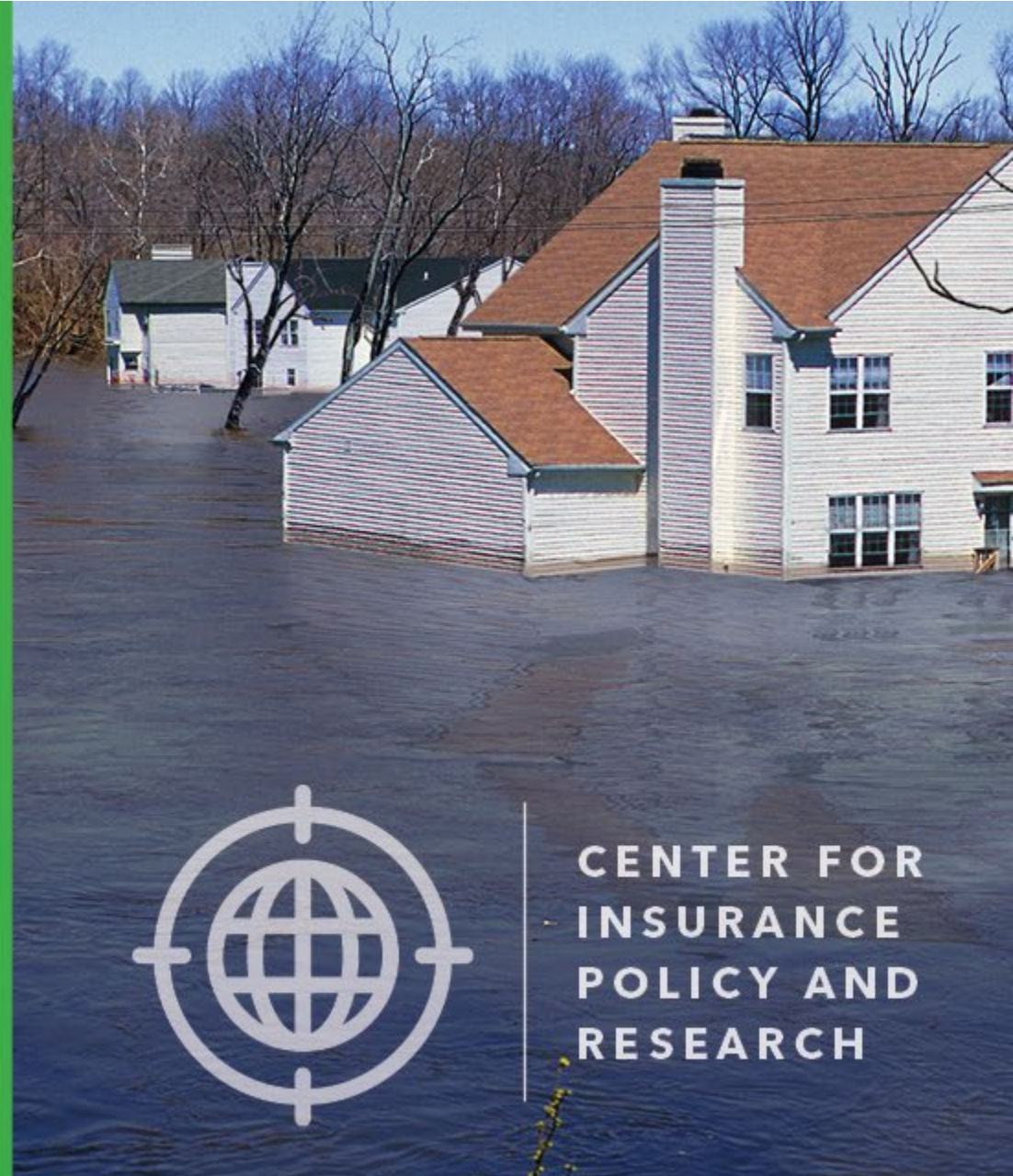


# Understanding and Assessing Indirect Impacts from Natural Disasters – A Focus on Health

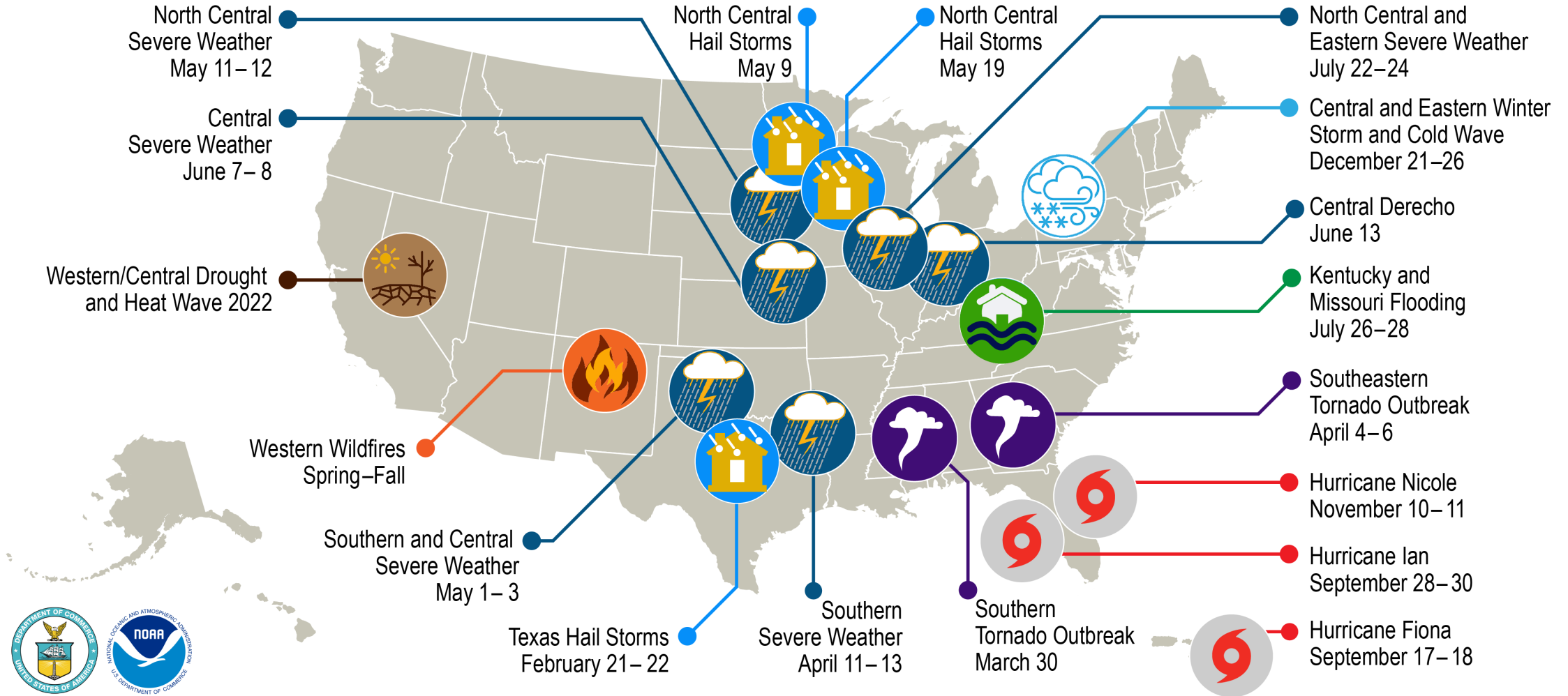
NAIC 2023  
SPRING NATIONAL MEETING  
THURSDAY, MARCH 23RD  
12:00 PM – 1:30 PM (ET)





