

DISASTERS OF HUMAN HEALTH – COMMUNICABLE DISEASE

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Health Impacts of Disasters

- What's an emergency?
 - Suspension of normal procedures with measures taken to avoid a disaster
- What's a disaster?
 - Disruption of normal conditions, exceeding the capacity of the affected community
- Disasters and emergencies are not “natural” but a result of how communities are structured and resources are allocated



Stronger, more frequent disasters...



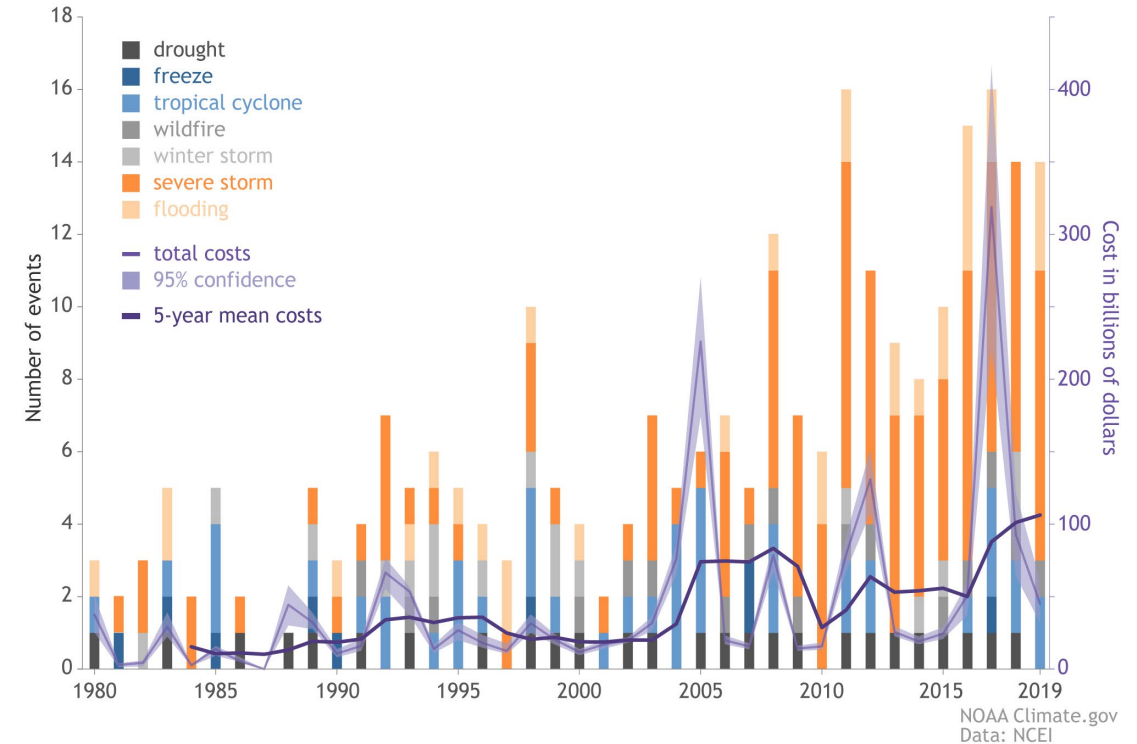
Rank	mm	in	Storm (Year)	Location
1	1538.7	60.58	Harvey (2017)	Texas
2	1321	52.02	Lane (2018)	Hawaii
4	1096	43.15	Imelda (2019)	Texas
8	912.6	35.93	Florence (2018)	N. Carolina



A growing public health problem

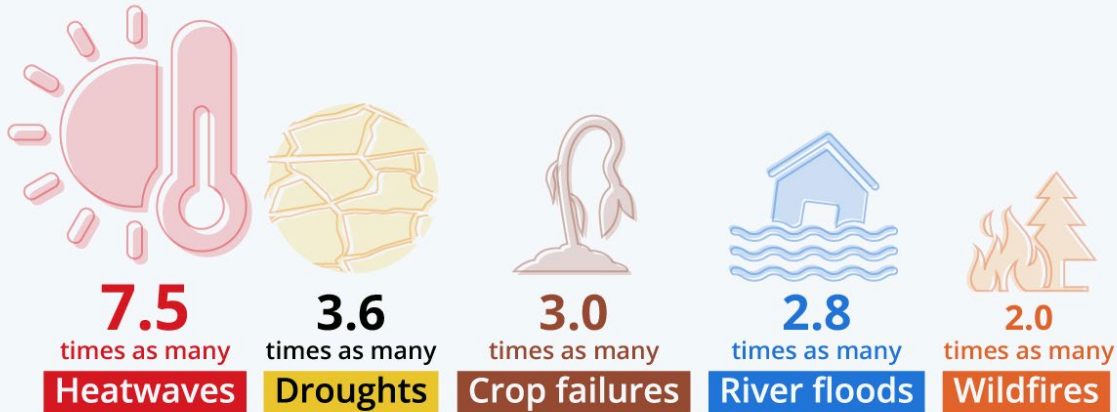
- Beyond compound disasters, the frequency and severity of disasters is increasing
 - Aging population; fastest growing in the U.S. are the “old old” >85
 - Urbanization: 50% of global populations in 3% of land (coastal, seismically active)
 - Climate change

