

LESSONS FROM PAST DISASTERS

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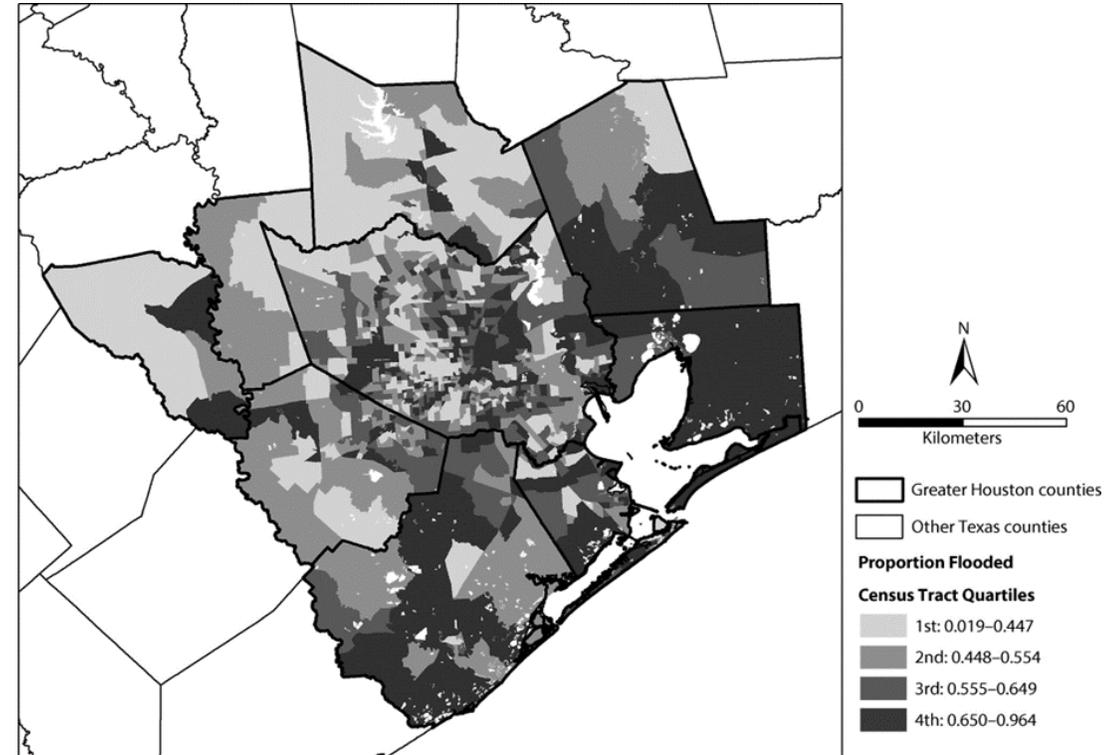


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Health Impacts of Disasters

- What's a disaster?
 - Disruption of normal conditions, exceeding the capacity of the affected community
- Disasters and emergencies are not “natural” but a result of how communities are structured and resources are allocated



...spatial correspondent between flood extent and non-Hispanic Black and Hispanic proportions, as well as SES (Chakraborty et al., 2019)



