**ID: 59950445**
**Environmental Health - 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
Senior 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. These projects have an emphasis on environmental health exposures, health equity, and climate change impacts. This billet encompasses a wide range of applied epidemiology methods including survey analysis, health indicator development and validation, mapping of exposure and outcomes, and identifying vulnerable populations. The fellow will be working in important and critical areas of growth like children's environmental health, data on climate change, and air pollution disparities. The fellow will gain the skills for developing surveillance data, analytical analyses, and mapping skills, with the expertise of senior environmental health epidemiologists.

The fellow will join our environmental epidemiology unit at the Minnesota Department of Health. This unit includes two programs the MN Environmental Public Health Tracking (EPHT) program and the MN Biomonitoring program. The EPHT program tracks over twenty environmental health indicators across diverse hazards and health conditions. This is unique since many other state programs only focus on one topic; you can explore the breadth of public health data and areas with us.

The EPHT program's goal is to bridge the gap between environmental exposure and health outcome using robust surveillance, data visualizations, and public health messaging. The EPHT unit includes two senior epidemiologists and two Ph.D. epidemiologists with many years of public health experience in analyzing environmental data and health outcomes. Each of us are subject matter experts in certain topics and work on large, analytical projects looking at health equity and environmental health topics.

The MN Biomonitoring program measures levels of chemicals in Minnesotans and whether chemical exposures differ between groups and over time. This information is used to promote public health actions to reduce chemical exposures. They are currently implementing the Healthy Kids Minnesota statewide study that is measuring chemicals in preschool-aged children. This program includes two Ph.D. epidemiologists and a health communicator.

We also have a senior researcher who conducts independent, complex environmental analyses. 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.

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.

**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, Tableau, SAS, ESRI ArcGIS, etc.). Analysis can be done in SAS and/or R with Tableau 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 Comprehensive Surveillance on Climate Health**

*Surveillance Activity Description:*
The fellow would be responsible for analyzing, interpreting, and displaying data on the MN EPHT data portal for climate health indicators (heat-related illness and cold related-illness). 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 project will include identifying and formatting Census population data to calculate age-adjusted rates, collecting risk factor data from the American Community Survey (e.g. poverty, elderly living alone), and using heat index climatic data to provide context to the heat-related illness. Under the guidance of their mentors, the fellow will learn ArcGIS mapping, hospital discharge analysis using SAS, conducting significance testing, interpreting data appropriately, developing the data for display, and using data visualization software.

The fellow would be assisting with transitioning some topic areas to our new data portal and taking over the updates for some content areas. This would include the annual analysis, documenting how-to-guide and process steps, validating, and possibly some testing and evaluation with a partner. 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 heat-related illness and cold-related illness data will be analyzed, and the charts, tables, maps, and interpretive messaging will be updated. The required data will be formatted and submitted to mete CDC's requirements.

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*Surveillance Activity Impact:*
The environmental health surveillance data will be maintained and updated for on-going surveillance and to inform the governor's climate action framework.

**Surveillance System Evaluation Title: Evaluating Motor Vehicle Traffic Exposure Indicators with Health Equity Lens**

*Surveillance System Evaluation Description:*
Traffic contributes to local air pollution and noise levels, especially near major roads. Vehicle traffic is not spread evenly across urban areas. It is important to address traffic-related health risks to achieve health equity. For example, a recent study suggest that lower-income areas and communities of color in the Minneapolis-St. Paul metro area tend to have higher levels of traffic-related air pollution, even though these same residents generally drive less than residents of wealthier, majority-white areas do.

According to the Minnesota Pollution Control Agency (MPCA), most of the air pollutants of concern today come from on- and off-road vehicles including cars and trucks. Motor vehicles emit a complex mixture of pollutants, including ozone and particulate matter. Long-term exposure to traffic-related pollution is a risk factor for developing lung and heart diseases, and for early death.

Using CSTE's Percentage of Population Living Near Busy Roads definition we developed map displays of census tract estimates of the number and percent of Minnesota residents living within 300 meters of busy roads, where air pollution from motor vehicle traffic is highest. This case definition was selected at the time due to its broader definition of a busy road to incorporate inner city roads with heavy traffic. CDC also developed a traffic indicator based on residents living within 150 meters of highways. However, we have never quantified the difference between CSTE's traffic indicator and CDC's traffic indictor.