Billion-dollar disasters by type, from 1980-2019



Number of Climate Disasters to Triple for New Generation

Frequency of climate disasters experienced in a lifetime for a person born in 2020 compared to one born in 1960



All climate disasters
~3 times as many

Based on NDC scenario (following Paris Agreement) of 2.7 °C/4.9 °F warming until 2100
Source: Thiery et al. Intergenerational Inequities in Exposure to Climate Change. Science (2021) via media reports

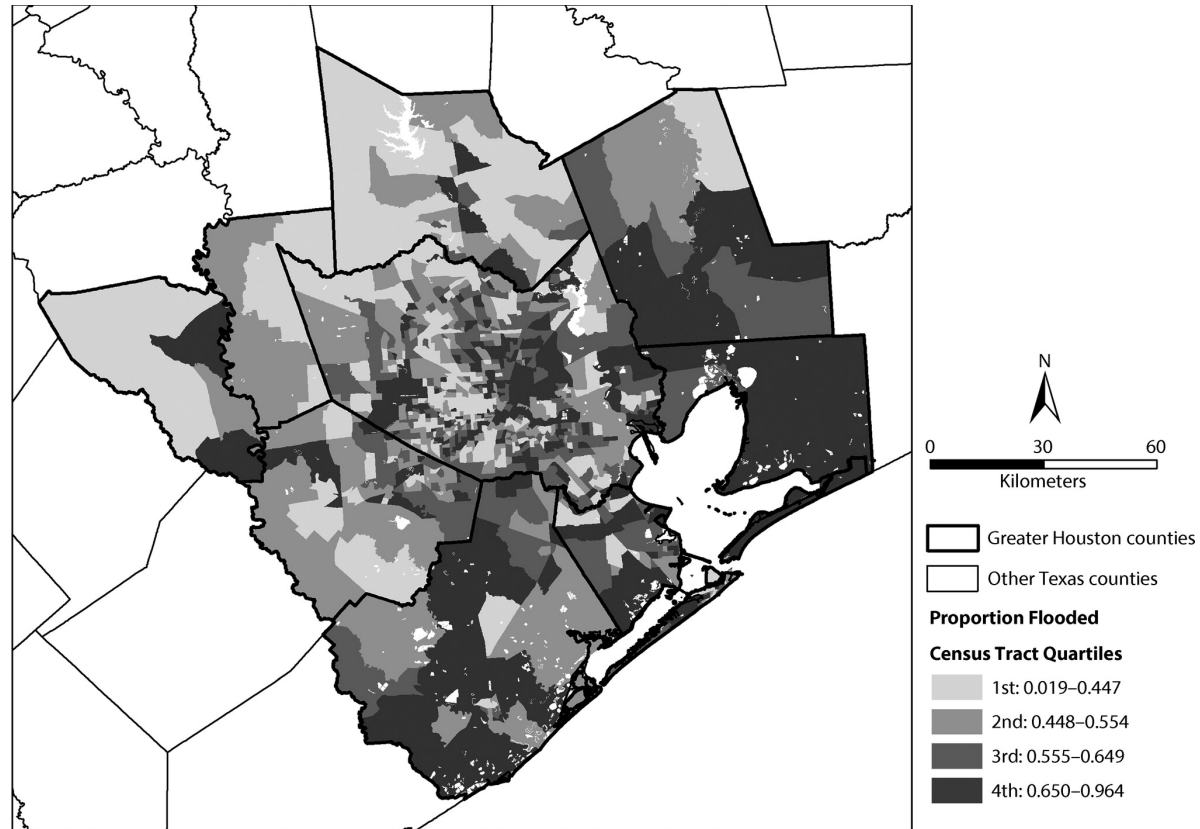


statista

- The U.S. has experienced 15 weather and climate disasters each incurring losses that exceeded \$1 billion in 2022
- Record eighth-consecutive year where the U.S. experienced 10 or more billion-dollar disasters
- Focus on \$ alone can distract from equity focus



Inequitable impacts



- “...spatial correspondence between flood extent and non-Hispanic Black and Hispanic proportions, as well as socioeconomic deprivation.”

Chakraborty, J., Collins, T.W. and Grineski, S.E., 2019. Exploring the environmental justice implications of Hurricane Harvey flooding in Greater Houston, Texas. American journal of public health, 109(2), pp.244-250.