# U.S. 2022 Billion-Dollar Weather and Climate Disasters

- Drought/Heat Wave
- Flooding
- Hail
- Hurricane
- Severe Weather
- Tornado Outbreak
- Wildfire
- Winter Storm/Cold Wave



This map denotes the approximate location for each of the 18 separate billion-dollar weather and climate disasters that impacted the United States in 2022.



# 2022 losses => \$165 billion in economic costs (60% insured) & 474 fatalities

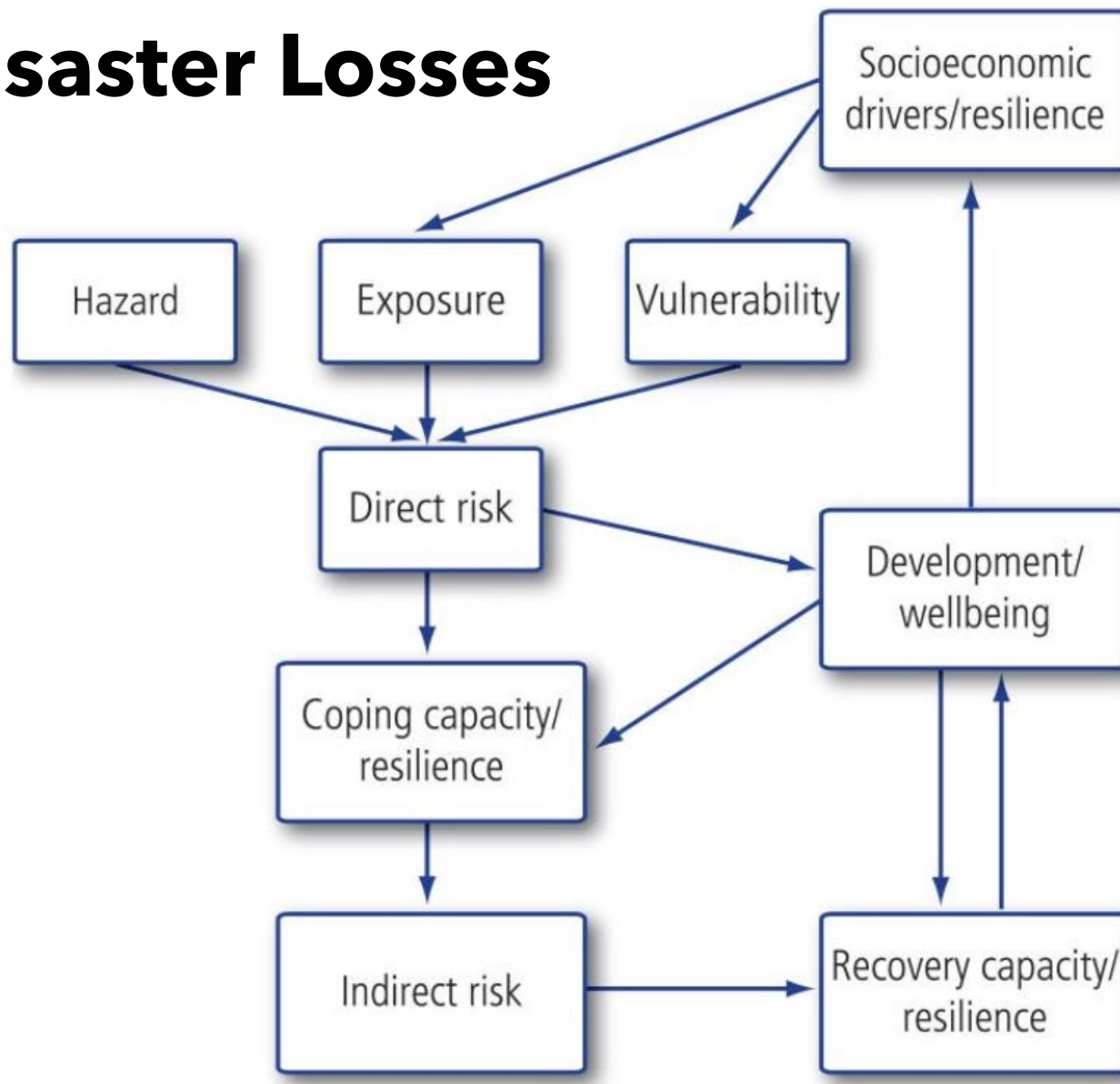
- These costs include:
  - physical damage to residential, commercial, and municipal buildings;
  - material assets (content) within buildings;
  - time element losses such as business interruption or loss of living quarters;
  - damage to vehicles and boats;
  - public assets including roads, bridges, levees;
  - electrical infrastructure and offshore energy platforms;
  - agricultural assets including crops, livestock, and commercial timber;
  - and wildfire suppression costs, among others.
- These disaster costs **do not take into account losses to:**
  - natural capital or environmental degradation;
  - **mental or physical healthcare related costs,**
  - the value of a statistical life (VSL);
  - or supply chain, contingent business interruption costs.

