

ID: 72764328

Environmental Health, Maternal and Child Health - Host Site Description

Multnomah County Health Department

Assignment Location: Portland, US-OR
Multnomah County Health Department
Environmental Health Services

Primary Mentor: Sarah-Truclinh Tran, PhD, MPH
Sr. Environmental Epidemiologist
Multnomah County Health Department

Secondary Mentor: Brendon Haggerty, MURP
Healthy Homes & Communities Manager
Multnomah County Health Department

Work Environment

Hybrid

Assignment Description

The CSTE Applied Epidemiology Fellow will join the Healthy Homes & Communities (HHC) team within MCHD's Environmental Health Services Department. HHC is a multidisciplinary team of 15 staff who provide core public health education, subject matter expertise, data monitoring, and applied research. The team informs practices and policies that improve residential and neighborhood environments, addressing critical issues such as lead poisoning, air quality, housing, the Portland Harbor Superfund Site, homeless encampments, climate change, and the built environment. HHC is situated within Environmental Health Services, which also provides food and lodging inspections, vector control, and vital records.

The Fellow's scope of work will be at the intersection of environmental health and parent, child, and family health. Primary projects will examine how environmental factors like severe weather, the built environment, and social determinants impact population health and wellness, such as pregnancy outcomes. The Fellow will use a variety of surveillance systems and datasets, including ESSENCE syndromic data, state surveys, meteorologic data, and vital records to glean insights that support MCHD program delivery, emergency preparedness, and resource allocation.

On a day-to-day basis, the Fellow will:

- Independently lead technical tasks, such as conducting literature searches, data management (data linkages, cleaning, and other quality control activities), and statistical analysis.
- Apply a health equity lens to all day-to-day activities and data projects.
- Collaborate with internal and community partners. Meet with mentors and peers.
- Research and prepare presentations, reports, memos.
- Develop and submit conference abstracts, manuscripts on behalf of MCHD.
- Attend and represent MCHD at local and national conferences, educational events, webinars, and collaboratives. Provide the team with key insights and recommendations based on the findings.
- Participate in employee resource groups and communities of practice at MCHD and beyond, as well as assist other HHC team members with community outreach, for professional growth and peer connection.
- Participate in training and educational opportunities about epidemiology, decolonizing research methods, public health policy, environmental justice, climate change, data analysis, etc. to advance knowledge and professional development.

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

Software: R, GIS, SAS/ Stata/ SPSS, Google suite, Microsoft Office suite.

Surveillance systems: Oregon ESSENCE syndromic surveillance (ED/urgent care visits data); Oregon Pregnancy Risk Assessment & Monitoring System (PRAMS), Behavioral Risk Factor Surveillance System (BRFSS), vital statistics, local surveys.

Statistical support: mentors and colleagues with practical experience in epidemiology (descriptive, inferential statistics), survey analysis with complex weighting, small sample analysis, R and SAS programming, data visualizations, mapping and spatial analysis in R and GIS. Also available at MCHD are communities of practice groups focused on R, data/research analysis, GIS, Oregon ESSENCE.

Projects

Surveillance Activity Title: Advancing public health monitoring of mental health outcomes in Multnomah County residents

Surveillance Activity Description:

This project is focused on establishing a standardized process for monitoring mental and behavioral health outcomes related to severe weather events and climate change in Multnomah County. The Fellow will develop protocols for data preparation, define meaningful health measures, and standardize code for ongoing analysis of climate-related mental health outcomes. The Fellow will leverage three primary data sources to capture diverse population impacts:

- 1) Oregon ESSENCE are near real-time emergency department and urgent care visit records submitted by participating health facilities. The Fellow will query diagnostic and triage notes to identify mental health outcomes- such as disaster-related mental health- for different populations of interest.
- 2) The Regional Climate-Mental Health Survey is a cross-sectional survey given to a convenient sample of tri-county residents that asked about self-reported climate anxiety, behavioral impacts, and coping strategies.
- 3) The Student Health Survey is a school-based survey given to 6th, 8th, and 11th graders that assesses mental/behavioral health and social support systems at home and school.

Surveillance Activity Objectives:

The Fellow will work with mentors and internal partners in Epidemiology and Behavioral Health to define meaningful mental health measures and public health use cases. The goals are to take inventory of available data sources, define key measures, and establish an analytic framework for ongoing monitoring of mental health impacts from severe weather among various populations.

Objectives:

- For each data source, define its sampled population and describe the available mental/behavioral health measures.
- Perform a literature review of mental/behavioral health measures used in public health surveillance.
- Use statistical software to analyze the prevalence, trends, and disparities in mental/behavioral health outcomes for specific populations covered by the data sources, including youths, ED/urgent care patients, and more.
- Apply data visualization principles to communicate findings in clear, concise, and actionable ways.