Inequitable impacts



- Poorer neighborhoods have more disaster impacts and less resources to recover
 - Hurricane Ida flooded low income communities in Wilmington in September 2021
- Must consider environmental justice as part of preparedness

Climate-driven disasters raise environmental justice concerns in DE: <https://www.delawarepublic.org/science-health-tech/2021-10-15/enlighten-me-climate-driven-disasters-raise-environmental-justice-concerns-in-delaware>



Inequitable impacts

Risk for COVID-19 Infection, Hospitalization, and Death By Race/Ethnicity

Updated Feb. 1, 2022 [Print](#)

Rate ratios compared to White, Non-Hispanic persons	American Indian or Alaska Native, Non-Hispanic persons	Asian, Non-Hispanic persons	Black or African American, Non-Hispanic persons	Hispanic or Latino persons
Cases ¹	1.5x	0.7x	1.0x	1.5x
Hospitalization ²	3.2x	0.8x	2.5x	2.4x
Death ³	2.2x	0.8x	1.7x	1.9x

Race and ethnicity are risk markers for other underlying conditions that affect health, including socioeconomic status, access to health care, and exposure to the virus related to occupation, e.g., frontline, essential, and critical infrastructure workers.

<https://www.cdc.gov/coronavirus/2019-ncov/covid-data/investigations-discovery/hospitalization-death-by-race-ethnicity.html>



Inequitable impacts



Real-world data shows early treatment for COVID-19 helps prevent hospitalization

Adults* prescribed Paxlovid for mild-to-moderate COVID-19 were

51% less likely

to be hospitalized than those who weren't

* regardless of vaccination status

IF YOU HAVE COVID-19 SYMPTOMS:

1 TEST

Use a self-test, locate a test site, or find a Test to Treat location

2 TALK

If you test positive, talk to a health care professional about treatment

3 TREAT

Start treatment within 5 days

Deployment
NOVEMBER 11

Discussion

In this study of nearly 700,000 COVID-19 patients who sought medical care, the proportion who were treated with an outpatient substantially over time, primarily driven by increased Paxlovid use; however, treatment gaps exist among racial and ethnic minorities. Paxlovid treatment was 35.8% lower among Black patients relative to White patients and 29.9% lower among Hispanic patients, corroborates previous reports of inequitable outpatient COVID-19 treatment (1, 2) and documents the persistence of racial and ethnic disparities in pharmacy dispensing of oral antiviral medications between zip codes with high and with low social vulnerability before and after the current study ended (3). Additional analyses can determine whether this recent ecological trend will result in reduced



Post-Disaster Surveillance

- Counts and rates of morbidity and mortality
- Shelter surveillance
- Provides data to evaluate public health impact of effectiveness of protective actions
- Data for analytic studies

Hurricane Ida Mortality in the U.S., Aug-September, 2021

State	Total	Direct	Indirect
LA	33	12	21
NJ	30	30	0
NY	18	18	0
PA	5	5	0
MS	3	3	0
AL	2	0	2
MD	2	2	0
CT	1	1	0
VA	1	1	0



Disaster-Related Mortality

- Major challenges in defining disaster-related deaths
 - Defining disaster-related deaths (direct and indirect)
 - Reporting disaster-related deaths
 - Capturing death information in a timely manner

<https://www.reuters.com> › world › hurricane-ravaged-flor... ⋮

Hurricane Ian death toll climbs to 83, officials defend response

3 days ago — The death toll from **Hurricane Ian** climbed past 80 on Sunday as embattled residents in Florida and the Carolinas faced a recovery expected to ...

<https://www.nbcnews.com> › news › us-news › hurrican... ⋮

Hurricane Ian blamed for at least 34 deaths in Florida

5 days ago — The true death toll from the powerful Category 4 **storm** that devastated parts of the state could go higher.

<https://www.nbcnews.com> › news › us-news › hurrican... ⋮

At least 14 confirmed dead as the scope of Ian's devastation ...

6 days ago — **At least 14 people have died** after Hurricane Ian tore across Florida with such ferocity that President Joe Biden said it could be the ...



Disaster-Related Morbidity

- Outbreak investigations
- Emerging or reemerging diseases (trapping and testing mosquitos for Zika)
- Suicide attempts and other mental health outcomes
- Animal and spider bites
- Domestic violence and other assault

HEALTH

Floridians injured from Hurricane Ian pour into urgent care

By Caroline Catherman
Orlando Sentinel • Oct 04, 2022 at 5:13 pm



Expand



Using a boat, Geneva, Fla., resident Joe Shaw (top) delivers a TV to his brother on his flooded street, Whitcomb Drive, Tuesday, October 4, 2022, after Lake Harney in Seminole County crested 8 feet above sea level with historic flooding from Hurricane Ian. (Joe Burbank/Orlando Sentinel)



Listen to this article

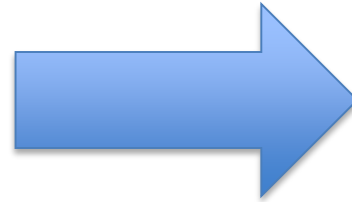


As recovery from Hurricane Ian continues, local hospitals and clinics are seeing more people come in with injuries.