*Estimates should be considered conservative with respect to what is truly lost, but **cannot be completely measured due to a lack of consistently available data***





# Measuring Disaster Losses

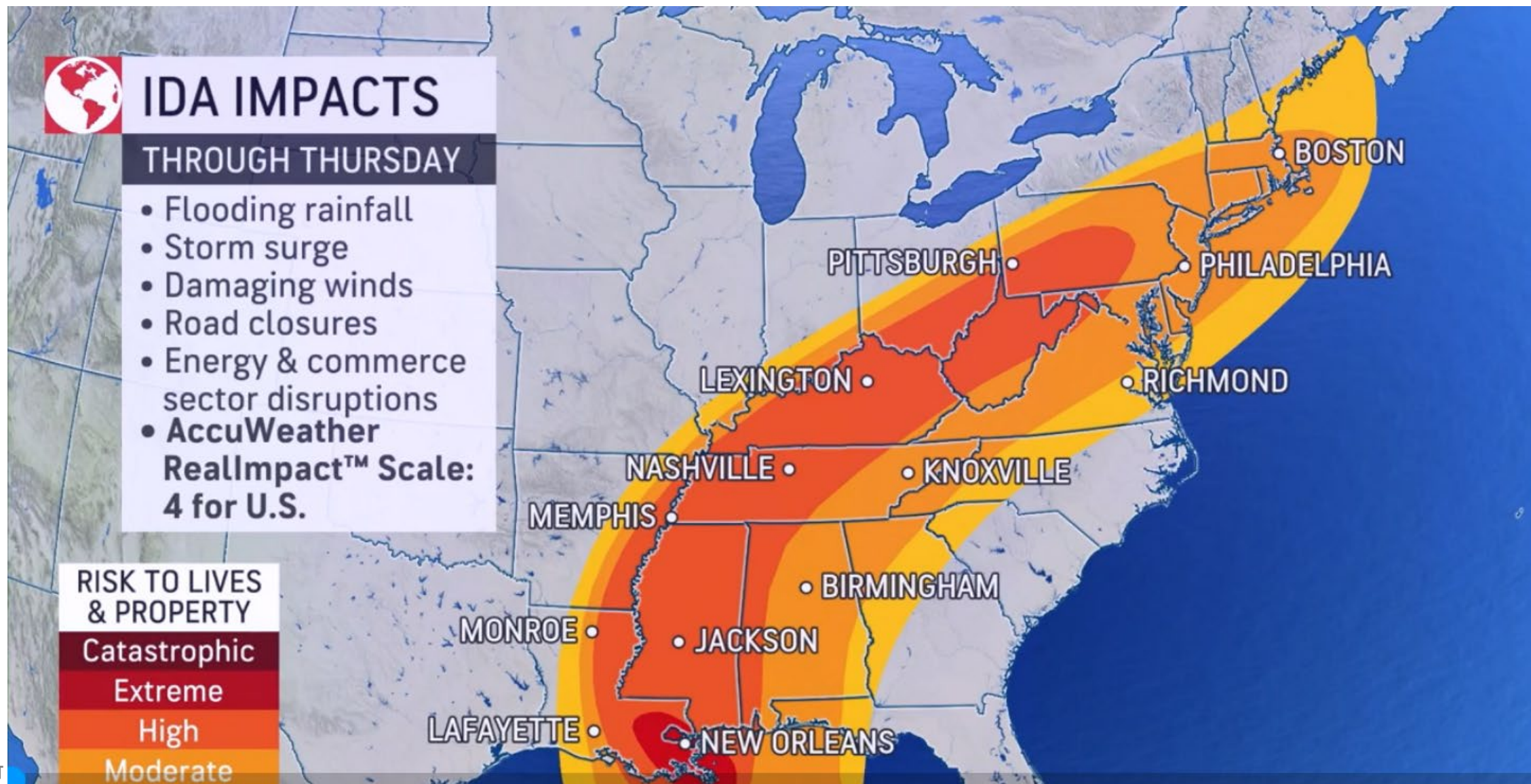


**Direct** = Immediate effect due to direct contact with the hazard (e.g., loss of life, physical and monetary loss)

**Indirect** = Occurs as a result of and in response to the direct impacts in the medium-long term (e.g., relief, recovery, reconstruction costs, longer term socio-economic effects)



# Thinking About (Indirect) Impacts in Space & Time





# U.S. Disasters from 2003 to 2022 - Human Impacts

Disaster Type	Total Deaths	Number Injured	Number Affected	Number Homeless	Total Affected
Drought	181				
Earthquake	5	345	<b>9,489</b>	<b>120</b>	9,954
Extreme Temp	696	31			31
Flood	625	387	<b>11,462,881</b>	<b>17,300</b>	11,480,568
Landslide	79	43	<b>1,338</b>	<b>150</b>	1,531
Storm	6,262	9,038	<b>96,431,485</b>	<b>129,948</b>	96,570,471
Volcanic activity			<b>2,500</b>		2,500
Wildfire	297	937	<b>1,006,377</b>	<b>55,245</b>	1,062,559
<b>Total</b>	<b>8,145</b>	<b>10,781</b>	<b>108,914,070</b>	<b>202,763</b>	<b>109,127,614</b>