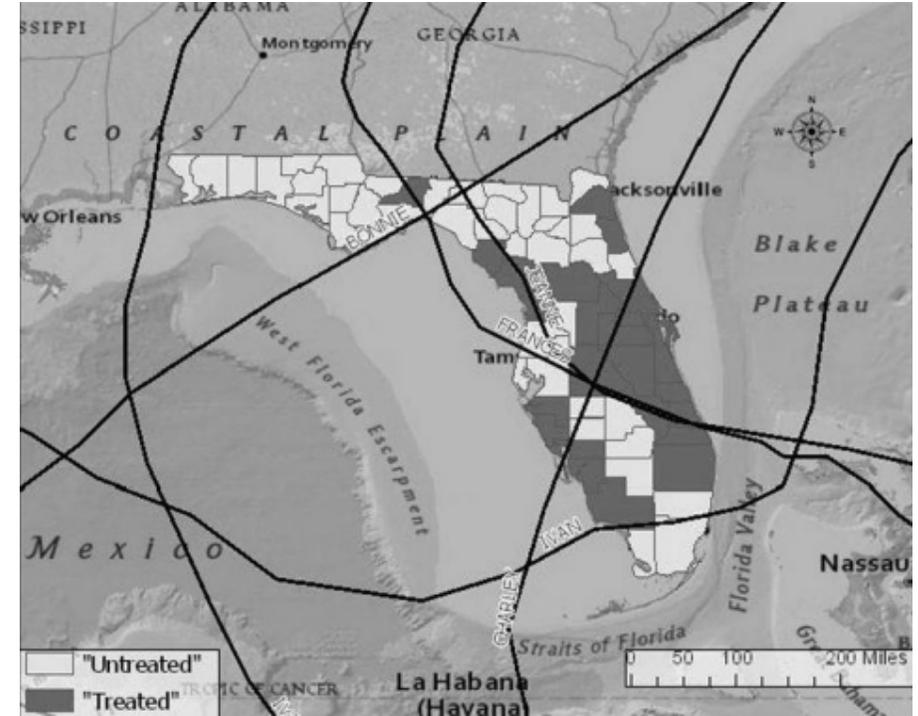
Community Structures and Resource Allocation

- Environmental justice neighborhoods bear unequal burden from disasters and environmental hazards
- Must consider environmental justice as part of preparedness and other policies and planning



Community Structures and Resource Allocation

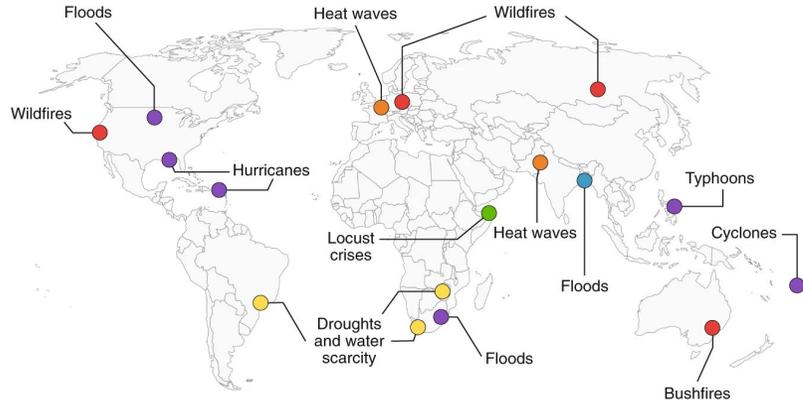
- These disparities increase during a disaster
 - Gendered impact of disasters
 - Loss of access to safe housing
 - Need to remain with family to qualify for funding assistance or other disaster aid
 - Mitigation and other funding awarded by ROI
 - Dose-response effect: More days of declared disaster = more violence, more negative health



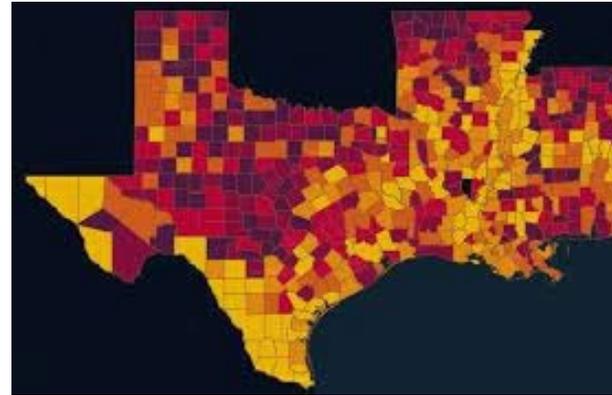
Gearhart, S., Perez-Patron, M., Hammond, T. A., Goldberg, D. W., Klein, A., & Horney, J. A. (2018). The impact of natural disasters on domestic violence: An analysis of reports of simple assault in Florida (1999–2007). *Violence and gender*, 5(2), 87-92.