Disaster-Related Morbidity

- Disease common in the disaster affected areas
- Living conditions of affected populations
- Availability of safe water and sanitation
- Underlying health status (nutrition, immunization coverage)
- Access to healthcare



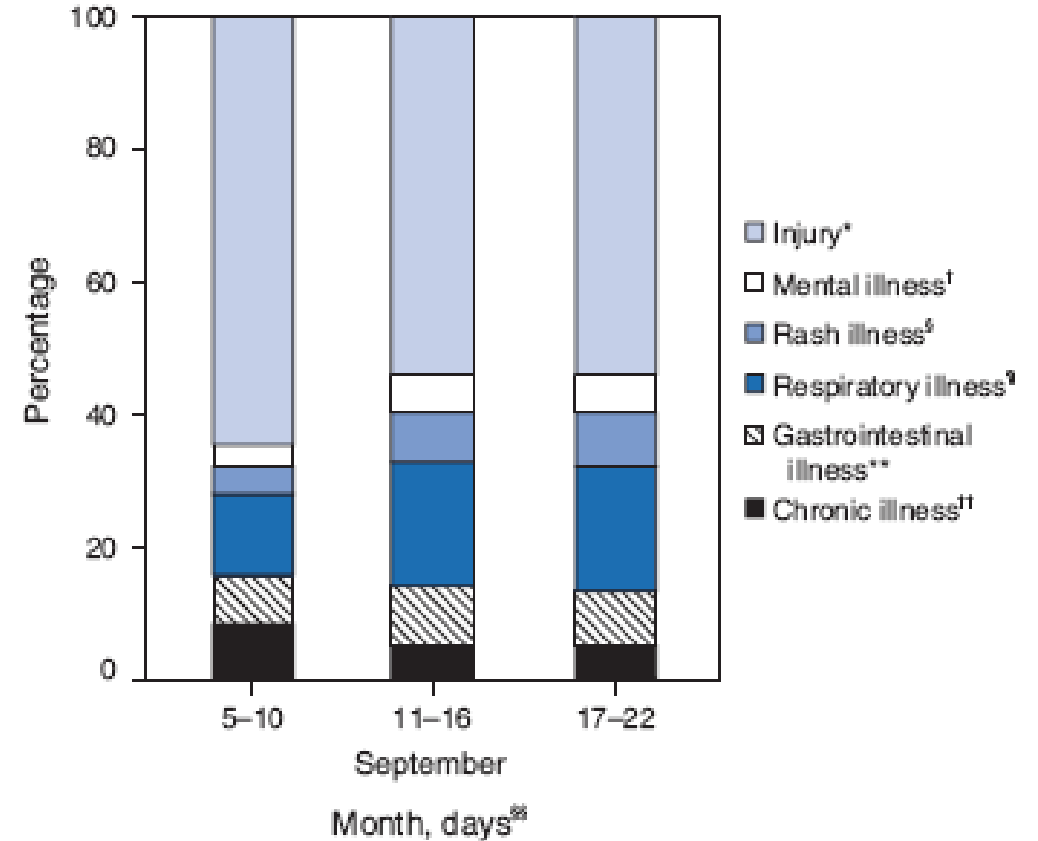
- Waterborne outbreaks
- Diseases associated with crowding
 - Acute Respiratory Infections
- Vectorborne diseases
 - Malaria, dengue, West Nile, Zika
- Fungal disease
 - Exposure to soils, molds, dust



Hurricane Katrina

- Significant spikes in ED census, peaking 3 days after landfall
- Active surveillance: 24,950 case reports from 29 facilities
 - 16% infectious disease
 - 26% injuries (e.g., MVA, trauma, falls)
 - 33% exacerbation of chronic illness (e.g., asthma, COPD) and medication refills

FIGURE 3. Percentage of total visits for selected health conditions reported by health-care facilities (HCFs) after Hurricane Katrina, by date — Louisiana and Mississippi, September 5–22, 2005