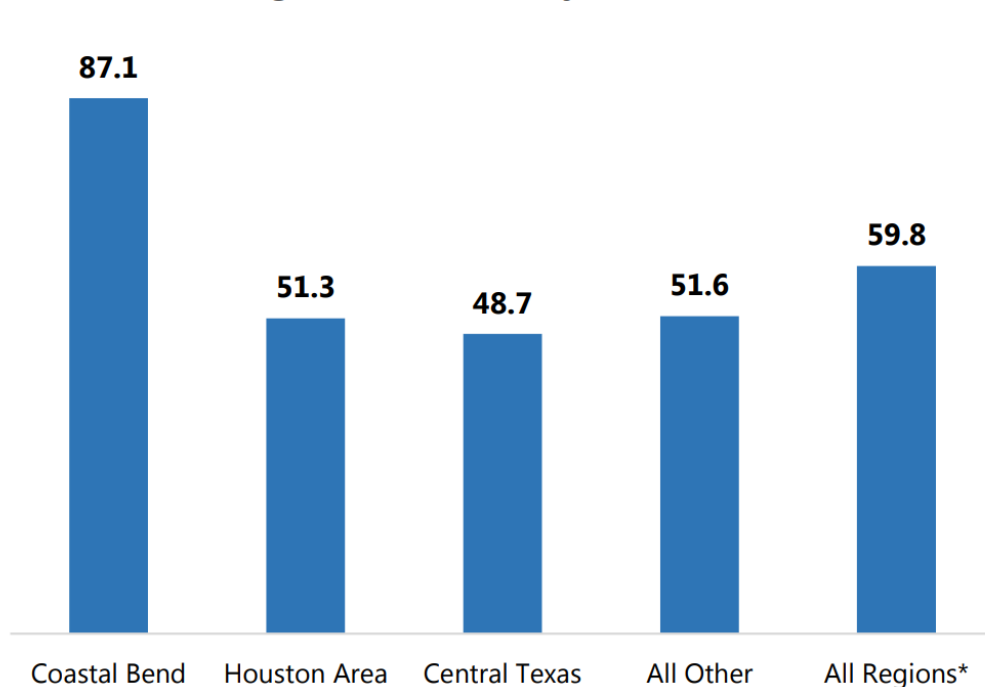
Source: <https://public.emdat.be/>

*Significant source of indirect impacts to potentially ensue*

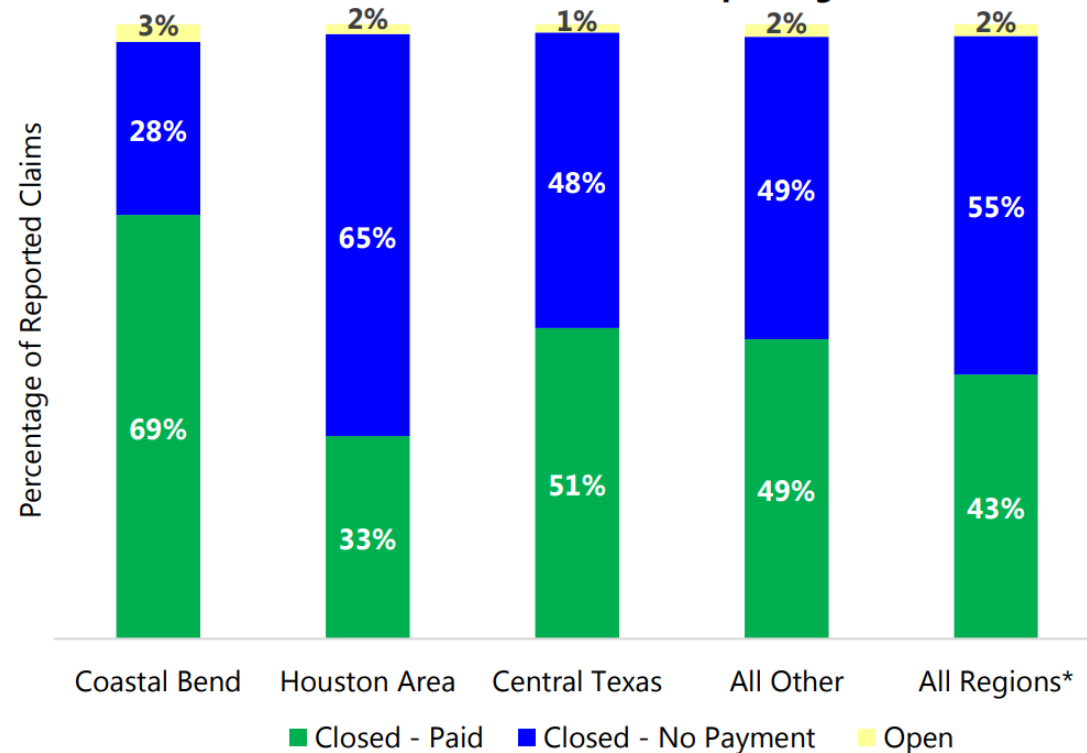


# Closing of Insurance Claims - Hurricane Harvey

### Average Number of Days to Close a Claim



### Status of Claims as of Reporting Date



Source: <https://www.tdi.texas.gov/reports/documents/harvey-dc-final-06302019.pdf>