Compound Hazards and Intersectional Risk



<https://www.nature.com/articles/s41558-020-0804-2/figures/1>



<https://phys.org/news/2020-08-hurricanes-wildfires-colliding-covid-pandemic.html>

Climate and other environmental risks interact with social, policy, physical, and economic risk to cause larger impacts to health.



Lack of Evidence Base

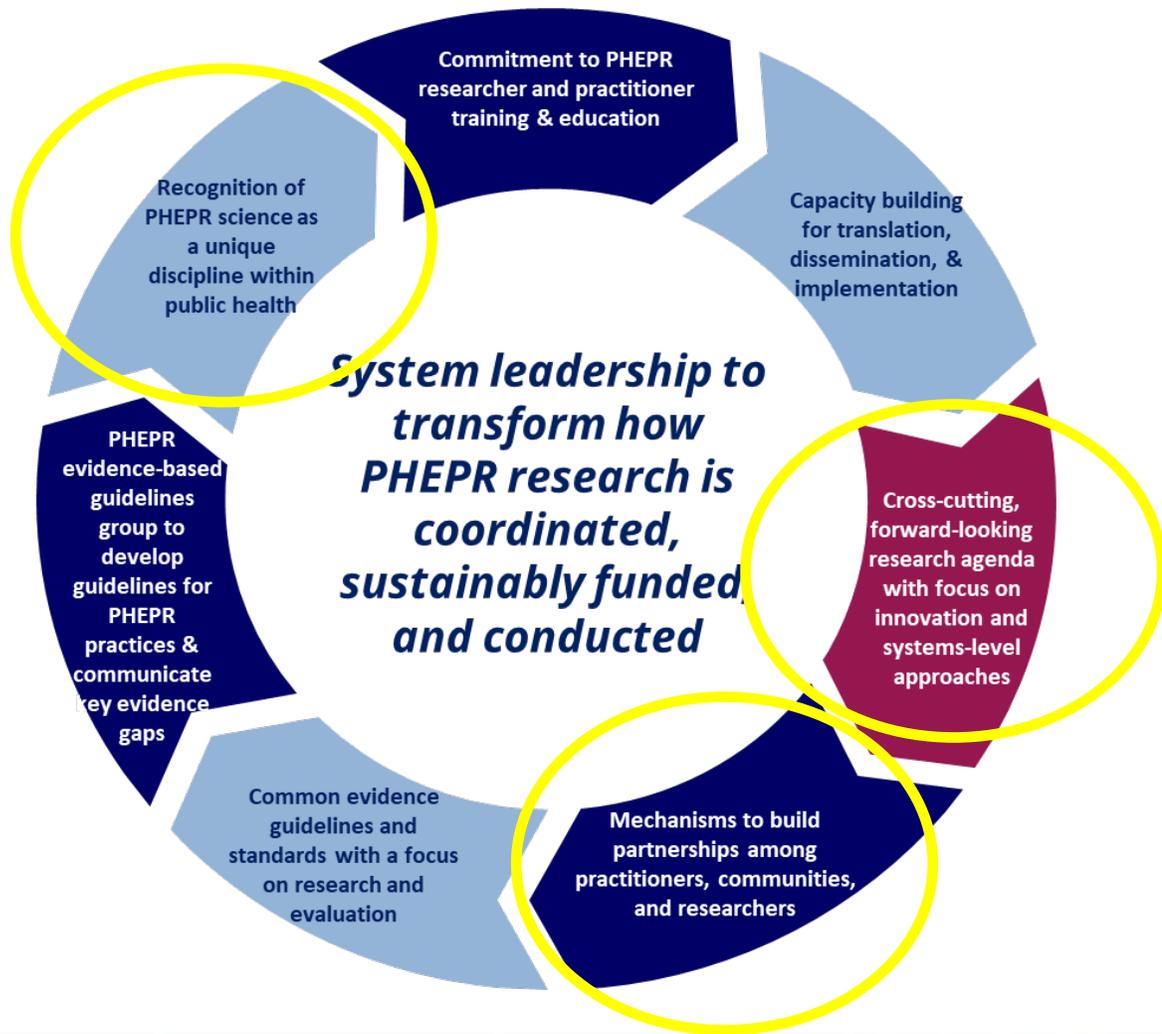
- *... the science underlying the nation's system of response to public health emergencies is seriously deficient, hampering the nation's ability to respond to emergencies most effectively to save lives and preserve well-being."*

National Academies of Sciences, Engineering, and Medicine. 2020. *Evidence-Based Practice for Public Health Emergency Preparedness and Response*. Washington, DC: The National Academies Press. <https://doi.org/10.17226/25650>."