<https://www.cdc.gov/mmwr/preview/mmwrhtml/mm5526a3.htm#fig3>



Carbon Monoxide Surveillance: AL & TX

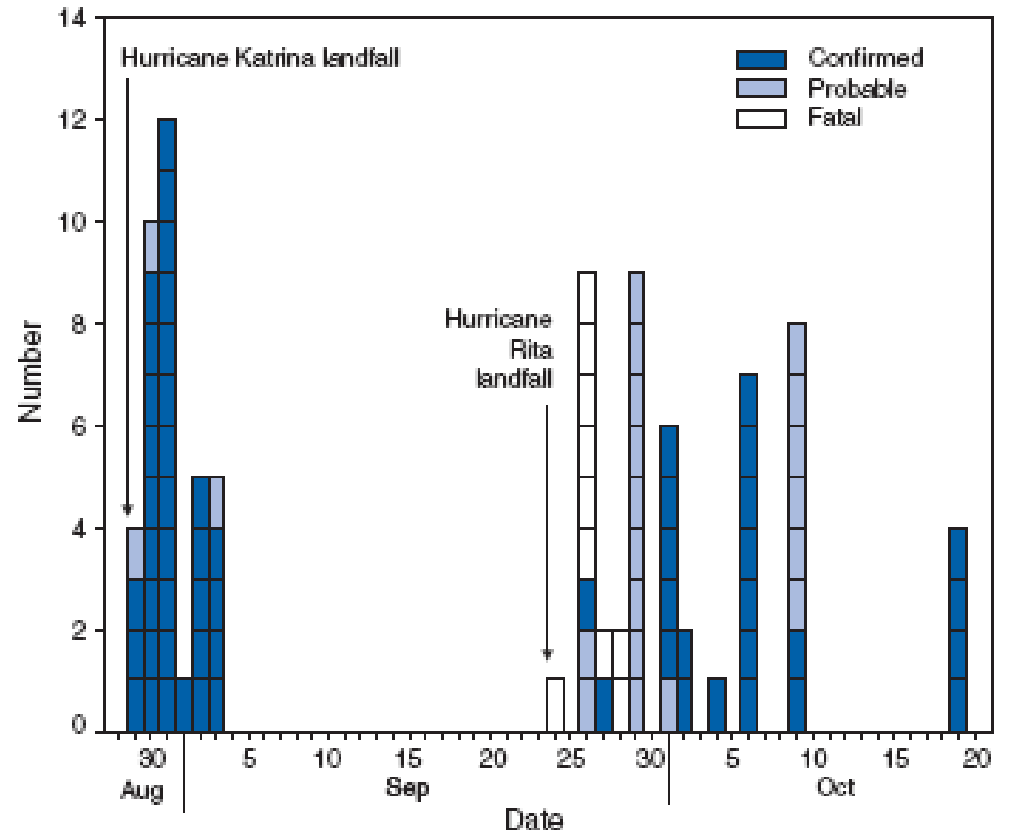
- Study of CO poisoning after Hurricanes Katrina and Rita
- 78 nonfatal cases, 10 deaths in hurricane-affected counties
- Nearly all associated with generator placed close to home

CDC. Carbon monoxide poisonings after two major hurricanes - -- Alabama and Texas, August—October 2005. MMWR.

2006;55(9):236-9. Available from:

<http://www.cdc.gov/mmwr/preview/mmwrhtml/mm5509a4.htm#tab2>

FIGURE. Number of cases of carbon monoxide poisoning after Hurricanes Katrina and Rita,* by date of medical contact — Alabama and Texas, August—October 2005



* All cases during August 29–September 3 occurred in Alabama, and all cases during September 24–October 19 occurred in Texas.

Emerging and Reemerging Infectious Diseases



Public Health Impacts of Crises



- WHO began a “catch up” polio vaccination campaign in Ukraine in Feb 2022
 - Response to 2015 outbreak to increase vaccine coverage (reached 83% by 2019)
 - COVID-19 reversed gains (53% of <1 by October 2021)

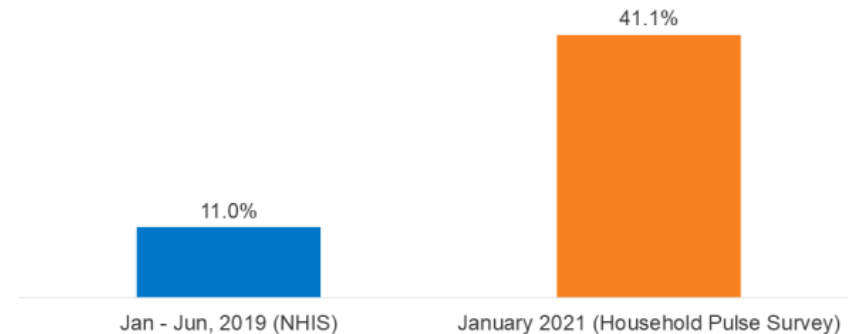


Indirect or Unmeasured Health Impacts

- Increases in domestic violence, child hunger, mental health, isolation
 - 51% increase in ER visits for suicide attempts by teenage girls
 - 8.1% increase in Domestic Violence
- Complications associated with delay (postoperative complications of appendicitis 15.3% vs. 6.7%)

Figure 1

Average Share of Adults Reporting Symptoms of Anxiety Disorder and/or Depressive Disorder, January-June 2019 vs. January 2021



NOTES: Percentages are based on responses to the GAD-2 and PHQ-2 scales. Pulse findings (shown here for January 6 – 18, 2021) have been stable overall since data collection began in April 2020.
SOURCE: NHIS Early Release Program and U.S. Census Bureau Household Pulse Survey. For more detail on methods, see: <https://www.cdc.gov/nchs/data/nhis/earlyrelease/ERmentalhealth-508.pdf>

