

# 2023 NIEHS EHSCC MEETING: Disaster Research Response & Climate Change & Health

We are inviting members of the NIEHS P30 Centers to present their disaster research response-themed or climate change-themed work at the October 2023 NIEHS EHSCC MEETING in Houston, Texas.

The leadership of each P30 Center is encouraged to nominate a member of their center to present at the October meeting. To participate, the nominated member should send an abstract of their work to the 2023 NIEHS EHSCC MEETING planning committee by completing this online questionnaire.

Up to four abstract authors will be invited as plenary speakers. Others will be invited to share their work during poster sessions.

Please submit your abstract by July 24, 2023. Plenary speakers will be notified by August 7, 2023.

Thank you - 2023 NIEHS EHSCC MEETING planning committee.

Response was added on 07/21/2023 6:56am.

## ABSTRACT AUTHOR'S CONTACT INFORMATION

Author's name (first name last name):	Deborah Watkins (The abstract author is the prospective presenter)
Author's contact email address	debjwat@umich.edu
Author's title	Research Associate Professor
Author's primary department & institution	Department of Environmental Health Sciences, University of Michigan School of Public Health
P30 Center where the author is a member:	University of Michigan Center on Lifestage Environmental Exposures and Disease (M-LEEaD)
The project PI/Lead	<input checked="" type="radio"/> Same as abstract author <input type="radio"/> Different from abstract author, if so, specify

## PROJECT FOCUS

The primary focus of the project (you may select more than one option, if applicable)

- Disaster Research Response (DR2)  
 Climate Change and Health (CCH)  
 Other, please specify

The type of DR2 issues (being) studied

- Natural - cause not traceable to a single action by identifiable persons  
 Industrial - cause traceable to an industry, usually due to business activities  
 Individual/group - cause traceable to one or more persons (intentional act or accidental)  
 Other, please specify

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The climate change and health issues (being) studied

- Exposure pathways (extreme heat, air quality, water quality/quantity, vector ecology, etc.)
- Vulnerability factors (demographic, biological, social determinants, geographic, etc.)
- Health system capacity & resilience - (governance, EHS workforce, health information systems, etc.)
- Stress response (pathways, psychosocial stress, eco-anxiety)
- Climate and geospatial modeling
- Other, please specify

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## **PROJECT DETAILS - DR2/CCH AND HEALTH GAPS, PROJECT OBJECTIVES, FINDINGS, & LESSONS LEARNED**

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Study Title

Investigating the impact of Hurricane Maria on an ongoing birth cohort in Puerto Rico: findings, challenges, and next steps

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DR2- or CCH-specific research gaps that the project addressed/is addressing

Experiencing a hurricane during pregnancy is associated with increased risk of stillbirth, preterm birth, and low birth weight infants. However, specific factors that cause these and other adverse pregnancy outcomes during or after a hurricane are unknown. For example, hurricanes and other extreme weather events may impact a person's ability to access critical prenatal care, clean water and food, may increase exposure to environmental hazards (chemicals, mold), and cause extreme stress or trauma. In addition, pregnant people from marginalized communities are likely more susceptible to extreme weather events, as they have fewer resources to manage food insecurity, housing instability, and other hardships, at a time when shelter and nutrition are essential. Identification of factors that increase risk of adverse birth outcomes, as well as populations at higher vulnerability during extreme weather events, will improve preparedness and intervention efforts in inevitable future storms.