Figure 1: National PHEPR Science Framework

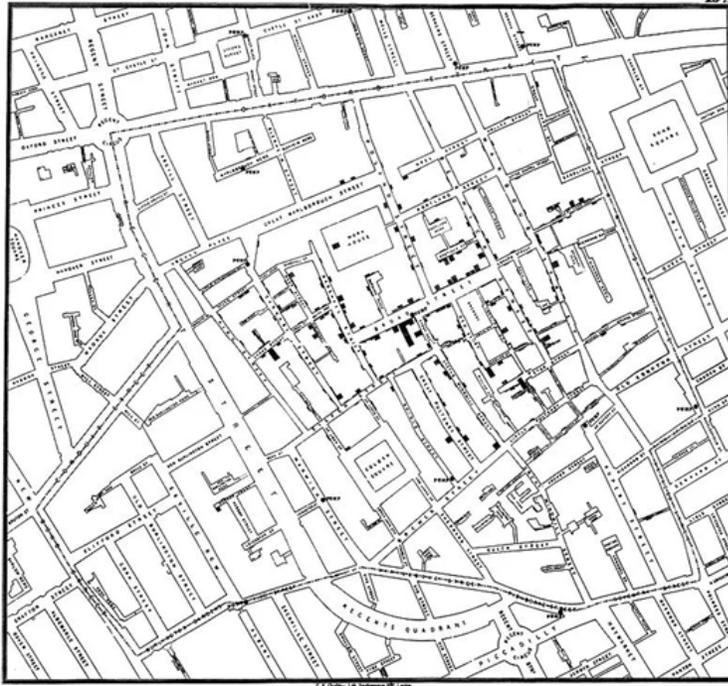
Opportunity



- Cross-cutting, forward looking, systems-level research agenda
- Mechanisms to build partnership among practitioners, communities, and researchers
- Recognition of public health emergency preparedness and response science



Cross Cutting, Systems Level Agenda



John Snow, “Father of Epidemiology” mapped cases of cholera in London, 1854



Healthy Cities: Where we live, work, and play is critical to our health, development, and well-being

