

# Hurricanes, Human Health, and Mortality

- Health impacts of hurricanes
  - Physical
  - Mental
  - Vary over the short to long term (immediate event to years after)
- Mortality from hurricanes
  - Death attributable to hurricanes is difficult to quantify!
  - Direct casualties vs. excess death
  - Example Hurricane Maria in Puerto Rico (Sep 16 – Oct 2, 2017)
    - Early official estimate of death was 64
    - Numerous analyses of excess death; official death toll was revised to 2,975

# Health disparities and environmental justice

- Health disparities research examines the unequal distribution of disaster health impacts across subpopulations, esp. inequitable health outcomes for socially disadvantaged groups (based on race/ethnicity, economic status, etc.)
- A review article of 27 U.S. health disparities analyses of floods (including analyses of hurricanes) documented consistent disparities in outcomes for:
  - *Black/African American and Hispanic/Latinx people*: Post-traumatic stress (PTS), pregnancy complications, gastrointestinal illness, asthma symptoms, PTS\* cardiovascular events (Black only)
  - *People of low socioeconomic status*: respiratory issues, skin rash, general physical health problems
  - *Women*: PTS, pregnancy complications
- Health disparities = unjust exposures \* unequal social vulnerability: Hurricane Harvey example
- Health disparities in hurricanes are environmental justice issues

# Reducing health impacts and disparities

- Community resilience-building and mitigation actions are needed, especially in light of climate change
- Special focus on equitable pre-event hurricane and flood hazard mitigation
  - On average, every \$1 spent on a FEMA hazard mitigation grant produces \$4 of benefits
  - In Hurricane Harvey, greater pre-event mitigation was associated with fewer physical health problems and adverse experiences, lower PTS, and faster recovery
- Identify vulnerable population groups in context, and reduce risks accordingly
- For hurricanes in particular, plan evacuations carefully
  - Hurricane Katrina exemplifies poor evacuation planning in terms of human lives lost
- Equitable recovery funding that addresses long-term needs of impacted, vulnerable populations

# Resources

- Hurricane impacts (general info.): <https://community.fema.gov/ProtectiveActions/s/article/Hurricane-Impact>
- Hurricane Maria excess mortality studies:  
[https://doi.org/10.1016/S2542-5196\(18\)30209-2](https://doi.org/10.1016/S2542-5196(18)30209-2)  
<https://doi.org/10.1056/NEJMsa1803972>
- Health equity/health disparities (general info.) <https://www.cdc.gov/health-equity/what-is/index.html>
- Health disparities in hurricanes/floods (review article):  
<https://doi.org/10.1007/s40572-024-00446-7> (contact Dr. Flores for a copy: [aaron.b.flores@asu.edu](mailto:aaron.b.flores@asu.edu))
- Environmental justice (Executive Order 14096):  
<https://www.federalregister.gov/documents/2023/04/26/2023-08955/revitalizing-our-nations-commitment-to-environmental-justice-for-all>
- Environmental justice issues across phases of the Hurricane Harvey disaster (research review):  
[https://drive.google.com/file/d/1SSp1RYsvscPiH6ULSHaw\\_u7xH4X5B4Zi/view](https://drive.google.com/file/d/1SSp1RYsvscPiH6ULSHaw_u7xH4X5B4Zi/view)
- Pre-event mitigation benefits (research articles): [https://doi.org/10.1061/\(ASCE\)1527-6988\(2007\)8:4\(97\)](https://doi.org/10.1061/(ASCE)1527-6988(2007)8:4(97))  
<https://par.nsf.gov/servlets/purl/10132226>
- Hurricane Katrina evacuation (research):  
<https://ajph.aphapublications.org/doi/pdf/10.2105/AJPH.2005.084335>