*Surveillance System Objectives:*
The fellow would evaluate CSTE's Percentage of Population Living Near Busy Roads and CDC's Percent of People Living within 150 m of a Highway traffic indicator to compare surveillance systems and to determine which indicator best captures Minnesota population motor vehicle exposure for urban and rural areas, keeping health equity concerns in mind. The fellow will utilize CDC's Guidelines for Evaluating Surveillance Systems and will work closely with EPHT PI mentor, Senior Epidemiologist, and CDC EPHT Climate Change Content Workgroup to evaluate and compare traffic indicators. Once a final indicator is selected, the fellow will develop charts, maps, and queries of trends and patterns in traffic exposure across Minnesota and populations of interest. Other potential outputs include a data brief, ArcGIS StoryMap, and presentations to our Content Work Group of data stewards and Advisory Panel.

*Surveillance System Impact:*
Vehicle traffic is not spread evenly across urban areas. It is important to address traffic-related health risks to achieve health equity. With traffic and air pollution discussions becoming more prominent, it's essential that we determine the ideal indicator and update and expand our motor vehicle traffic exposure data for use in public health and policy.

**Major Project Title: Children's Environmental Health Data Scan and Indicator Development**

*Major Project Description:*
Children's environmental health is an active and growing area of work in MN's public health systems, and focusing resources on developing data, reporting, tools, and partnerships around this critical area can help maximize disjointed efforts, clarify priorities and synergies, and provide an integrated view of disparities and needed interventions.

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The fellow will design, conduct, and synthesize a baseline data and needs assessment with MDH and external stakeholders and subject matter experts on children's environmental health. They will conduct an inventory of relevant data sources already in use by MN EPHT (e.g., childhood lead, asthma) or available through MDH programs (e.g., WIC), and will then work with current and new partners to assess gaps and priorities through key informant interviews, existing workgroups (e.g., MDH Schools and Childcare Workgroup), and an online survey. They will collaborate with key MDH stakeholders, including MN Biomonitoring, Childhood Lead, Healthy Homes, Toxic Free Kids, Maternal and Child Health programs and others, using EPA's America's Children and the Environment Report as a model.

The fellow will utilize existing MN EPHT data, developing new data sources on exposures in school and childcare settings, and conducting analyses to identify trends and disparities. and Then they will identify and start to develop expanded analyses focusing on children's environmental health by integrating critical behavioral, mental health, and exposure information with environmental health surveillance data on the MN Data Portal.

*Major Project Objectives:*
The fellow will develop a report on their findings of the children's environmental health inventory and key informant interviews. This will include recommendations on gaps and where to expand on children's environmental health indicators. They will start developing analyses to fill gaps. For example, MDH Asthma Program has identified asthma ED rates in younger age groups (5-14 and 15-24) as a target for improvement. The fellow will develop new analysis and visualizations for the MN Data Portal to better characterize ED visits in these age groups and help inform actions to reach this target.

*Major Project Impact:*
Children are a vulnerable group, and this is a growing and important area. We want to ensure we are providing data to inform and improve children's health.

**Additional Project #1 Title: Review and recommend top climate health indicators**
**Project #1 Type: Surveillance Activity**

*Project #1 Description:*
MN EPHT works closely with our partners in the MN Climate and Health program to develop and maintain climate health data. To support their strategic goals of tracking and reporting on the public health impacts of climate change, the fellow will review and recommend the next climate and health indicators we should adopt.

The fellow will review existing climate and health indicators, such as the State Environmental Health Indicators Collaborative (SEHIC) and CSTE established climate change indicators and the Lancet Countdown indicators. The SEHIC indicators are based on a comprehensive review of the scientific literature to identify outcomes and actions related to climate variability that could inform recommendations about the development of a suite of climate and health indicators. The Lancet Countdown tracks 47 indicators across five key domains: climate change impacts, exposures, and vulnerability; adaptation, planning, and resilience for health; mitigation actions and health co-benefits; economics and finance; and public and political engagement.