Planning and Public Health: Hurricane Harvey

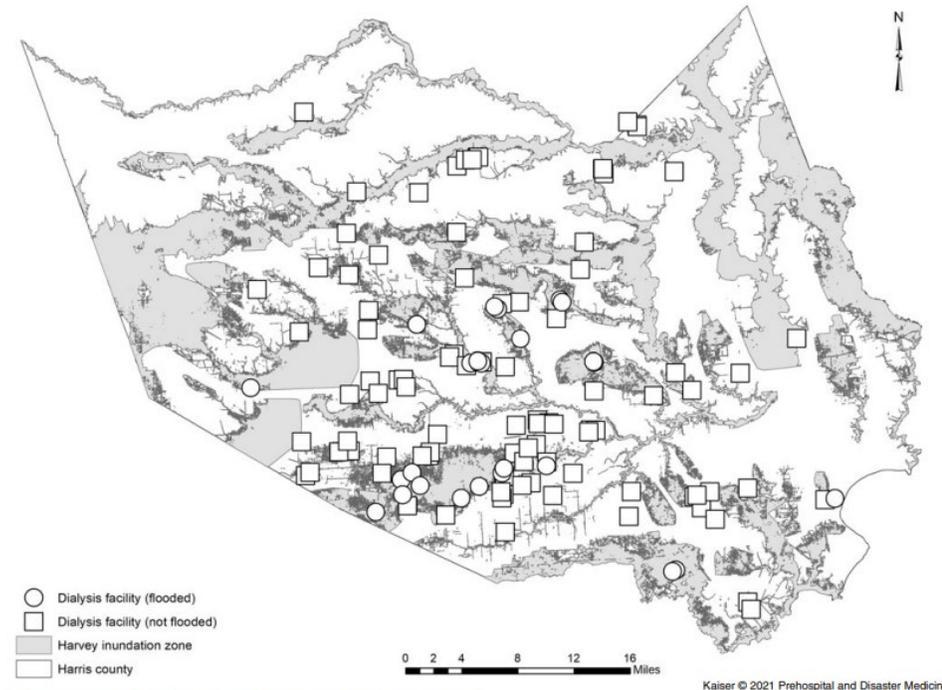
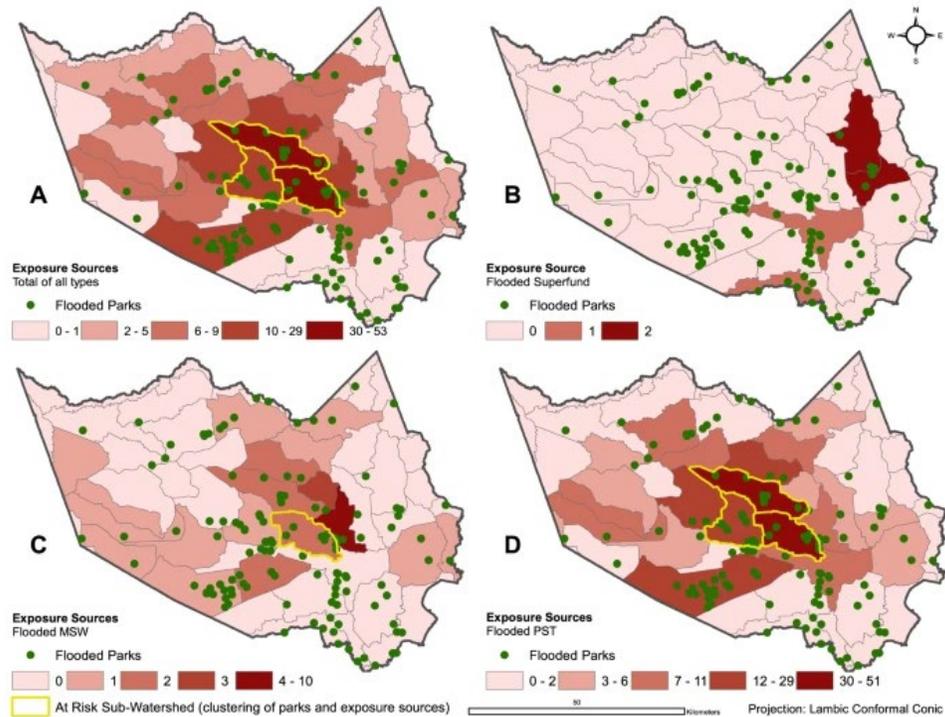


Figure 2. Hemodialysis Clinics Flooded from Hurricane Harvey.

Karaye I, Stone KW, Casillas GA, Newman G, Horney JA. A spatial analysis of possible environmental exposures in recreational areas impacted by Hurricane Harvey flooding, Harris County, Texas. *Environmental management*. 2019 Oct;64:381-90; Kaiser R, Karaye IM, Olokunlade T, Hammond TA, Goldberg DW, Horney JA. Hemodialysis clinics in flood zones: A case study of hurricane harvey. *Prehospital and Disaster Medicine*. 2021 Apr;36(2):135-40.