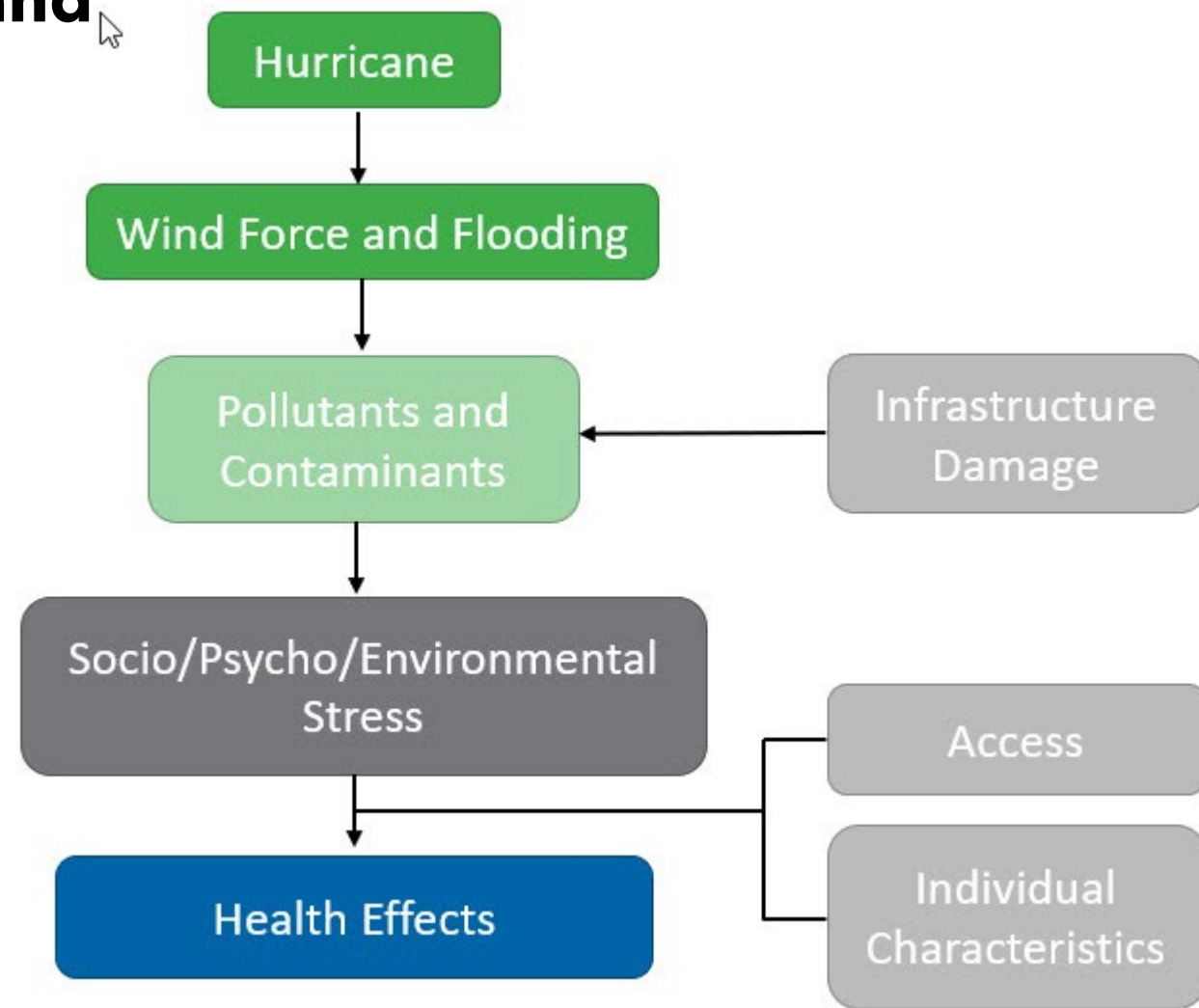


# Conceptual Model of the Direct and Indirect Effects of Catastrophic Events on Health (Hurricane)

Floodwaters have **increased concentrations of semi-volatile organic compounds** beyond safe thresholds.

Homes with greater flood damage after a hurricane have **higher levels of mold growth and airborne mold spores**.

**Exposure to airborne chemicals increases** due to the loss of electricity (e.g., carbon monoxide) and post-hurricane restoration (e.g., debris removal and infrastructure repair).



Modified from Waddell et al. (2021).



# Research Literature "Stylized Facts"



## Immediate Health Effects of Natural Disasters

- Examples include injury, electrocution, drowning, violence
- Most prominent among more vulnerable populations
  - > 50 percent are likely to be age 75+
- More likely for those who **shelter in place**
  - disproportionately suffer from **chronic illness**
  - disproportionately **poor** or members of other traditionally **marginalized groups**, such as minorities and disabled
- High ED visits from those on electronic medical devices







## Immediate Effects - Disruptions in Healthcare Delivery

- Serious damage to medical facilities, which can significantly **impair access to care**.
  - Hospitals
  - Free-standing treatment centers (dialysis centers, cancer treatment centers)
  - Exacerbates existing medical conditions for some due to untimely management
  - Displaced individuals with complex medical histories especially likely to find accessing care difficult
- Disruptions in medical transport
- Power outages are known to disrupt access to Electronic Health Records (EHRs) and healthcare devices more generally.





# Long-Term Health Impacts

- **Excess death due to all causes, especially for seniors**
- **Associations with cancer and exacerbation of existing cancers**
  - e.g., particulate matter following wildfires; toxins and carcinogens in flood water
    - Post- Harvey, residents were exposed to toxins and carcinogens in standing water for months.
  - Existing cancer patients may also suffer a disruption of time-sensitive cancer management.
- **Exacerbation of chronic illnesses** (e.g., diabetes, cardiopulmonary diseases, cancers)
  - Leading causes of excess deaths post-Maria were heart disease, diabetes, Alzheimer's, and septicemia
- **Exacerbation of asthma is common, particularly in children.**
  - "Wealth of evidence" documenting a relationship between **mold exposure** and lower respiratory problems
- **Infectious diseases** (44% of diseases occurred a year+ following a sample of hurricanes)
- **Stress-related mental health problems** (increasing over time post-event; through 3 years+)
  - Stress can also aggravate symptoms associated with comorbidities
  - Those reporting "a lot of fear and distress" during Hurricane Sandy were at much increased risk of being hospitalized two years later.



# Direct & Indirect Health loss values have been shown to matter in economic analyses

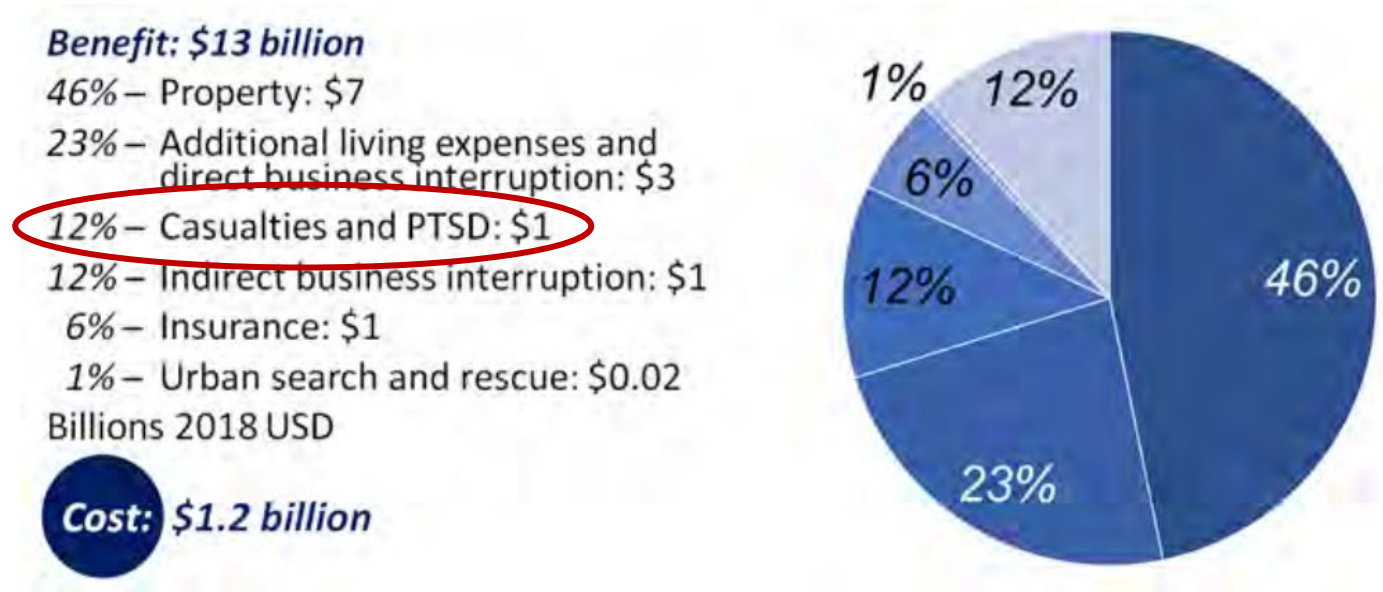


Figure 1: Total costs and benefits of meeting the 2018 IRC and IBC.