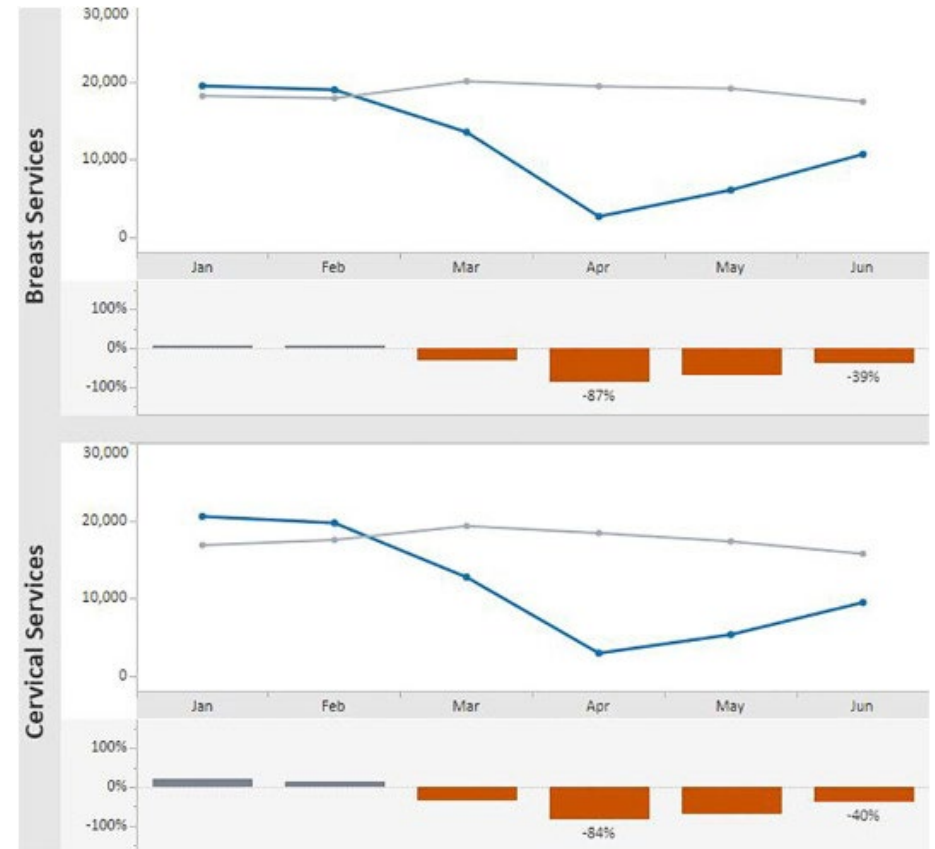
KFF

<https://www.kff.org/coronavirus-covid-19/issue-brief/the-implications-of-covid-19-for-mental-health-and-substance-use/>



Indirect or Unmeasured Health Impacts

- Reductions in access to screening and other preventive care (e.g., childhood lead screening) – reduced hours/restricted services
 - Delays in cancer diagnoses due to COVID-19 were estimated to increase the number of deaths among patients diagnosed with breast, colorectal, esophageal, or lung cancer by 4.8%-16.6% (UK National Health Service)