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Project goals and objectives

This project describes the impact of Hurricane Maria on PROTECT, an ongoing birth cohort study in Puerto Rico. Extensive data and biological samples have been collected from pregnant PROTECT participants since 2010, providing an opportunity to examine hurricane-related changes in environmental exposures, stress, and birth outcomes in the months surrounding this extreme weather event. Our first goals were to ensure the safety of our research team, contact participants, and provide resources. Our research objectives were to compare biomarkers of prenatal metal, polycyclic aromatic hydrocarbon, and phthalate exposure, and measures of prenatal stress and depression, from before, the 3-6-month recovery, and >6 months after Maria. We administered a "Hurricane Questionnaire" to participants who were pregnant during Maria or the recovery period to collect information on access to drinking water, food, electricity, cell phones, medical care, generator use, health, housing damage, and other experiences. We aimed to use questionnaire responses to identify post-hurricane experiences related to changes in exposure or mental health. Finally, we aimed to evaluate whether timing of pregnancy in relation to Maria (before, recovery, or after), as well as changes in exposure and/or mental health, were related to birth outcomes, including preterm birth, gestational age, and birth weight.

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Research methods/approaches used

- Community-engaged research methods
- Communications research methods
- Field epidemiological methods
- Fundamental/basic science methods
- Other, please specify

Project stage/status:

- Project is ongoing - process findings available to present; no primary outcomes findings available yet  
 Project is ongoing - process findings and/or primary outcomes findings available to present  
 Project completed - process findings and/or primary outcomes findings available to present  
 No stage/status to report  
 Other, please specify

Describe the process/primary outcomes findings from the project.

Of the 122 PROTECT participants responding to the Hurricane Questionnaire, almost half reported structural damage to their home, with many reporting mold (25%), mice (26%), or mosquitoes (75%) in or around their home. The median time without electricity was 90 days, but ranged from 7 days to >1 year. Most had a gas-powered generator at home (86%), while 80% did not have cell phone service, limiting communication with family, friends, and emergency/recovery services, and 14% did not have public water service, although only 2% reported drinking tap water. In response to an open-ended question about their experiences, participants also reported concerns regarding their pregnancy and health, disruptions in health care services, difficulty getting prenatal vitamins and baby items, and poor mental health. Respondents said that material and emotional support from family, neighbors, and community was extremely important to them, providing insights into how social connections can increase the resiliency of a community, even when resources are scarce.

In regard to exposures, urinary concentrations of cadmium, cobalt, copper, molybdenum, nickel, and zinc were higher in the three months after Maria, and most of these metals returned to pre-Maria levels within 6 months. Interestingly, urinary manganese, which on average is high in this population, dropped drastically in the 3-6 months after Maria but were returning to pre-Maria levels after 6 months. Contrary to our hypotheses that generator use would increase PAH exposure, urinary PAH metabolites decreased in the months after Maria. With the exception of DEHTP, many urinary phthalate metabolites also decreased after Maria and have not returned to pre-Maria levels. We were not able to assess relationships between Hurricane Maria and birth outcomes due to the small number of PROTECT participants who experienced the adverse outcomes of interest during the months following Maria and challenges in participant follow-up during that time.

Describe key challenges or lessons learned.

A primary challenge to this study was loss to follow-up, as 25-30% of PROTECT participants eligible to complete the hurricane questionnaire were unreachable. Additionally, a shift in participant demographics from those who delivered before Maria, compared to those who were pregnant during Maria and remained in the study to delivery, suggests that participants with fewer resources were more likely to be lost to follow-up in Maria's aftermath. Increased effort is needed to get necessary care to less-resourced pregnant people before, during, and after extreme weather events. Puerto Rico is highly vulnerable to climate change and future extreme weather events because of its location, high poverty rate (40%), substantial health disparities, widespread environmental contamination, and fragile utility infrastructure. Our goal is to understand and mitigate the effect of future extreme weather events on mental health and birth outcomes among pregnant people, particularly in socially vulnerable communities like Puerto Rico.

## PROJECT SPONSORSHIP/SUPPORT

Project sponsorship (choose all that apply)?

- P30 inter-center collaborative pilot funding (via NIEHS)  
 Other NIEHS - (NOT inter-center collaborative funding)  
 NIH - other institutes (NOT NIEHS)  
 Any other federal agency (NOT NIH)  
 Non-federal government agency (state, local, etc.)  
 Non-government, non-profit entity  
 For-profit entity  
 Insitutional (intramural) funding  
 Project not sponsored  
 Other, please specify