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Deliverables:

- Presentation to team, internal programs, and relevant external programs summarizing the data sources (sampling method, population, timeframes), health measure, summary of the data findings.
- Internal report to leadership summarizing the data findings with implications and recommendations for ongoing surveillance.
- Presentation of findings to statewide meeting, such as the Oregon Public Health Association conference, Oregon Epidemiologist Annual Meeting, or the Oregon Climate and Health Community of Practice.

Surveillance Activity Impact:

Current data regarding the mental health impacts of severe weather on our local population is limited, despite signs that these challenges are widespread. In this project, the Fellow will build a foundation for the continuous monitoring of climate-related mental health outcomes in Multnomah County. Data findings from this surveillance system will help quantify the mental health impacts of severe weather to inform equitable public health programming, assessments, and emergency responses. Furthermore, this project will strengthen relationships between HHC and Behavioral Health teams, aligning our programs toward the common goal of mitigating mental health risks from environmental exposures.

Surveillance System Evaluation Title: Evaluation and refinement of a respiratory illness query for syndromic surveillance

Surveillance System Evaluation Description:

Working with content experts, the Fellow will design and implement an evaluation of an existing syndromic surveillance query used to identify non-infectious respiratory illness (NIRI) visits in emergency departments and urgent care clinics. The existing query is known to have flaws, for example a high rate of false positives. It is currently used as a performance measure for public health programs that focus on air pollution and climate impacts, as well as in epidemiologic investigations of environmental exposures and emergency response.

Surveillance System Objectives:

Objectives:

- Work with HHC team members and other content experts to refine the NIRI query to improve its data accuracy and utility for near real-time public health action.
- Assess the query's performance- specifically its accuracy, sensitivity, and specificity- relative to a gold standard method, such as manual review.

Deliverables:

- Technical report featuring the query's classification accuracy statistics and statistical analyses that compare NIRI patterns and trends against other data sources, along with recommendations for refining the surveillance approach.
- Disseminate findings through presentations to a statewide meeting such as the Oregon Public Health Association conference, Oregon Epidemiologists Annual Meeting, or the Oregon Climate and Health Community of Practice.

Surveillance System Impact:

Non-infectious respiratory illness is an important indicator for several Multnomah County programs addressing environmental exposures, including wildfire smoke, pollen, and general air pollution. Because the existing query is used in reporting on state grants and is an accountability metric for all Oregon public health jurisdictions, its accuracy is critical. We expect the improved NIRI query will provide higher-quality data for: 1) Program evaluation for our woodsmoke curtailment program; 2) Measuring the impact of air pollution events; 3) Routine surveillance reporting; 4) Emergency response.

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With this information, we can adjust our interventions to reduce acute and chronic disease related to environmental exposures.

Major Project Title: Examining the independent and interactive effects of temperature and outdoor air pollution on pregnancy outcomes in Multnomah County

Major Project Description:

The project purpose is to examine the independent and interactive effects of extreme heat and air pollution on birth outcomes in Multnomah County. A previous retrospective cohort study by our team revealed that exposure to high temperatures during the last week of pregnancy significantly increased preterm birth risks by 15%. The association was pronounced for pregnant individuals who lived in census tracts with low climate resilience and high social vulnerability. As wildfires- and the resulting intersection of extreme heat and smoke- are becoming more frequent in the Pacific Northwest, this follow-up analysis is critical to quantify how these combined exposures impact maternal and infant health.

The Fellow will have the latitude to refine the research question based on their interest and technical expertise. The analysis will leverage three main data sources: Multnomah County birth records, daily temperature measurements, and PM2.5 air pollution data for the Portland Metro area. Birth record data- which contains demographic, health status, and birth outcomes information- serves as a vital source for understanding health and health disparities in birthing people and infants. By linking these records on date of birth to spatial and temporal environmental data, the Fellow will investigate how environmental exposures prior to delivery influence birth outcomes.

Supported by a literature review and guidance from mentors and PCFH program staff, the Fellow will select an appropriate study design (e.g., retrospective cohort design, case-crossover) for their study question(s). They will define the study population, exposures, outcomes, confounders, and effect measure modifiers. The Fellow will carry out robust analyses to address three aims: 1) Characterize the study population using counts, means, and proportions to describe the distribution of demographic and social determinants of health; 2) Estimate the independent effects of extreme heat and PM2.5 exposure on adverse pregnancy outcomes, such as severe maternal morbidity, preterm birth, small-for-gestational age infants. 3) Quantify effects of overlapping heat and air pollution exposures on these pregnancy outcomes, identifying which communities face the highest cumulative burden and greatest risk of birth complications.

