



Consistent Patterns in Secondary Health Effects of Disasters



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Objectives

- **Define primary and secondary death/injury causes related to disasters**
- **Discuss factors related to recurring death/injury patterns in disasters**
- **Provide resources for further study (post-presentation upload)**



Interdependent infrastructure (Y. Wang)



Aftermath of an earthquake in Japan, 2004
Photograph by Kimimasa Mayama/Reuters



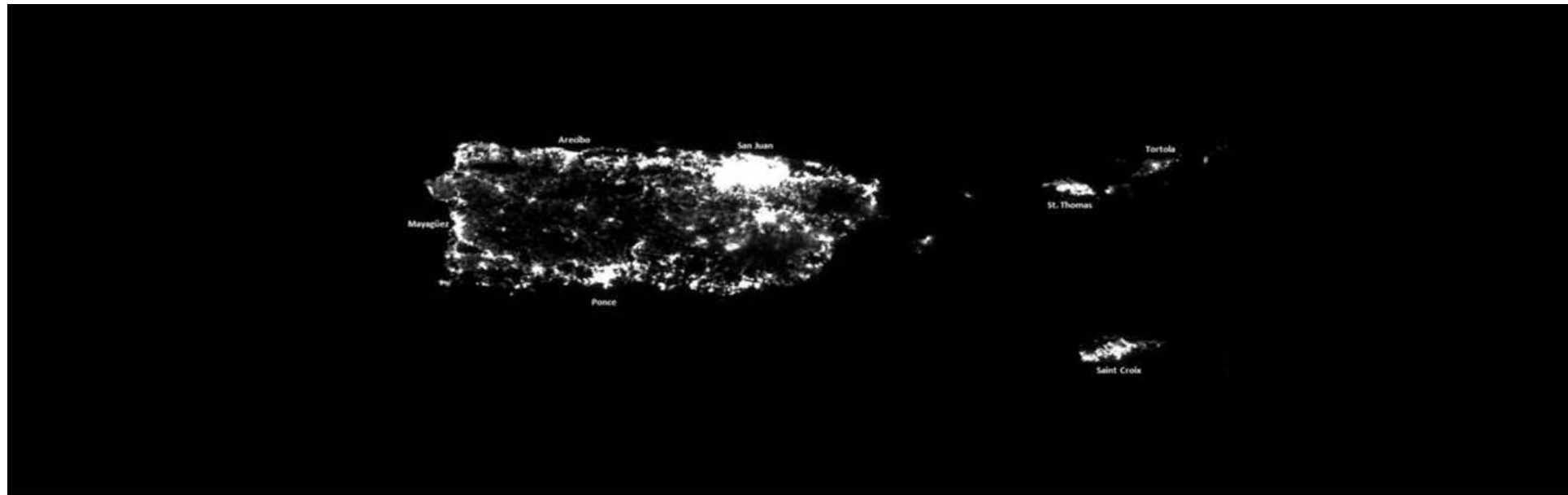
Power



Slate



Power



NOAA



Health and healthcare



Texas Monthly



Health and healthcare



AP-Mark Schiefelbein



Evacuation and sheltering



NBC



Coming or going?



STEVE BISSEY/SAVANNAH MORNING NEWS VIA AP



How would you do?

- No primary power for 7-30-xx(x) days
- Scarce fuel: how will pumps, generators work?
- No reliable water/wastewater
- Minimal cellular/internet
- Multi-modal transportation impact
- Most non-emergency government services unavailable
- ATMs spotty at best



What kills people in disasters?

■ Primary

- Direct trauma determined by event
- Disease (e.g., acute epidemic)
- Direct environmental impact (e.g., heat/cold/chemical exposure)

■ Secondary

- Pre-existing medical conditions
- Environmental impact
- Secondary trauma
- Psychological impact



Pre-existing medical conditions

- Diagnosed, ~ stable, chronic
 - Cardiorespiratory (hypertension, heart failure, COPD)
 - Endocrine (diabetes)
 - Other (ESRD, psychiatric)
- Controlled by diet, medication, home care, out-patient procedures
 - Dialysis, home O₂, powered life-support equipment
- Common to most disasters/disruptions
 - Low threshold
- Difficult to attribute



Environmental impact

- **Unmediated exposure**
 - Heat, cold
 - Environmental degradation (air, water, food)
 - Enteric disease, mold
 - Otherwise-controlled pathogens
 - Localized; major disease outbreaks uncommon
 - Introduced toxicants
 - **CO**



Morbidity and Mortality Weekly Report
www.cdc.gov/mmwr



Secondary trauma

- **Post-event; unintentional**
 - **Repair/recovery activities**
 - **Falls, electrocution**
 - **Fires**
 - **Motor-vehicle collisions**



Psychological trauma

- **Beyond/exclusive of pre-existing conditions**
 - Effects of prolonged disruption, dislocation
 - Ongoing/continuing incidents (e.g., aftershocks)
 - Personal loss



Selected references and resources

- National Library of Medicine Disaster Management Research Center (NLM-DIMRC)
- Disaster Medicine and Public Health Preparedness (DMPHP) (journal)
- Prehospital and Disaster Medicine (PDM) (journal)
- Morbidity and Mortality Weekly Report (MMWR): CO poisoning after
 - Hurricane Irma (2017)
 - Hurricane Ike (2008)
- **MMWR:** epidemiologic impact assessment of 4 Hurricanes, FL, 2004
- **MMWR:** nonfatal injuries after Hurricane Sandy, NY City, 2012
- **MMWR:** snowstorm-related mortality, NY State, 2014
- **GSA:** landslide-caused valley fever outbreak, Northridge EQ, 1994
- **PDM:** acute respiratory illness due to post-EQ mold exposure, Japan, 2011



Selected references and resources

- DMPHP: chronic conditions and disaster relief
- DMPHP: baseline medical needs in disaster-displaced populations
- DMPHP: planning for post-disaster chronic-disease medications
- Ann. Emerg. Med.: post-disaster hospital admissions, older adults
- DMPHP: chronic diseases in 5 years after EQ, Japan
- CDC: vulnerable older adults disaster chronic-disease needs
- Am. J. Kid. Dis.: dialysis care and death after Hurricane Sandy, 2012
- DMPHP: risk of social isolation among EQ/tsunami survivors, Japan
- DMPHP: post-EQ resilience and recovery, New Zealand
- Kaiser Fndn.: Gulf-Coast recovery experiences Hurricane Harvey, 2017
- Kaiser Fndn.: public health in Puerto Rico after Hurricane Maria, 2017



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