Community Engagement & Partnerships

Site inventories, site visits, participatory workshops to observe planning and health challenges firsthand; hear from communities



Community Engagement & Partnerships

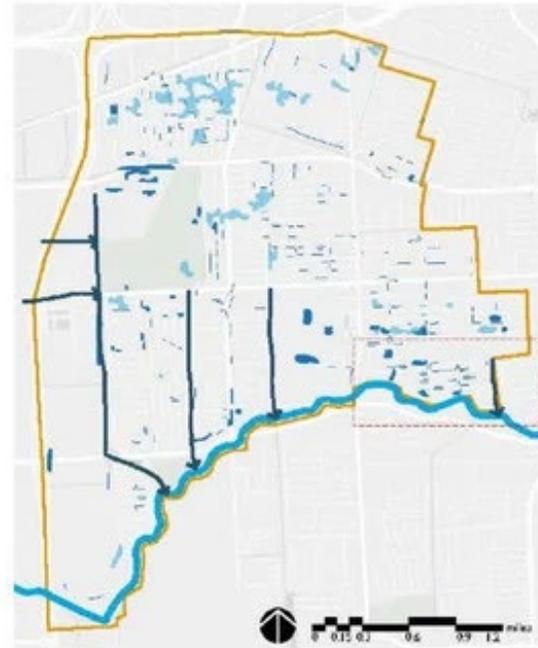
FLOOD VULNERABILITY



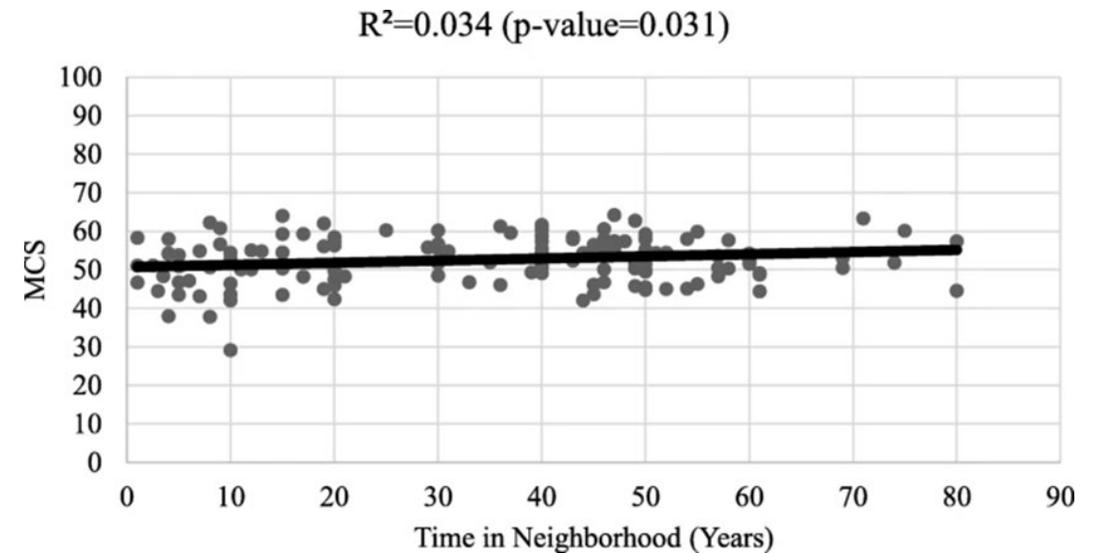
- 100-year Floodplain
- 500-year Floodplain
- Sim's Bayou

*these data reflect conditions for the year 2020

PONDING



- Flow Paths in Hazard Situation
- Large Ponding Areas in Hazard Situation
- Shallow Ponding Areas in Hazard Situation
- Small Ponding Areas in Hazard Situation
- Vulnerable Area

