

Subject Area: Environmental Health

Assignment Description

The Bureau of Disease Control, Prevention and Epidemiology (BoE) within the Michigan Department of Community Health (MDCH) provides epidemiological support to the state's Public Health programs. It is staffed by nearly 200 epidemiologists and professional staff organized into five Divisions: Communicable Diseases; Environmental Health; Immunization; Life Course Epidemiology and Genomics; and Health Wellness and Disease Control; they work on projects ranging from acute surveillance of and response to infectious and environmental exposures to provision of public health services in Michigan. The Fellow can expect to interact regularly with many BoE staff including the 30 staff in the DEH. Major program areas in DEH include surveillance for poisoning due to pesticides, carbon monoxide, other chemicals, and for hazardous substances releases; epidemiology of injuries, violence and drug abuse; the hazardous site assessment program funded by the Agency for Toxic Substances and Disease Registry; preparedness for environmental emergencies; health impacts of climate change; healthy homes/asthma interventions; and lead abatement.

The CSTE Fellow will have opportunities to experience and contribute to applied epidemiology in an emerging topic, the health impacts of climate change, which cuts across multiple areas of public health. He/she will be based in the Epidemiology and Surveillance Section of the Division of Environmental Health (DEH), which provides epidemiology support to the DEH programs and runs the Michigan Climate and Health Adaptation Program (MICHAP). Besides the Mentors, an incoming Fellow will have support from our Section's Injury Epidemiologist Specialist, Tom Largo, MPH, who will provide technical support to the Fellow in accessing and manipulating data and in understanding case definition and coding issues; and Dominic Smith, MSA, who is MICHAP Project Manager. Because of the collaborative structure of the MDCH BoE, the Fellow can get access and assistance in using data systems managed by other Divisions. Please visit our Bureau website at www.michigan.gov/epi and the MICHAP website, www.michigan.gov/climateandhealth

Day-to-Day Activities

The Bureau of Disease Control, Prevention and Epidemiology (BoE) is building its capacity for environmental epidemiology and surveillance. On a daily basis, the Fellow will learn to use data sets of varying size and complexity, link data files, edit data and maintain quality control, and manage projects. He/she will participate in the design of studies, in data collection, and the analysis, interpretation, and dissemination of results. Collaboration projects on climate change are underway with other CDC-funded states and with academic experts. The Fellow will join this collaborative team which is constructing surveillance and analytic studies of climate change impacts on mortality and morbidity and developing interventions. The Michigan Climate and Health Adaptation Program (MICHAP) is compiling a wealth of data resources that are being used to develop state and community plans for climate adaptation. The Fellow can work with many other partners on climate adaptation projects, such as the Michigan Climate Coalition, the Michigan Department of Environmental Quality, the Office of Services to the Aging, the Michigan Chapter of the American Association of Planners, the Detroit Climate Action Collaborative, the

Land Information Access Association, and Local Health Departments. There may be opportunities for community field investigations around extreme weather events such as heat waves or floods (see section on Emergency Preparedness).

Potential Projects

This position provides the CSTE Fellow the opportunity to pursue a wide range of topics under the broad area of Environmental Epidemiology. Dr. Cameron is the Principal Investigator of the Michigan Climate and Health Adaptation Program (MICHAP), our CDC-funded program for addressing the public health effects of climate change. This program includes many cross-cutting issues which would allow the Fellow to explore diverse topic areas of interest. Some possible projects are described below:

1. Through MICHAP and our communicable disease epidemiology partners, the Fellow could explore the relationship of temperature, precipitation and other weather parameters on a variety of communicable diseases, including the following: a) The Fellow could determine if the ArboNet surveillance system detects associations of weather measurements with arbovirus infections in humans, animals, and mosquitoes; or he/she could examine associations of Lyme disease with climatic changes favorable to tick population growth and spread using data collected by vector-borne disease specialists. b) Increasing frequency of severe rainstorms and warmer temperatures may raise the risk of flooding, water contamination, and algal blooms. Our Bureau does not have an active waterborne disease surveillance system, but MICHAP has established relationships with colleagues in the Water Bureau (Michigan Department of Environmental Quality), the US Geological Survey Lansing office which collects water quality data, climatologists at the Great Lakes Integrated Sciences + Assessments Center, the Waterborne Pathogens Group at MSU and the University of Michigan Water Center. The Fellow could work with these partners to initiate the development of surveillance for waterborne diseases, perhaps through modifying the current communicable disease reporting system, the Michigan Disease Surveillance System (MDSS). Research collaborations with these academic groups are also possible.

2. The MICHAP is working with community planners and local health departments throughout Michigan to develop and test tools for assessing vulnerabilities and planning for health impacts of extreme weather events in their communities. The Fellow can gain experience in applied local public health by providing epidemiological support to local health department vulnerability and health impact assessment activities (HIAs). Our MICHAP Program Manager, Dominic Smith, has training and experience in conducting HIAs and is part of the Michigan HIA Network of practitioners. There are also opportunities to work with expert partners at MDCH, University of Michigan (UM) and Michigan State University (MSU) to conduct spatial analyses of population vulnerability.

