

Climate Epidemiology

**Advancing health research in the
context of climate change**

Brooke Anderson

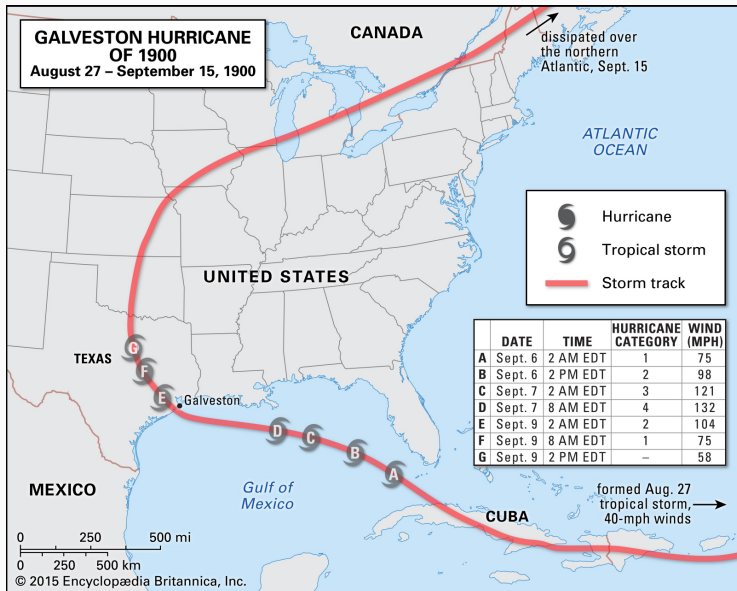
Colorado State University

June 20, 2019

*"Everybody talks about the weather,
but nobody does anything about it."*

— Mark Twain
(attributed)

Galveston Hurricane, 1900



Source: *Encyclopedia Britannica*

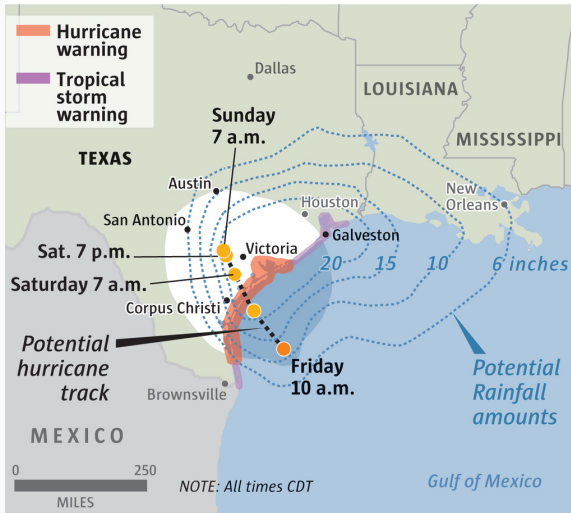
Galveston Hurricane, 1900



Source: *Library of Congress*

Advances in forecasting hurricanes

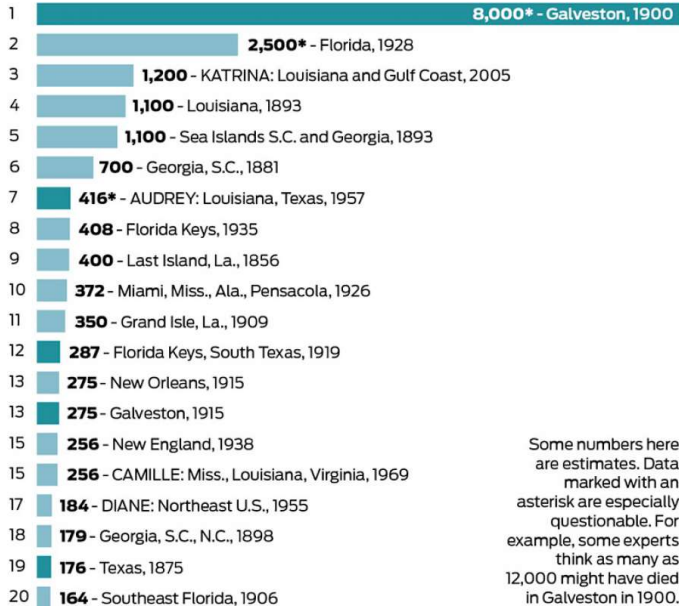
Hurricane Harvey's potential path



MARK NOWLIN / THE SEATTLE TIMES

Source: *Seattle Times*

RANKED BY THE NUMBER OF FATALITIES ...



Some numbers here are estimates. Data marked with an asterisk are especially questionable. For example, some experts think as many as 12,000 might have died in Galveston in 1900.