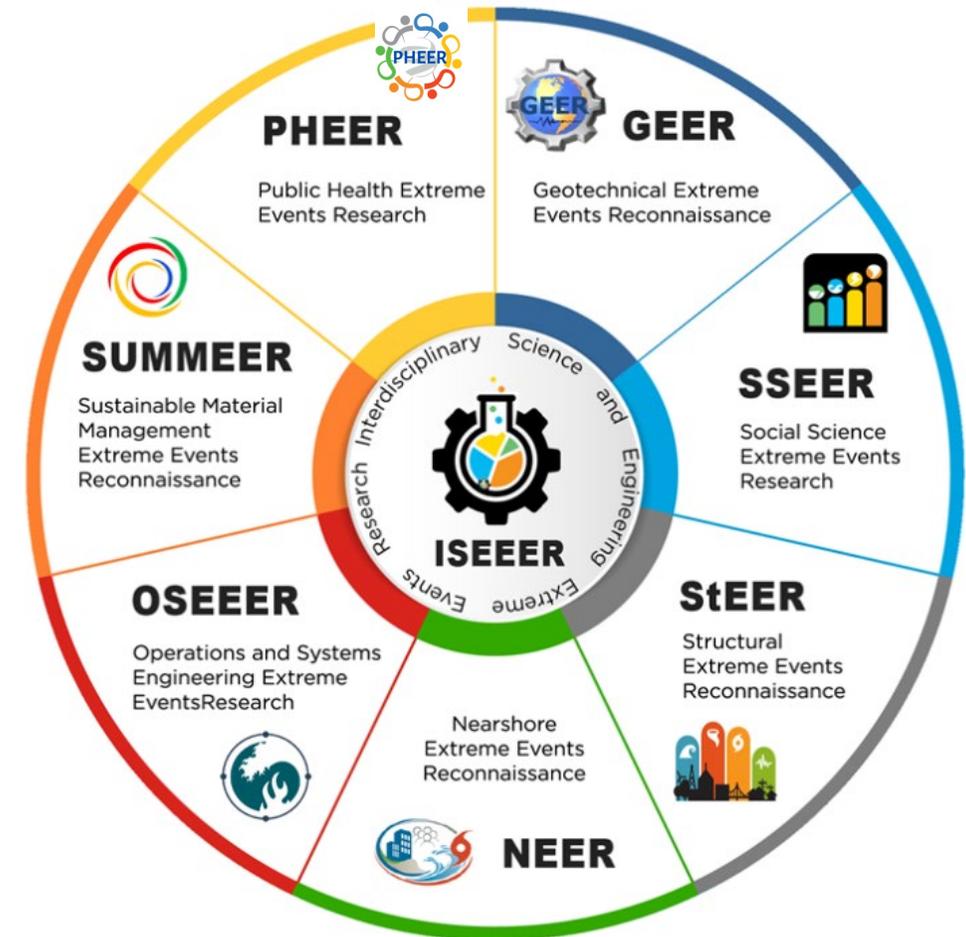


Newman G, Sansom GT, Yu S, Kirsch KR, Li D, Kim Y, Horney JA, Kim G, Musharrat S. A framework for evaluating the effects of green infrastructure in mitigating pollutant transfer and flood events in Sunnyside, Houston, TX. *Sustainability*. 2022 Apr 2;14(7):4247.; Sansom GT, Kirsch K, Horney JA. Using the 12-item short form health survey (SF-12) to assess self-rated health of an engaged population impacted by hurricane Harvey, Houston, TX. *BMC public health*. 2020 Dec;20(1):1-8.



Emergency Preparedness & Response Science

- Coordinated mechanism for engagement with research community
 - Evidence informed practice
 - Generalizable and novel data about public health impacts of disasters
 - Bridging the gap between the disaster research and practice community
 - Needed for environmental disaster research and response



Remaining Challenges

- Timing: Sampling and analysis; risk communication; research translation
- Existing Collaborations: Maintaining over time, funding, turnover
- Identifying the right experts
- Evolving priorities
- Lack of baseline data
- Return on Investment
- Growing inequities: Green gentrification; intersectional risk; post-pandemic



Number of Climate Disasters to Triple for New Generation

Frequency of climate disasters experienced in a lifetime for a person born in 2020 compared to one born in 1960



All climate disasters
~3 times as many

Based on NDC scenario (following Paris Agreement) of 2.7 °C/4.9 °F warming until 2100
Source: Thiery et al. Intergenerational Inequities in Exposure to Climate Change. Science (2021) via media reports



statista

- The stakes are high:
 - As of 10/10/23, the U.S. has experienced 24 weather and climate disasters incurring losses that exceeded \$1 billion
 - The 18 disasters >\$1 billion in 2022 caused 474 direct or indirect fatalities
 - We know little about longitudinal health impacts



Questions?

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