Source: [https://www.nibs.org/files/pdfs/NIBS\\_MMC\\_MitigationSaves\\_2019.pdf](https://www.nibs.org/files/pdfs/NIBS_MMC_MitigationSaves_2019.pdf)





# Sampling of Industry & Regulatory Actions

- Health Insurance Providers Actions Concerning Natural Disasters

- If members
  - are in a mandatory evacuation zone they can refill their prescriptions right away, even if they are not due to be refilled
  - have been displaced, they may see an out-of-network provider at in-network benefit levels and replace medical equipment and supplies, if needed
- Outreach by text message, email, and phone to remind them to refill and pick up prescriptions
- Expanded engagement with Medicare and commercial members in potentially impacted areas to ensure member safety and access to emergency services
- Members are eligible for \$0 virtual visits through Teladoc for non-emergency health conditions
- Availability of a bilingual 24/7 hotline for immediate emotional support at no extra cost, even for non-members
- Suspension of prior authorization requirements for all prescriptions and medical services, covering medical services regardless of participating or non-participating provider networks, and proactively contacting high-risk members to ensure their medical needs are met

- Florida OIR Notice to Industry during Hurricane Ian

*This notice is a reminder that all health insurers, managed care organizations, and other health entities must comply with provisions of [section 252.358, Florida Statutes](#), which allows for early prescription refills in the event the Governor issues an Executive Order declaring a State of Emergency. This mandate remains in effect until the Governor's Executive Order is rescinded or expires*

# Panel Members

**Karam Ahmad**  
Colorado Health Institute



**Grace Arnold**  
Minnesota Department  
of Commerce



**Dale Hall**  
SOA Research Institute



**Maanasa Kona**  
NAIC Consumer Rep,  
Georgetown University



# Reference Slides





## POTENTIAL SHORT-, MEDIUM-, AND LONG-TERM HEALTH IMPACTS OF HURRICANES

Short-term	Medium-term	Long-term
<ul style="list-style-type: none"><li>• Drowning from floodwater</li><li>• Injury from debris during storm, evacuation, or mitigation (for example preparing home for storm), electrocution from downed power lines</li><li>• Threats to high-risk individuals (for example dialysis patients, cardiac patients, or persons in nursing homes) in connection with evacuation, medical centers without power</li><li>• Auto accidents during evacuation or resulting from unsafe roads</li><li>• New or exacerbated mental health conditions, including anxiety, post-traumatic stress disorder, substance use disorder, or depression at the time of the incident, evacuation or displacement</li></ul>	<ul style="list-style-type: none"><li>• Infections – skin, gastrointestinal, eye, ear resulting from unsafe conditions</li><li>• Unsafe premises, lack of food or water, contamination to food or water, carbon monoxide poisoning from poor ventilation</li><li>• Impaired access to usual healthcare for displaced people</li><li>• New or exacerbated mental health conditions, including post-traumatic stress disorder, substance use disorder, depression, or anxiety following incident, evacuation, or displacement</li><li>• New or escalated physical abuse / maltreatment</li></ul>	<ul style="list-style-type: none"><li>• Consequences from disruption to preventive care</li><li>• New or exacerbated mental health conditions, including post-traumatic stress disorder, substance use disorder, depression, or anxiety following incident, evacuation, or displacement</li><li>• Respiratory ailments due to mold growth in damaged homes or dust from repair activities – asthma, chronic obstructive pulmonary disease</li></ul>

Source: <https://www.soa.org/48f109/globalassets/assets/files/resources/research-report/2022/health-hurricanes-studying-impact.pdf>



