the MN EPHT data portal for a few chronic disease indicators (chronic obstructive pulmonary disease, asthma, and myocardial infractions). These indicators are important for informing wildfire exposure impacts, in partnership with the MN Pollution Control Agency. These hospital discharge data are collected from the Minnesota Hospital Association and are a complex and robust dataset to work with. They will conduct annual and seasonal trends, assess at-risk populations using significance difference testing for age groups and gender, and map rates to see geographical patterns and use significant difference to identify areas of concern. This could be expanded to include utilizing syndromic surveillance of respiratory impacts from wildfires, which have been increasing in frequency and severity.

Under the guidance of their mentors, the fellow will learn ArcGIS mapping, hospital discharge analysis using SAS, formatting Census population data to calculate age-adjusted rates, conducting significance testing, interpreting data appropriately, developing the data for display, and using data visualization software.

This would include the annual analysis and data interpretation and presentation. In their second year, the fellow will learn how to conduct CDC data submission for grant requirements to assist the program with meeting our grant deliverables.

Surveillance Activity Objectives:
The chronic disease indicators will be analyzed, and the charts, tables, maps, and interpretive messaging will be updated. The required data will be formatted and submitted to meet CDC's data submission requirements.

ID: 59950445
Environmental Health, Chronic Disease - Host Site Description
Minnesota Department of Health

Surveillance Activity Impact:
The chronic disease surveillance data will be maintained and updated for on-going surveillance and to inform air pollution impacts.

Surveillance System Evaluation Title: Developing and Validating a Query for Identifying Persons Experiencing Homelessness in Syndromic Surveillance

Surveillance System Evaluation Description:
Persons experiencing homelessness (PEH) face disproportionate health burdens across multiple domains-including injuries, environmental exposures, infectious diseases, and chronic conditions-yet remain largely invisible in traditional public health surveillance systems. Housing instability is a fundamental social determinant of health, but most health surveillance systems either do not include reliable measures of housing status or exclude unhoused people from data collection entirely. For example, recent work in New Mexico found that syndromic surveillance data revealed two-to-four times as many unique individuals with evidence of homelessness compared to the official annual point-in-time count for the state, highlighting massive undercounting in traditional enumeration methods.

Clinicians frequently document housing status and social determinants of health in electronic health records, but this information appears primarily in unstructured free-text fields (such as triage notes) rather than structured diagnosis codes. In Multnomah County, Oregon, analysts developed a query combining coded homelessness indicators with keyword searches across free-text fields to identify PEH in emergency department visits. Their query achieved 88-97% accuracy and 76-77% sensitivity when tested against manual chart review across different health conditions. However, approaches vary widely across jurisdictions, and no standardized, validated query exists for consistent identification of PEH in syndromic surveillance data.

Without reliable surveillance data on PEH, health departments cannot adequately monitor health disparities, respond to emerging threats (such as extreme weather events), or evaluate the impact of interventions designed to improve health outcomes for this vulnerable population. Standardizing methods for identifying PEH in syndromic surveillance would enable routine monitoring of morbidity patterns, support targeted public health responses, and provide evidence to inform resource allocation and policy decisions.

Surveillance System Objectives:
The fellow would develop and validate a comprehensive query for identifying persons experiencing homelessness in syndromic surveillance data (ESSENCE or similar platforms) and evaluate its performance against manual chart review as the gold standard.

The fellow will utilize established validation methodologies including sensitivity, positive predictive value, and overall accuracy assessments.

Surveillance System Impact:
A validated, standardized query for identifying PEH in syndromic surveillance would enable routine monitoring of health outcomes in this population, support evidence-based resource allocation, and provide actionable data to inform public health responses to events like extreme weather. This project directly advances health equity by making visible a population that has been systematically undercounted and underserved.