3. The relationship of extreme heat events with morbidity or mortality has been extensively discussed in the literature but its analysis is not straightforward. We have conducted preliminary analyses of adverse birth outcomes and hospitalizations due to cardiovascular, respiratory and renal disease following an extreme heat event. These analyses could be continued by combining birth and death registry data from our Division for Vital Records along with historic temperature data from NOAA or GLISA to examine the impact of the week-long 2003 power outage during an extreme heat event in the Detroit area; or

explore lagged models linking heat events to low birth weight and intrauterine growth retardation. MICHAP is collaborating on a systems dynamics model of behavior around extreme heat events. The Fellow can participate in behavioral research working with collaborators Drs. Marie O'Neill and Natalie Sampson of UM and MSU systems modeler Dr. Laura Olabisi.

4. The MDCH Asthma Control and Prevention Program (ACP) is a national leader in asthma surveillance and epidemiology, and is an important MICHAP partner. ACP conducts surveillance on asthma prevalence, quality of life for people with asthma, asthma management, indicators of asthma control, the quality of health care received, and outcomes such as hospitalizations and death related to asthma. The Fellow could utilize the ACP surveillance system to examine environmental and climate change impacts on asthma, including analyses of asthma mortality, Medicaid claims, inpatient (hospitalization), ED, and pharmacy data. The Fellow could examine the association of asthma incidence, exacerbation or mortality with environmental parameters such as temperature, mass air stagnation events, air pollutants, and length of allergy season, or project the burden of respiratory disease in Michigan using risk assessment models such as EPA's BenMap.

5. The DEH maintains surveillance systems based on mandatory reporting of laboratory detection of mercury, arsenic, and cadmium in human blood and urine samples and, in collaboration with MSU, has surveillance systems based on reports from health care providers and facilities for acute pesticide illness and injury, carbon monoxide (CO) poisoning, work-related amputations, and occupational diseases. DEH also works closely with the Michigan Poison Control Center and has access to all poisoning reports in their data base. Surveillance system evaluations, special projects, and research studies can be carried out using these data sources, many of which have data going back 10 or more years with individual case reports including contact information.

Potential Fellow projects related to poisoning surveillance include: a) Identify an additional significant source, risk factor, or vulnerability for poisoning that is of interest to the Fellow but not included in the current DEH surveillance activities. The Fellow would develop the surveillance protocol, obtain Institutional Review Board (human subjects' protection) review, and implement the surveillance of the additional poisoning. This would provide experience in all aspects of surveillance system development and implementation. b) Develop and implement a survey of non-occupational pesticide illness and injury case reports to collect additional information used to inform the development of interventions to reduce these exposures. (Currently we only follow-up occupational pesticide poisoning cases).

6. A team from DEH, UM, MSU, and DEQ conducted an epidemiologic study using spatial and temporal analyses to determine the effects of exposure to specific air pollutants and proximity to and density of traffic on asthma urgent care utilization in the pediatric Medicaid population in Detroit. This data set could be further analyzed to examine the joint impact of air quality and temperature or to determine if there are population-based or regional health disparities. This team also conducted analyses of air quality and low birth weight, pre-term births, and births with intrauterine growth retardation (IGR). The Fellow could examine the effects of exposure to temperature extremes and specific air pollutant on a health outcome, such as asthma exacerbation, births with IGR or perinatal mortality.

7. DEH currently generates Council of State and Territorial Epidemiologists (CSTE) State Indicators for Injury, Occupational Health, Environmental Health (EH), and Climate Change. Indicators are descriptive summary measures, written to be easy to understand and straightforward to calculate, and meant to improve public health practice by improving the accessibility, availability and distribution of information for decision-making. DEH staff participate in the State Environmental Public Health Indicators Collaborative (SEHIC) which is developing and testing sets of indicators for Air Quality, Asthma, and Climate Change. The Fellow could join the workgroup, calculate one or several of the Indicators, and conduct an evaluation of their utility for public health surveillance. An important component of this project would be to improve the indicator by offering feedback to DEH and SEHIC.

8. Opportunities are available for the Fellow to participate in communicable disease or environmental field investigations, as time and interest permits.

Preparedness Role

The Fellow will participate in trainings and exercises, through the DEH's Environmental Health Preparedness Section and MDCH Office of Public Health Preparedness, for chemical, natural disaster/extreme weather, infectious and radiological emergency events. If a real emergency event takes place in environmental or communicable disease, the Fellow will be assigned an epidemiology function within the Incident Command Structure. (Note: one of the previous Fellows spent three weeks in the Command Center following a large oil spill in Michigan tracking acute health effects from the spill, and was a co-author on the resulting surveillance report.) All of MDCH's CSTE Fellows and other CDC assignees participated in Michigan's first CASPER (Community Assessment for Public Health Emergency Response) the week of September 10, 2012, which involved door-to-door surveys using the CDC CASPER methodology. If a CASPER is conducted in 2014 or 2015, the Fellow will have this opportunity to be directly involved with a Preparedness activity. Finally, MDCH is beginning the process of developing "Responder Safety and Health" plan to protect public health staff deployed during a public health emergency. The Fellow will be expected to contribute to the design of this plan, which will need to include a health surveillance module.

Assignment Location: Michigan Department of Community Health
Lansing, Michigan

Primary Mentor: Lorraine Cameron, PhD, MPH
Environmental Epidemiologist Manager

Secondary Mentor: Julia Wirth, PhD, MS
Environmental Epidemiologist