DIFFERENT MEASURES OF HURRICANE SEVERITY

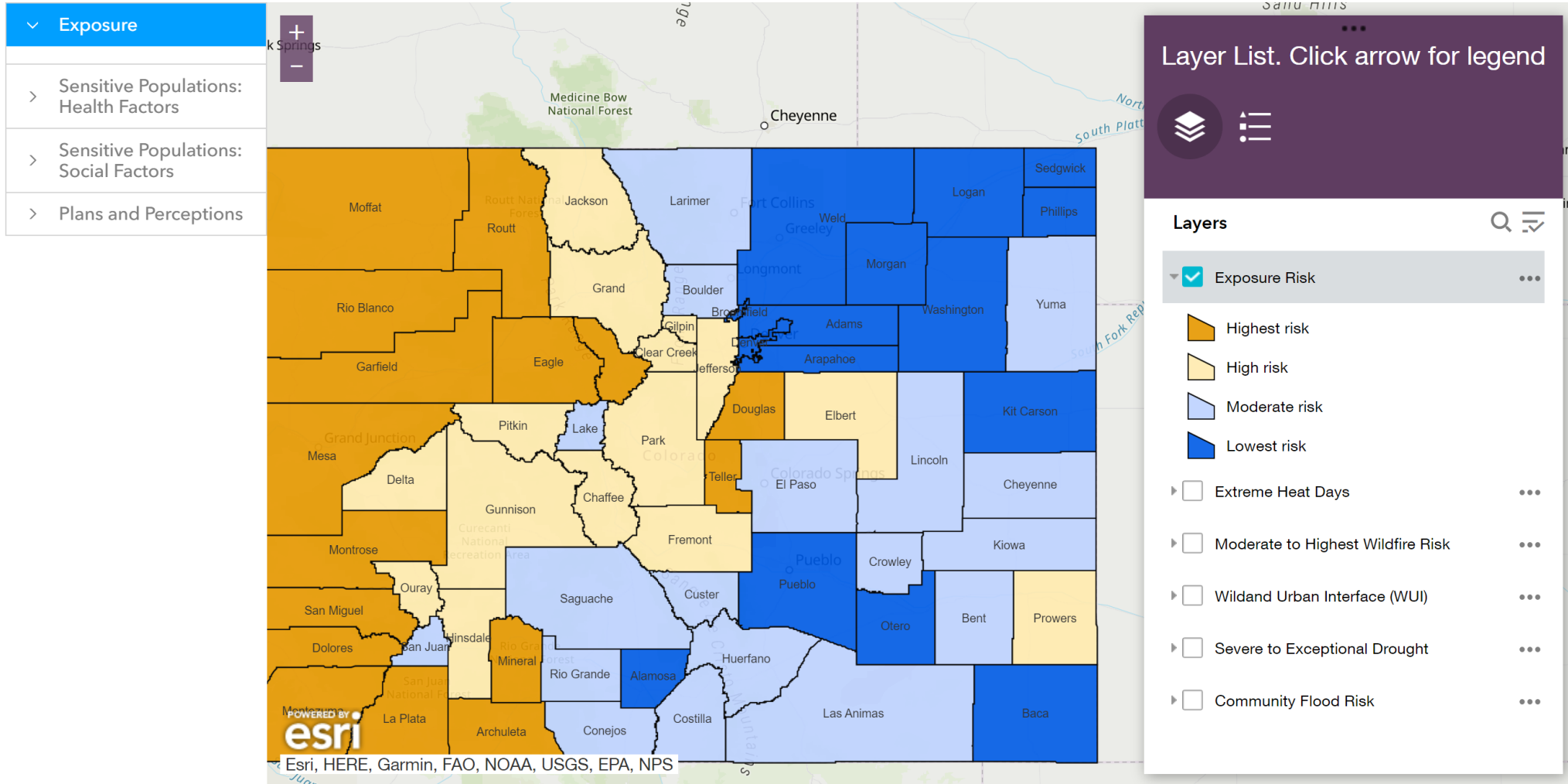
Storm	Date Range	Landfall Date	Category at Landfall <sup>17</sup>	Damage <sup>2</sup>	US Deaths Direct / Indirect <sup>2</sup>	Displaced Population <sup>18</sup>	Affected Population <sup>19</sup>	Evacuations <sup>20</sup>
Harvey	8/17/2017 to 9/1/2017	8/25/2017	4	\$136.3B	68/35	848,000	12,272,331	Evacuations began 8/24. Half of deaths in Harris County which was evacuated late.
Irma	8/30/2017 to 9/12/2017	9/6/2017	4	\$54.5B	10/82	202,000	51,306,639	Evacuations 9/6-9/17. Largest evacuation in history.
Florence	8/31/2018 to 9/17/2018	9/13/2018	4	\$25.7B	22/30	464,000	7,276,715	Coastal evacuations began 9/11/2018.
Michael	10/7/2018 to 10/11/2018	10/9/2018	5	\$26.5B	16/43	375,000	17,475,780	Evacuations in Florida coastal zones began 10/8.

Source: <https://www.soa.org/48f109/globalassets/assets/files/resources/research-report/2022/health-hurricanes-studying-impact.pdf>



## Interactive Mapping Tool

Health and Climate Index - For Web

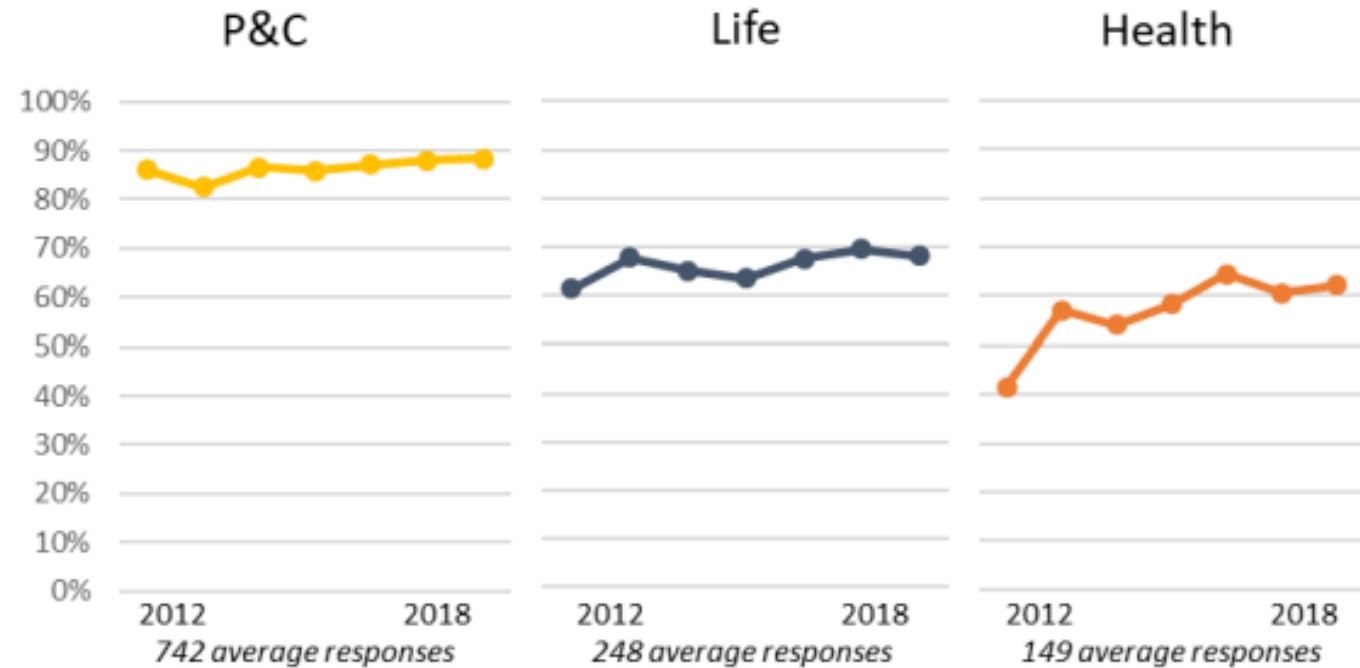


Source: <https://www.coloradohealthinstitute.org/research/2022-climate-change-health-index>

Former 8 Question  
Survey: CIPR Report  
(2020) - Assessments  
of and Insights from  
NAIC Climate Risk  
Disclosure Data

Question 4: Risks

**Summarize the current or anticipated risks that climate change poses to your company.** Companies answering yes by line of business, 2012–2018