Major Project Objectives:

Objectives:

- Design and execute an environmental epidemiologic study investigating the impacts of high heat and air pollution exposures on birth outcomes in Multnomah County.
- Gain experience managing and merging multiple disparate datasets for applied public health research.
- Perform descriptive and advanced statistical modeling to analyze health impacts from environmental factors.
- Identify and describe the magnitude and disparities in the associations between environmental and social factors that affect local community health.
- Interpret data findings to provide actionable recommendations, based on integrating local program context with broader evidence-based interventions.
- Collaborate with others (e.g., environmental health, maternal & child health) to refine each phase of the research, including determining communication/dissemination strategies to internal and external audiences.

Deliverables:

- Present findings to diverse audiences, including: MCHD programs, external partners working in the parent & family health fields, and at local conferences.
- Prepare draft of manuscript for publication.

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Major Project Impact:

The expected public health impacts of this project are significant. By quantifying the “compounding” risk of heat and air pollution, this project provides MCHD and our partners with local evidence/data needed to drive targeted, equity-centered interventions to prevent poor birth outcomes from severe weather events. Findings will help us issue more precise public health advisories tailored to pregnant individuals and families during dual exposure events (e.g., heat and smoke alerts). Furthermore, the data can inform more strategic distribution of resources, such as air purifiers and cooling units, to pregnant individuals living in geographic areas vulnerable to heat, wildfire smoke, or both. In addition, the findings will have implications for prenatal care services, especially if the Fellow identifies a specific window of vulnerability like the final week of pregnancy. Clinicians can proactively counsel patients or refer them to resources that reduce exposure during late-term heatwaves or wildfire seasons to prevent adverse health outcomes. Finally, findings from this project will contribute to growing evidence linking climate change-related heat waves and wildfire smoke to poor birth outcomes that could inform broader health promoting policies amid climate change.

Additional Project #1 Title: Using epidemiologic data to identify high heat-risk areas and characterize heat-related health burdens to inform public health interventions.

Project #1 Type: Surveillance Activity

Project #1 Description:

Multnomah County Health Department is establishing heat resilience focus areas to mitigate urban heat in neighborhoods that are the most exposed and have the fewest resources to cope with extreme heat. Working with the HHC’s built environment and climate resilience team, the Fellow will identify and analyze public health data that could be used to identify areas that are vulnerable to extreme heat and its associated health burdens. This work involves aggregating diverse datasets- including morbidity and mortality data, built and natural environment variables, population demographics, health care utilization- at the census tract or neighborhood level. Beyond technical analysis, the Fellow will summarize these findings into accessible materials for community engagement and provide data-driven support for policy development.

Project #1 Objectives and Expected Deliverables:

This project will support the identification of new heat resilience focus areas and characterize risk factors and the burden of heat related illness in these areas. Project deliverables include:

- Descriptive analysis of heat related morbidity and mortality at small geographic scales
- Analysis and recommendations on methods of identifying and ranking heat resilience focus areas
- Qualitative analysis of community data
- Recommendations for criteria for removing the designation of heat resilience focus area

Project #1 Impact:

Heat resilience focus areas are coalition projects that use the Oregon Solutions model of consensus-building to align community resources. By rallying community support and resources to address the root causes of heat vulnerability, this project will help reduce systemic risk factors, enhance community resilience, and strengthen social cohesion in a sustainable way.

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

The Fellow will use Oregon ESSENCE data to monitor ED/urgent care visits for spikes related to severe weather. When heightened activity is anticipated or identified, they will participate in emergency preparedness briefings to share data insights that inform MCHD response. During extreme heat or cold events, the Fellow may join MCHD staff to volunteer in cooling and warming shelters. This provides a firsthand look at the human impact of severe weather events and the

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coordination between government and community agencies during disaster response. The Fellow will also join some members of HHC to participate in meetings with the National Weather Service to learn how meteorologic forecasts are developed, communicated, and translated into life-saving public health actions. These activities are expected to comprise up to 15% of the Fellow's time, primarily during the peak summer and winter seasons.

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

The Fellow will dedicate up to 15% of their time supporting investigations into foodborne, waterborne, and community-based outbreaks. Working in close collaboration with our colleagues in the Environmental Health Services' Inspections team and Communicable Disease program, the Fellow will assist in identifying sources of infection and mitigating transmission. Primary responsibilities include conducting case interviews, performing contact tracing, and assisting with the collection and analysis of data. They may also help with risk communication by helping to interpret findings for both internal leadership and the affected public. Additionally, the Fellow may support investigations into disease clusters within high-risk settings, such as homeless encampments. Using the recent Shigella outbreak as a model, the Fellow will support our Encampment Specialist and collaborate with Multnomah County's Homeless Services to conduct field interviews and tracing to track the scope of the outbreak, identify exposure patterns, and help inform targeted interventions and resource allocation.