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NCST Advisory
Committee Meeting

NCST Technical Investigation of Hurricane Maria's Impacts on Puerto Rico:

Preliminary Project Plan for Mortality Study

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Goal 1: The Wind Environment and Technical Conditions Associated with Deaths and Injuries

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this presentation

Project: Characterization of Hazards

Objective: The objective of this project is to complete a quantitative morbidity and mortality assessment in Puerto Rico, to better understand how damaged buildings and supporting infrastructure played a role in the injuries and deaths associated with Hurricane Maria. The study results will provide guidance to improve codes, standards and inform future approaches to accurately attribute and predict life loss due to wind storm building failure(s).

Background (1/3)

- It has been challenging to develop guidance/policy to prevent disaster attributed mortality due to the lack of standards, consistent data collection and reporting.*
- While many agree on characterizing deaths and injuries due to direct exposure to environmental forces, many disagree on the contribution of indirect exposure to adverse health outcomes.*
- A **directly related death** is defined as a death directly attributable to the forces of the disaster or by the direct consequences of these forces, such as structural collapse, flying debris, or radiation exposure.*
- An **indirectly related disaster** death occurs when the unsafe or unhealthy conditions present during any phase of the disaster (i.e., pre-event or preparations, during the actual occurrence, or post-event during cleanup after a disaster) contribute to a death.*

*Combs D.L., Quenemoen L.E., Parrish R.G., Davis J.H., 2009. "Assessing disaster-attributed mortality: Development and application of a definition and classification matrix." *International Journal of Epidemiology* 28(6): pp. 1124–9.

Background (2/3)

- Death certificates are the fundamental and primary source of official mortality statistics in the United States.**
- National statistics on mortality are collected from death certificates using the International Classification of Diseases (ICD).**
- ICD categorizes deaths by event type, but does not distinguish whether the event is a disaster.**
- If the certifier does not record the event name and type on the death certificate, then information on the cause of death may be lost and the death not properly counted.**
- The lack of awareness by medical certifiers of what constitutes a disaster-related death and how to document this information on a death certificate has contributed to underreporting of mortality.**

**(CDC) Centers for Disease Control and Prevention, 2017. "Vital Statistics Reporting Guidance: A Reference Guide for Certification of Deaths in the Event of a Natural, Human-induced, or Chemical/Radiological Disaster." October 2017

Background (3/3)

- As of December 9, 2017, Puerto Rico's Department of Public Safety certified 64 deaths related to the storm.***
- Record keeping was challenging in the days and weeks after the storm due to the loss of power for months across the island after Hurricane Maria made landfall.***
- The New York Times and other news organizations estimate that the actual death toll could be over 1,000, based on analysis of daily mortality data from Puerto Rico's Vital Statistics Record Office.***
- Additional instances of deaths due to power failures at local hospitals, or oxygen tanks running out resulted in local government's willingness to revisit death count.***
- George Washington University will lead an effort to review excess mortality in Puerto Rico.****

***Robles, F., Davis, K., Fink, S., and Almukhtar, S., 2017. "Official Toll in Puerto Rico: 64. Actual Deaths May Be 1,052." *The New York Times*. December 9, 2017.
****Milken Institute School of Public Health News Release on Feb 22, 2018:
https://publichealth.gwu.edu/content/milken-institute-sph-project-will-estimate-excess-mortality-puerto-rico-tied-hurricane-maria

Preliminary Project Plan: (1/4) Mortality Study

In order to make recommendations for changes to or the establishment of evacuation and emergency response procedures and for improvements to building standards, codes, and practice, we need to use scientifically rigorous methods for:

(1) attributing morbidity and mortality to windstorms (directly and indirectly),
(2) examining the health impact associated with building and building system failures in windstorms,
(3) developing a process to integrate epidemiology and engineering methodologies and tools that better determine the risk factors of and predict life loss due to failures in the built environment.

Preliminary Project Plan: (2/4) Mortality Study

- Develop overall project plans, solidify partnerships, and establish contracts, MOUs, and any other means of formalizing relationships for this multidisciplinary project.
- Work closely with hazard characterization and critical building performance teams to characterize the exposure and causes of building failures.
- Identify important data sources for injuries and fatalities directly and indirectly related to the disaster.
- Review data regarding excess mortality, analyze and geocode deaths using death certificates, and identify sample for in-depth analysis related to direct and indirect deaths associated with building damage and supporting infrastructure failures.

Preliminary Project Plan: (3/4) Mortality Study

- Develop two survey tools for in-depth analysis of risk factors for direct and indirect deaths and injuries:
  (1) work closely with building performance team to develop physical damage assessment tool to be used in the morbidity/mortality studies.
  (2) develop survey instrument for verbal autopsy of the families of people directly or indirectly killed by the hurricane.
  (3) complete PRA/IRB approval processes, as necessary.
- The surveys will include mechanisms of direct injury and indirect illness and injury related to building damage and infrastructure failure mechanisms.
- Use data analysis to assess the association of the injuries and deaths to building and critical infrastructure failures.

Preliminary Project Plan: (4/4) Mortality Study

- Structured surveys with sampled households
- Information may be collected on the following:
  - Did the deaths occur during any of the hazard events associated with Hurricane Maria (e.g., damaging winds, landslides, torrential rains, flooding)?**
  - Did the deaths occur due to unsafe conditions caused by any of the hazard events associated with Hurricane Maria (e.g., structural collapse, flying debris, falling trees, high water, downed power lines, power outage, carbon monoxide exposure)?**
  - Were the deaths caused by direct physical forces (e.g., traumatic injury, drowning, electrocution, hyperthermia)?**
  - Were the deaths caused by unsafe or unhealthy conditions created by the hazard events associated with Hurricane Maria (e.g., evacuation, loss or disruption of health care, loss or disruption of utilities, loss or disruption of transportation, repair or cleanup activities, returning to unsafe structures or environments, disaster preparedness)?**

**(CDC) Centers for Disease Control and Prevention, 2017. "Vital Statistics Reporting Guidance: A Reference Guide for Certification of Deaths in the Event of a Natural, Human-induced, or Chemical/Radiological Disaster." October 2017

FY18 Planning Tasks

- Identify other agencies (e.g., CDC, HHS, NCDMPH, FEMA), academics (e.g., GW) and local stakeholders (e.g., PR's Department of Public Safety, PR's Vital Statistics Bureau, medical examiners or coroners, and hospital directors) with information on excess mortality, local practice for counting official storm deaths, and/or claims for funeral assistance.
- Specifications will be developed for a Contractor to conduct surveys and interviews
  - (Sources Sought notice currently posted: https://www.fbo.gov/index?s=opportunity&mode=form&id=7b726288d3a629d06a9f7a6792b04809&tab=core&_cview=0)
- Survey and interview protocols will be created
- Assess availability and quality of injury data
- Sampling strategies among selected areas will be developed
- PRA/IRB approvals will be obtained for the protocols, as necessary
- Additional resources, e.g., term appointments, may be obtained to assist with this project, as necessary

Source: NIST

Questions?