Source: *Houston Chronicle*

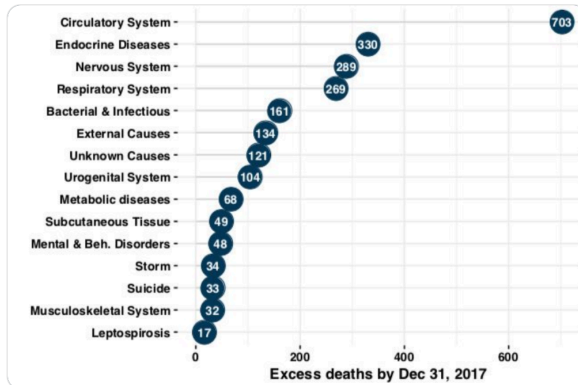
Excess deaths, Hurricane Maria



Rafael Irizarry @rafalab · 5 Sep 2018

The causes of death that increased after Maria are consistent with a collapsed health system: lack of access to insulin and bacterial infectious diseases. Elevated heart attacks and suicide rates point to stress as a problem. Here are the estimates for the 9/20-12/31 period

3/4



4



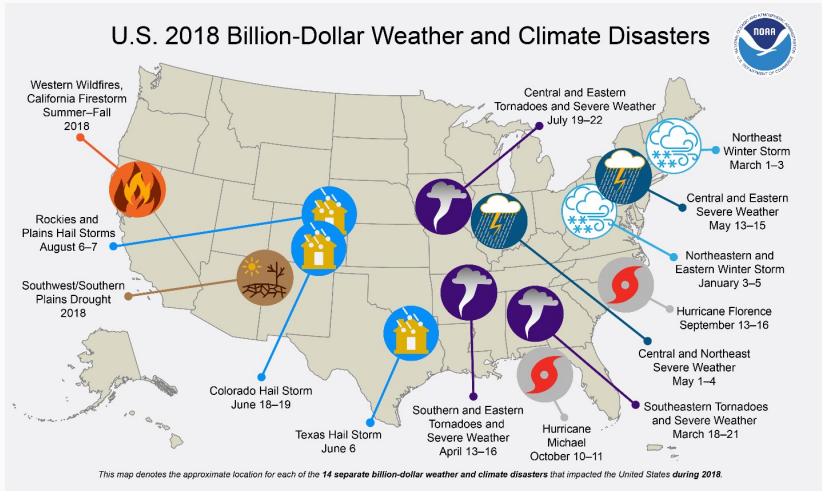
114



128

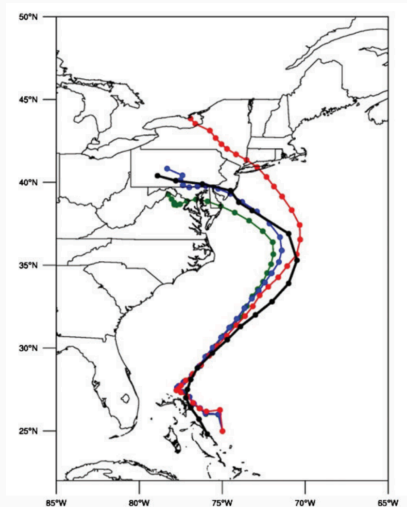


Climate-related disasters today



Source: NOAA

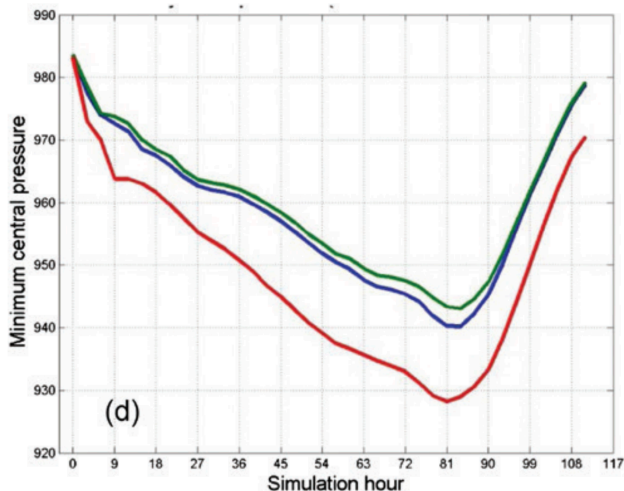
Hurricane Sandy event attribution



Under conditions in the 1880s (green), at present (blue), and 2090s (red)

Source: *Lackmann 2015*

Hurricane Sandy event attribution



Under conditions in the 1880s (green), at present (blue), and 2090s (red)

Health impact attribution

Attributing human mortality during extreme heat waves to anthropogenic climate change

Mitchell et al., 2016. *Environmental Research Letters*

Talk about the weather

A faded map of the central United States serves as the background. It shows major cities like St. Louis, Springfield, Chicago, and St. Paul. Overlaid on the map is a weather system represented by concentric isobars and arrows indicating wind direction and speed. The system is centered over the Gulf of Mexico, with arrows pointing outwards towards the land. The text "Talk with atmospheric scientists" is prominently displayed in the upper left quadrant of the image.

Talk with atmospheric scientists

The background of the slide is a light gray map of the United States. Overlaid on the map is a series of concentric circles and arrows, resembling a hurricane's path and impact zones. The circles are centered over the Gulf of Mexico and the southeastern United States. Arrows point outwards from the center, indicating the direction of the storm's movement and the spread of its effects. The map includes labels for various cities and states, such as Dodge City, Wichita, Springfield, St. Louis, Nashville, Oklahoma City, San Antonio, and Fort Eads. The text of the title is overlaid on the left side of the map.

The Future of Climate Epidemiology: Opportunities for Advancing Health Research in the Context of Climate Change

G. Brooke Anderson, Elizabeth A. Barnes,
Michelle L. Bell, and Francesca Dominici