ID: 59950445
Environmental Health, Chronic Disease - Host Site Description
Minnesota Department of Health

Major Project Title: Analyzing Biomonitoring Data from the Healthy Kids Minnesota Program

Major Project Description:
Biomonitoring is an increasingly important tool in environmental public health surveillance. Healthy Kids Minnesota (HKMN), a statewide biomonitoring program focused on children's environmental exposures, is a groundbreaking new MDH effort, funded with support from the CDC's 2024-2027 State-Based Public Health Laboratory Biomonitoring Programs funding. Using a population-based sampling approach, the program works with partners at school districts, local public health agencies, and tribal nations to recruit children through Early Childhood Screening appointments. These developmental screenings are a pre-kindergarten requirement for all Minnesota children. With family consent, a urine sample is collected and analyzed by the MDH Public Health Laboratory for over 70 chemicals of concern within six categories of chemicals: metals, pesticides, polycyclic aromatic hydrocarbons (PAHs), environmental phenols, phthalates, and flame retardants.

HKMN moves to different regions of the state in a five-year cycle, working in one Metro and one non-Metro region each year. Launched in 2021, four of the five program years are completed and recruitment will begin again in spring 2026 to complete the final program year. The program has been hugely successful so far, recruiting over 1,800 children and achieving participation rates of 55-75%. Results are used to assess population exposures, identify disparities that may exist, and inform actions needed to reduce these disparities and ensure a healthy start for all Minnesota children.

A huge amount of data is collected as part of the program. In addition to individual-level biomonitoring results for all 70+ chemicals, families answer survey questions about background factors and possible sources of exposure their child may have had to the chemicals including drinking water source, diet, personal care product use, home and yard pesticide use, etc. Some families choose to receive free private well testing, results of which can be compared to biomonitoring measures. We have geographic location for each child along with environmental exposure data layers such as crops grown in certain areas and vehicle traffic measures.

Major Project Objectives:
- The AEF will analyze survey responses and biomonitoring results.
- Assess population exposure and compare to the National Health and Nutrition Survey (NHANES).
- Identify differences in exposure by household income, rural/urban status, race/ethnicity, and other factors.
- Investigate exposure sources using survey and environmental data. Utilize epidemiologic methods that account for confounding and effect modification, correlated data, and non-normally distributed outcome variables.
- Produce data reports for partner organizations and to inform community reports, presentations to Advisory Panel and national meetings, at least 1 peer-reviewed scientific publication.

Major Project Impact:
Through this project, the results from Healthy Kids Minnesota - a first-time state effort to proactively examine childhood exposures to chemicals across the state - will be analyzed, interpreted, and shared widely with partners and the scientific community. The results will provide key information for public health action and exposure reduction messaging, with the broader public health goal of reducing childhood exposures to chemicals that may harm child development.

ID: 59950445
Environmental Health, Chronic Disease - Host Site Description
Minnesota Department of Health

Additional Project #1 Title: Evaluating Radon Testing Trends and Risk Messaging for Minnesota's Environmental Public Health Tracking Portal
Project #1 Type: Surveillance Activity

Project #1 Description:
Radon is a naturally occurring radioactive gas that is the leading cause of lung cancer among non-smokers and the second leading cause of lung cancer overall in the United States. In Minnesota, radon poses a significant public health concern due to the state's geology, with the Minnesota Department of Health historically communicating that approximately 2 in 5 homes have elevated radon levels (at or above the EPA action level of 4 pCi/L). This messaging has been used for years to convey risk to homeowners and promote radon testing and mitigation.

Minnesota's Environmental Public Health Tracking (EPHT) program maintains a comprehensive radon database containing test results from thousands of Minnesota homes. Recent preliminary observations suggest that radon levels may be declining over time, raising important questions about whether current risk messaging accurately reflects Minnesota's radon landscape. Potential factors contributing to declining levels could include changes in housing stock (newer homes with radon-resistant construction techniques), increased mitigation in previously tested homes, seasonal variation in testing patterns (more spring/summer testing in recent years versus historical fall/winter testing), or changes in testing technology and protocols.