Indirect or Unmeasured Health Impacts

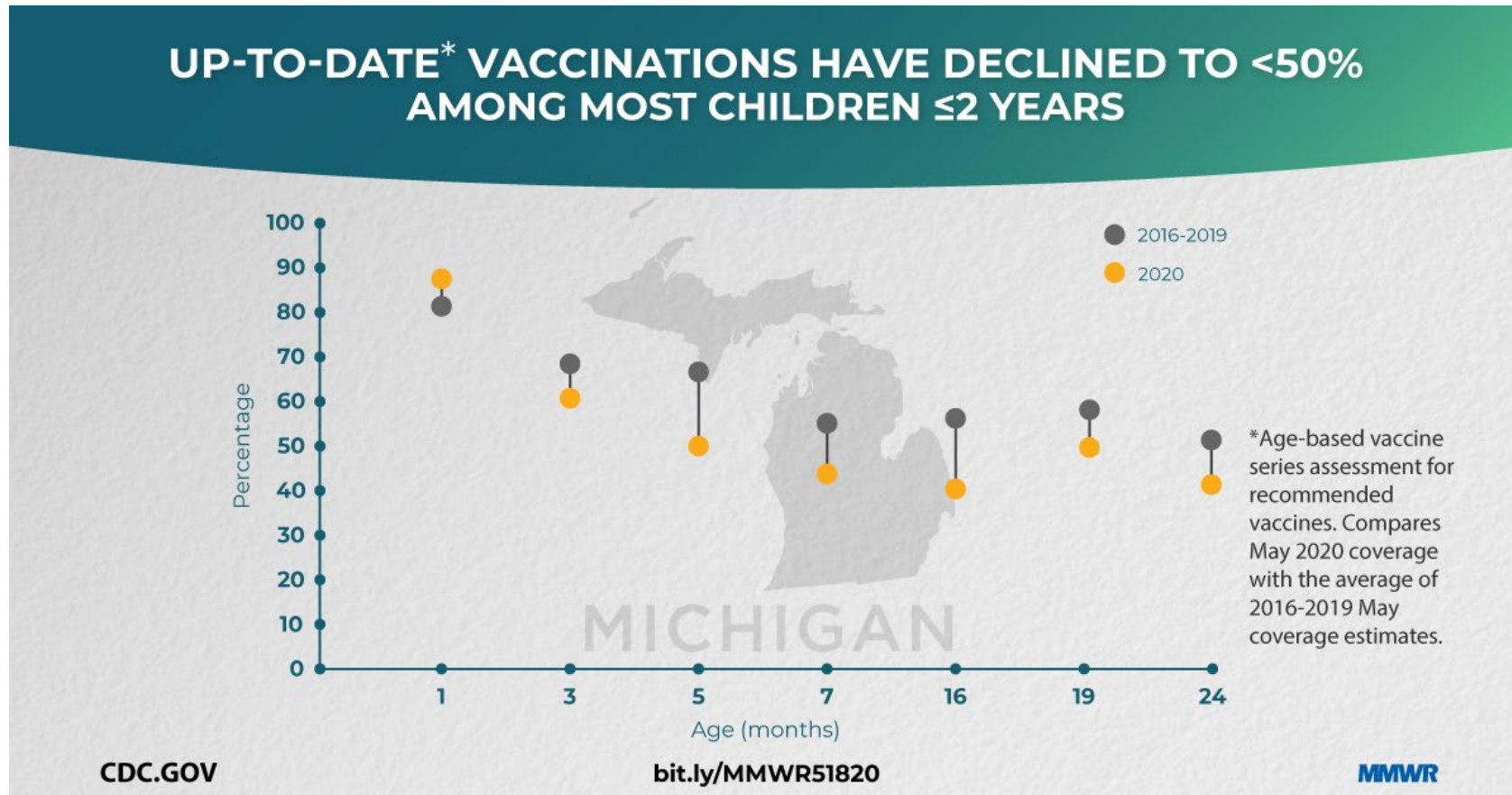
- Lead: Neurotoxin that causes permanent damage to brain
 - Early life exposure to lead leads to cognitive and behavioral impairments; lifelong problems with school performance, need for special education
- All U.S. jurisdictions had decline of at least 40%; Delaware among 6 states and Washington, DC with >75% reduction in childhood lead screening

Location	Blood Lead Level	Data Type	2016	2017	2018	2019	2020	2021
Delaware	At or above 3.5 mcg/dL	Number	530	411	363	384	192	182
		Percent	4.55%	3.62%	3.67%	3.68%	3.05%	2.74%
	Tested	Number	11,650	11,360	9,882	10,443	6,301	6,648
		Percent	17.54%	16.81%	14.66%	15.94%	9.64%	10.04%

<https://www.cdc.gov/nceh/lead/docs/lepac/cdc-decline-in-testing-blood-lead-rates-during-covid-pandemic-508.pdf>



Decline in Vaccine Coverage during COVID-19



Public Health Emergency: Polio New York

- 1 case of paralytic polio in an unvaccinated in Rockland County
- Polio detected in wastewater across Rockland, Orange, Sullivan, and Nassau Counties & New York City
- Nassau County case genetically linked to the case of paralytic polio previously identified in Rockland County

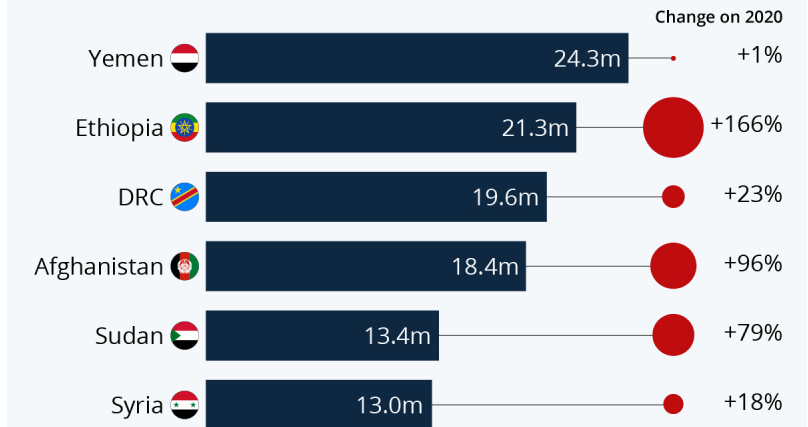


Vaccine Preventable Diseases and Disaster

- Between 2000 and 2015, outbreaks associated with disasters and humanitarian crises:
 - Polio, Measles, Rubella, Mumps, Varicella
 - Meningitis
 - Yellow Fever
 - Hepatitis A, B, and E
 - Rotavirus, Cholera
 - Tetanus
 - Pneumococcus