The fellow will interface with subject matter experts on various topics from water quality to vectorbourne disease, including collaborating with the state climatologist office. These efforts might include developing a survey of stakeholders to assess climate health indicator importance, data need, and data availability. They will collaborate with climate and health key stakeholders to reach a consensus on the top climate and health indicators using a criteria rubric and evaluation process. These recommended indicators will be informed by the 2021 Minnesota Climate and Health Strategic Plan, the Minnesota Climate Action Framework, a 2015 review and evaluation of MN climate and health indicators, and based on data quality and Minnesota specific climate health needs.

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*Project #1 Objectives and Expected Deliverables:*
The fellow will manage this project and provide a report based on findings and criteria evaluation. They will lead regular meetings with stakeholders and connect with subject matter experts. Information will be presented at the MDH Climate and Health Workgroup and the MN EPHT Content Team.

*Project #1 Impact:*
These findings will inform addition of new data to the MN Data Portal and goals for the MDH Climate and Health Workgroup.

**Additional Project #2 Title: Conduct needs assessment survey of data users**
**Project #2 Type:**

*Project #2 Description:*
The MN EPHT program is a robust program that hosts many indicators and data displays. To provide some direction for our data portal development, we plan to conduct a needs assessment survey of our partners to assess data needs and data utilization for applied public health use cases. This information will identify a suite of indicators based on the priority areas and gaps in our data portal for key partners like local public health, MDH programs, and community partners.

Our 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 be the lead on survey analysis to analyze across different data user populations. This analysis might require both quantitative and qualitative analyses.

*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)**

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 who is the co-chair. The fellow will work on an environmental health emergency preparedness project on capacity building for community water systems. The fellow's anticipated role in preparedness activities should comprise 10% or less of their total allocated time.

Climate change is expected to impact the frequency, duration, and intensity of rainfall events. The Midwest has seen an increase in very heavy precipitation in the last 50 years and more winter precipitation is falling as rain rather than snow. Flooding can cause sewage overflows, cause contamination of surface water, and waterborne disease outbreaks from contaminated drinking or recreational contact. Minnesota has community water systems (CWS) that serve approximately 80% of Minnesota residents. Water from these systems can come from groundwater (water found in underground aquifers, the pores between sand, clay, and rock) or from surface sources (rivers, lakes, and streams).

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Heavy rainfall and flooding events can cause an increase in contaminates such as coliform or arsenic. Knowing these threats to our drinking water systems, its necessary to have more data on emerging contaminates and understand the vulnerable areas of our state.

The fellow will develop, analyze, and integrate state public drinking water systems and the related spatial epidemiology evaluating current and potential emerging chemicals of concern. They will develop capacity to link drinking water contaminants with place-based vulnerabilities and human health surveillance, including knowledge of and improvements in the related public health infrastructure and emergency preparedness.

The drinking water/community water systems will be analyzed to update the MN Data Portal. The fellow will develop SAS/R code, prepare indicators (surveillance measures), choose new contaminants for analysis, assess vulnerable populations using equity metrics, create charts and maps, and draft a report and final presentation. They will work with key partners including MDH drinking water protection staff, MDH Climate and Health program, and MDH Emergency Preparedness staff.

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

The environmental health section that our program is under conducts regular environmental investigations. Currently, we are responding to concerns of elevated nitrate levels in private wells in southeast Minnesota. MDH is part of a coordinated and comprehensive response to reduce nitrate contamination of drinking water in eight southeastern Minnesota counties through identifying private well residences, outreach, and education about nitrate in groundwater, providing free well water testing and alternate water if private wells have nitrate concentrations above 10 parts per million, and maintaining public records about the nitrate work.

The fellow will be asked to participate in environmental or chronic disease cluster investigations, as available. 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.

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

This role does not involve COVID response work currently. In the event of an emergency declaration the fellow will be called upon to assist.

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

Health equity is embedded into each of the projects outlined in this billet. The health equity data analyses in these projects help identify risk factors, vulnerable populations, and population comparisons that allow us to better understand, identify, and intervene to reduce health disparities. The fellow will be encouraged to incorporate a health equity lens into their analyses and interventions, ensuring a focus on populations with varying needs. If the fellow has an interest in health equity, there are additional projects looking at health impacts by race/ethnicity or geography that they could participate in as well. Our department emphasizes the importance of fostering an inclusive environment, and fellows will be supported in developing culturally competent approaches to public health. We also have a Health Equity Community of Practice within our environmental health division that has quarterly presentations to be more informed about health equity.