



Communities, Climate Change, and Health Equity Workshop Series: Exploring flood adaptation strategies to support health equity



Experiences related to flooding health risks and equity

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Content

- Situation
- What we did (Response)
- Interventions
- Outcomes
- Conclusions

Major Flooding in PR

- **Hurricane Maria in 2017** caused catastrophic flooding across the island, causing extensive damage to infrastructure, homes, and businesses and resulted in loss of life and long term power outages.
- **The floods of April 2019.** Heavy rainfall caused flooding in multiple municipalities across PR, leading to evacuations, road closures, and damage infrastructure.
- **Tropical Storm Isaias in 2020,** caused significant flooding and mudslides. It resulted in widespread damage to roads and bridges.
- **September, 2022 H Fiona floods.** Heavy rainfall in the Southern and Central region of PR caused significant flooding that caused collapse of roads, bridges, homes and again the power grid.



Flooding consequences

- Infrastructure damage
- Property destruction
- Financial losses
- **Health risks**
 - **Morbidity & Mortality increased**
- Displacement of people
- Disruption of essential services



Major damage to the island is caused by flooding

Storm surge and tidal waves

- Estimated levels of 6-9 feet above ground level (USGS)

Rainfall and flooding

- Calculated at 22.8 inches, storm total 38 inches
- Caused serious flooding and mud slides

healthcare infrastructure

01

Healthcare
infrastructure
largely damaged

02

Shortage of
diesel

03

National IV fluids
shortage due to
damage to Baxter
Pharmaceutical
Company

04

Communication
system failed

Death toll

- **Direct death**

- Drowning
- Injuries
- Medical emergencies

- **Indirect**

- Lack of prescription medicine, insulin, cardiovascular events
- Hospital generator failure



Vulnerable population

- During the days and weeks after H. Maria, children appeared unbothered
- Elderly were unable to look for food, water or medications
- Renal patients who required dialysis were unable to receive treatment
- People with diabetes, hypertension, heart failure and renal disease did not have their medication or diet
- People that were bed ridden suffered from extreme heat, lack of clean water, and electrical support equipment

Reality Check!

- Despair
- Distress
- Isolation
- Anxiety
- **Signs of resiliency**
- Neighbors helped each other
- Phone and food sharing



People's experiences

“We were taken to a hospital and it collapsed while we were still there”.



“The river flood took apart my house, took off the walls, the roof, the ceiling, everything”.



“My family buried my grandpa in their back-yard because they were isolated and the body was starting to decompose.”



Response, resources and allocations



Local



Municipal



Federal

Resources

- The USNS Comfort provided medical services
- 25 regional supply distribution centers
 - Food, water, commodities
- 10,000 Federal workers on the Island
 - DOD reported 9,000 military personnel
- Coalition of healthcare professionals provided at home services



HEALTH IMPACT



HEALTHCARE and HEALTH IMPACT OF FLOODING

- **CONTAMINATION OF WATER**
 - Sewage, chemicals and other pollutant
 - Outbreak of hepatitis A,
 - Increase of leptospirosis
- **MOSQUITOES AND OTHER VECTORS**
 - Dengue
- **MOLD**
 - Increase mold growth
 - Respiratory problems (allergies, asthma)
- **PHYSICAL INJURIES**
 - Cuts, bruises, fractures
 - Drowning
 - Indirect deaths
- **MENTAL HEALTH EFFECTS**
 - Anxiety
 - Stress
 - Depression
 - PTSD
- **INCREASE OF MORBIDITY AND MORTALITY FROM CHRONIC DISEASES**



TAKE AWAY

Highlights of flooding events in PR

- Flooding events expose the vulnerability of Puerto Rico at all levels
- The urgent need to improve infrastructure
- Improve disaster preparedness and response to mitigate the impact of future events on the island
 - Communication
 - Power grid
 - Response teams
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What we learned

- Education in disasters from elementary to higher education
- Communication is crucial
 - Improve radio communication
 - Backup system
- Prepare for the worst
 - Water supply, food, medication for more than two weeks
 - Mobilize people to safe shelters
 - Increase flooding awareness through community leaders
- Have a community registry of bed-ridden and disable people to provide health outreach assistance
- Prepare for fuel shortage
- Prepare for extended periods without power

Care of the responder

- Consider the burn-out factor of the responders
- Be attentive to sign and symptoms of heat fatigue, anxiety, depression or worsening of mental status from community and responders

Thank You !

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