The Biggest Humanitarian Crises of 2021

Countries with the most people in need of humanitarian assistance and protection in 2021



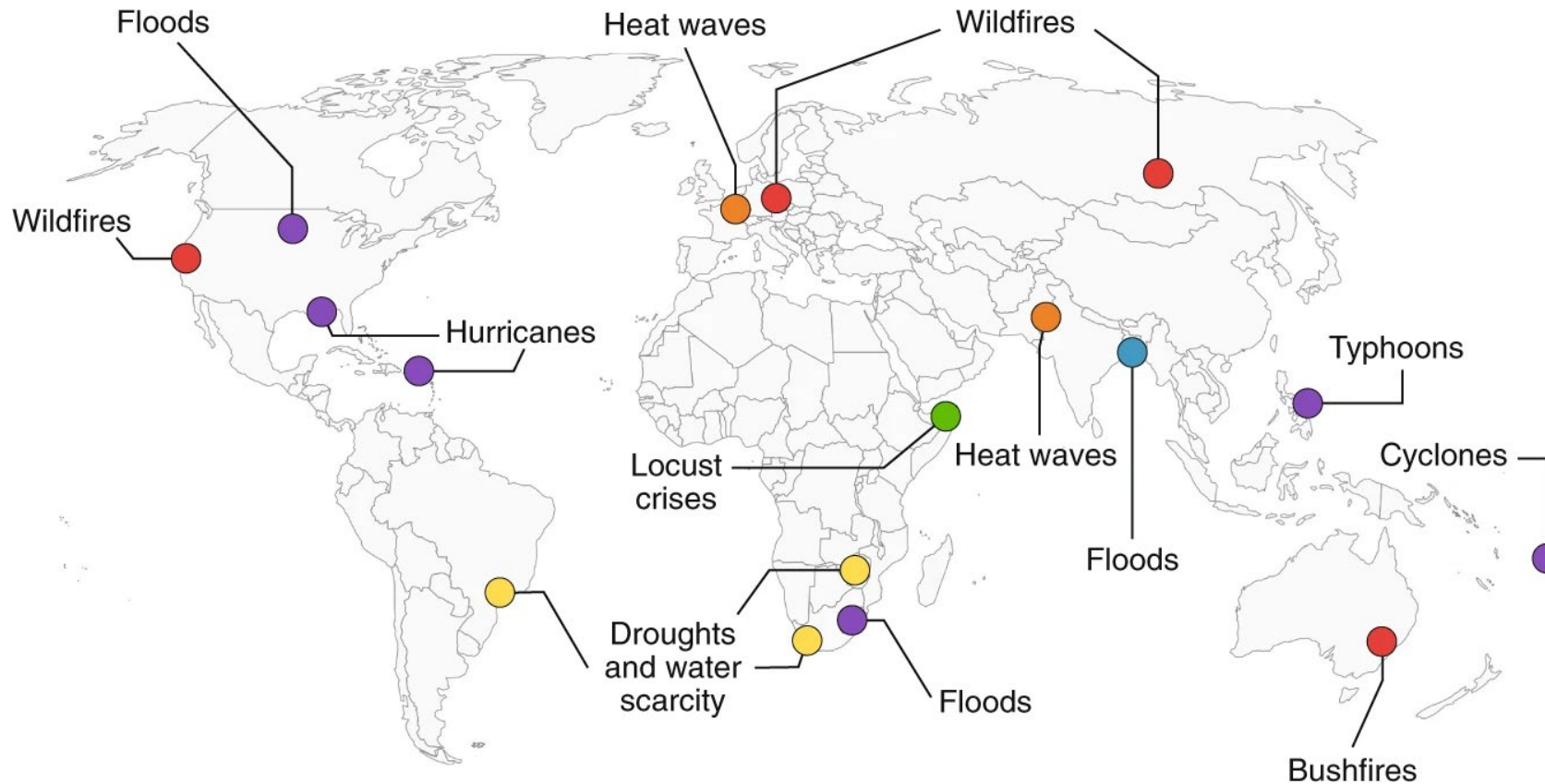
Source: UN via Statista - 2021 in Numbers



statista



Compound Hazards during COVID-19



<https://www.nature.com/articles/s41558-020-0804-2/figures/1>



Hurricanes during COVID

- Mass evacuations and risk of infection
 - Capacity of responders and response organizations
 - Reduced capacity of transportation and shelters
 - Disrupted testing capacity – would there be a spike in COVID-19 afterwards?



Shultz, J.M., Fugate, C. and Galea, S., 2020. Cascading risks of COVID-19 resurgence during an active 2020 Atlantic hurricane season. JAMA, 324(10), pp.935-936./



Remaining Challenges

- Demonstrating return on investment
 - Investment vs. temporary funding for surge capacity that ends with emergency
- Strengthening the evidence base
 - Research on what worked; Funding for practice-based research and
- How to address growing inequities post-pandemic
 - Green gentrification; Intersectional risk from emergencies and sequelae



Questions?

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