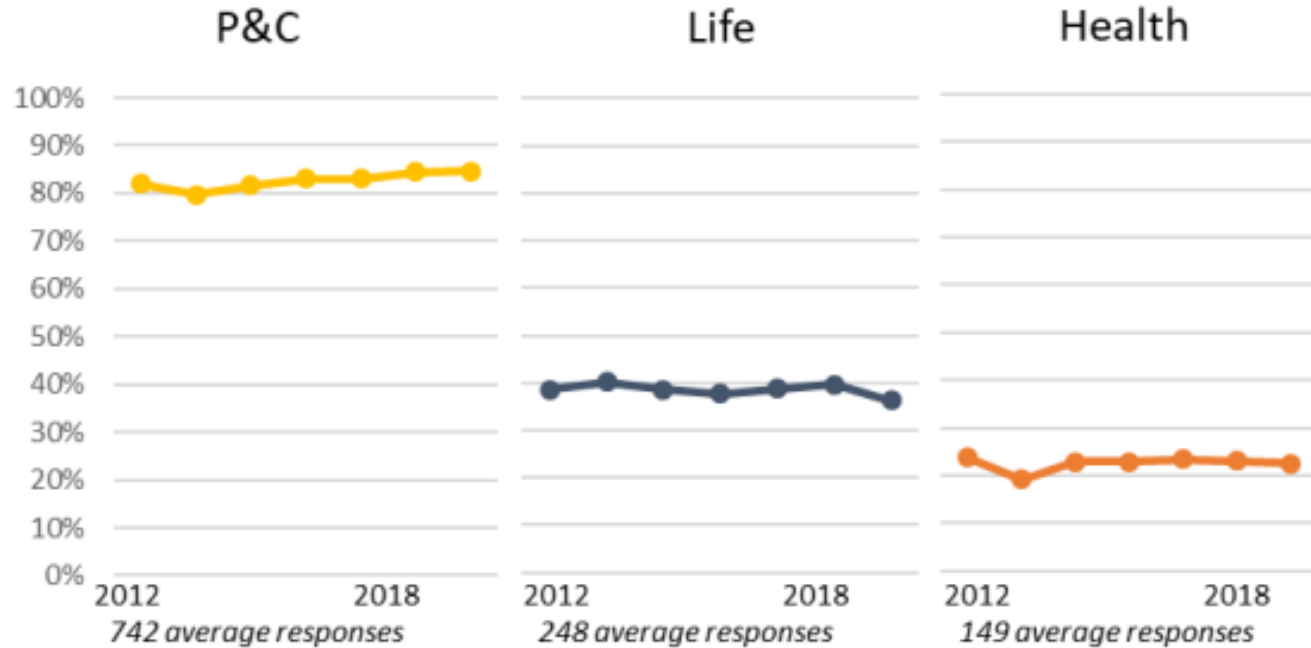
**Source:** National Association of Insurance Commissioners



Former 8 Question  
Survey: CIPR Report  
(2020) - Assessments  
of and Insights from  
NAIC Climate Risk  
Disclosure Data

Question 6: Mitigate

**Summarize steps the company has taken to encourage policyholders to reduce the losses caused by climate change-influenced events.** Companies answering yes by line of business, 2012–2018

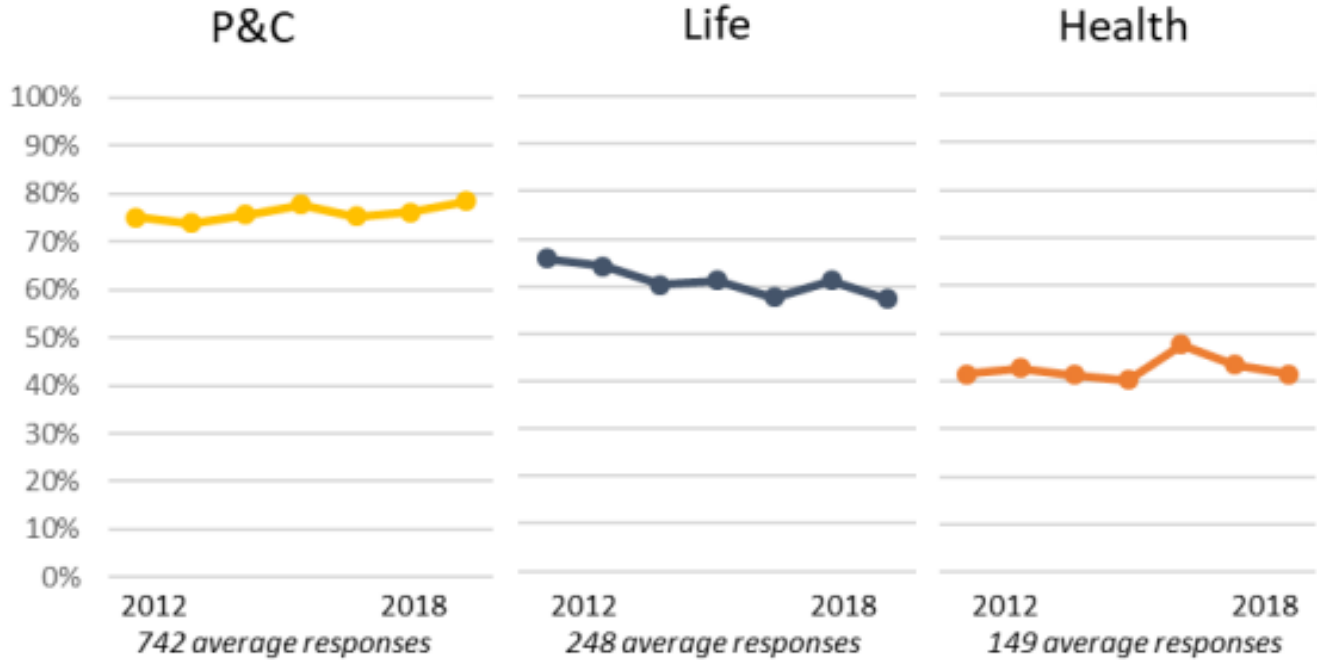


**Source:** National Association of Insurance Commissioners

Former 8 Question  
Survey: CIPR Report  
(2020) - Assessments  
of and Insights from  
NAIC Climate Risk  
Disclosure Data

Question 7: Mitigate

**Discuss steps the company has taken to engage key constituents on the topic of climate change.** Companies answering yes by line of business, 2012–2018



**Source:** National Association of Insurance Commissioners



## References - Stylized Facts

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