Without systematic evaluation of these trends, Minnesota may be communicating outdated risk estimates that either overstate or understate current radon exposure. It is critical to determine whether the "2 in 5 homes" messaging should be updated to reflect current conditions, or whether observed declines are artifacts of changing testing patterns rather than true reductions in radon exposure risk.

Project #1 Objectives and Expected Deliverables:
The fellow will produce a comprehensive report with charts and maps, calculate the current proportion of homes above the EPA action level, provide recommendations for updated messaging, and update radon data displays for the EPHT portal.

Project #1 Impact:
This work will ensure Minnesota’s radon risk communication is accurate and actionable, supporting evidence-based awareness campaigns and informing policy decisions to reduce preventable cancer risk.

Additional Project #2 Title: Conduct data portal needs assessment and evaluation survey
Project #2 Type: Other

Project #2 Description:
MN EPHT program hosts the MN Public Health Data Access Portal; a central location for disseminating aggregate, public data, visualizations, maps, and risk information across MDH program areas. As part of a multi-year data modernization project, we plan to conduct a needs assessment and evaluation survey to gather information about data dissemination gaps, needed analysis tools, and user experience. We will also conduct key informant interviews and interactive feedback sessions with key data users and stakeholders, including Local Public Health departments, data stewards, external data users and community-based organizations.

Our EPHT program manager, also a senior epidemiologist, will lead this project and provide mentorship throughout. The fellow will participate in developing the survey instrument in REDCap and assist with the survey implementation design. The fellow will be the lead on survey analysis to analyze across different data user populations, as well as synthesizing and integrating qualitative information.

ID: 59950445
Environmental Health, Chronic Disease - Host Site Description
Minnesota Department of Health

Project #2 Objectives and Expected Deliverables:
The fellow will write a report on the findings and present to our team of data stakeholders and at our advisory panel meeting.

Project #2 Impact:
These findings will be used to develop a strategic plan and data portal roadmap for expanding topics and data displays to meet our users' needs.

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

Emergency Preparedness and Response Division will provide opportunities to learn more about emergency preparedness and response at the state level. The fellow will be expected to take basic MDH public health preparedness courses on Incident Command Structure. Additionally, the fellow can learn about disaster epidemiology by participating in the CSTE Disaster Epidemiology Subcommittee calls and workshops alongside her secondary mentor. The fellow's anticipated role should comprise 5% or less of their total allocated time.

Potential activities:

- Orientation to the Emergency Preparedness and Response Division to include an overview of the public health preparedness program and healthcare preparedness program.
- Participation in MDH response and incident management workshops and exercises. Share information of related emergency preparedness workshops and conferences in Minnesota.
- Attendance at a meeting with partners to enhance knowledge of preparedness and response training in Minnesota. Meetings include:
    - Science Advisory Team, established by MDH to develop operational processes for the provision of crisis clinical care in the event of a public health emergency and provide clinical and operational expertise to MDH prior to and during events requiring such input.
    - Regional Hospital Preparedness Quarterly Meeting which includes the regional healthcare preparedness coordinators, public health preparedness consultants, members from health care coalitions and MDH staff. These meetings provide for collaboration inter-regionally across the state for planning and response purposes.
    - Local Public Health meetings with directors and emergency preparedness staff for information sharing.
    - Tribal Emergency Preparedness meeting with tribal staff, EPR staff and staff from the MDH Office of American Indian Health.

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

We have connections with the infectious disease division and can have the fellow involved in those outbreaks. Our current fellow is working on the pertussis outbreak.

The environmental health section that our program is under conducts regular environmental investigations. The fellow could participate in environmental health response cadres at the Minnesota Department of Health. Their level of involvement depends on the need, fellow skillset, and where the response is currently at. They could be called upon to develop epidemiology study design with comparison populations including considering exposures and risk factors. They will complete informational briefs or summary reports after these investigations. The fellow's anticipated role in environmental or cluster investigations should comprise 5% or less of their total allocated time.