

# Financial Inequities Caused by Climate-Related Disasters

American Academy of Actuaries  
Climate Change Joint Committee

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## Presenters

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# Agenda In Order of the Paper

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Introduction—Connecting Climate Events to Equity Issues

Climate, Health and Property—Setting the Stage

Transformation From Isolated Events to Trends

Disaster Responses

Examples of Events—Wildfire, Hurricanes, Heat, and Water

Possible Solutions

What Comes Next for Actuaries

Definitions

# Introduction

## Connecting Climatic Events to Equity Issues

# Connecting Climatic Events to Equity—The Events

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- Climatic Events:
  - Hurricanes
  - Wildfires
  - Tornados
  - Extreme Heat
  - Floods

# Connecting Climatic Events to Equity—Who

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- Populations disproportionately impacted by disasters include:
  - Low socioeconomic status
  - Children
  - People with disabilities
  - The elderly
  - Rural populations



## Impacts

- Limited financial resources from savings, insurance, and government grants
- Potential impeded mobility to alternative locations both during the disaster and after
- Health issues negatively impacted by the event—mental illness, mobility, and chronic illnesses
- Inability to pay insurance premiums subsequent to the event

# Climate, Health, and Property

## Setting the Stage

## Health

Short-term ills can emerge during the event—injury, fatality, displacement.

Long-term illness persists and loss of health follows as a result of the event.

- Chronic disease appears or worsens

- Social determinants of health deteriorate

Mental health issues

- May appear in the moment, persist after, and are spread far and wide

- Manifesting as climate dread/anxiety

## Property Damage—Potential Impacts

Personal—homes, vehicles, personal property, income loss

Commercial—business locations, work force, customers, supply chain

Agriculture—livestock and crop loss, water, transport

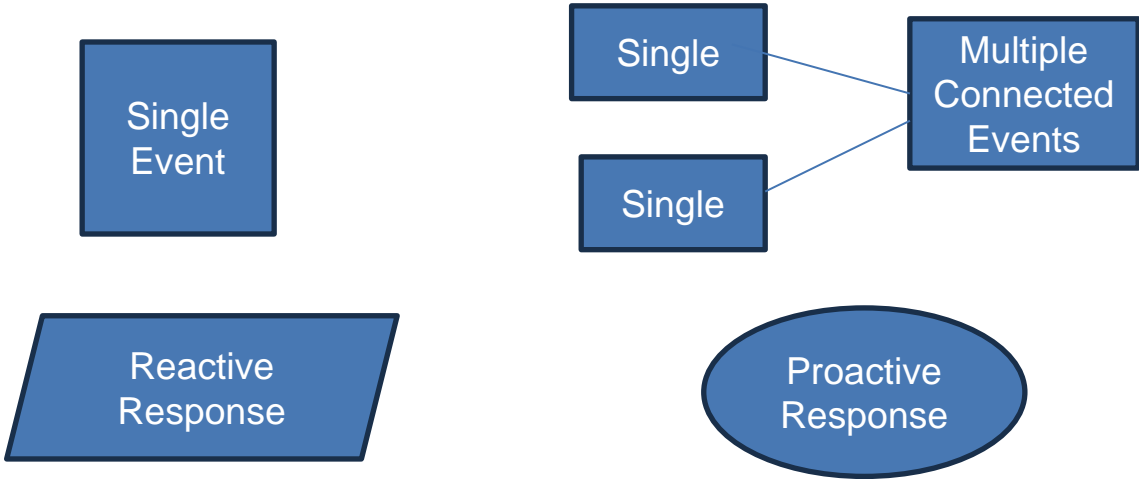
Civic—Schools, infrastructure, health facilities, government

Community—Population displacement, disruption in “third places”

While many residents suffer loss in the path of an event, the financial impacts have a disproportionate impact on aforementioned populations.

# Transformation From Isolated Events to Trends

# Transformation From Isolated Events to Trends



# Examples of Potential Trends Rather Than Isolated Events 15

Lake Charles, LA



Hurricanes Laura & Delta  
within six weeks - 2020  
Freezing conditions &  
Large rainfall in 2021

Mayfield, KY



2023 Rainfall Record  
2021 Tornado

West Coast



Atmospheric Rivers  
Needed after drought  
versus excessive rainfall

# Disaster Responses



# Disaster Recovery Expenses

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- Disadvantaged populations face food and lodging insecurity
- Immediate need for liquid assets
- 40% of household lack \$400 of liquid assets<sup>1</sup>
- Low-income renters face post disaster challenges
- Rental market impacted by supply & demand of housing

<sup>1</sup> Jacobsen K, Marshak A, Griffith M (2009) Increasing the financial resilience of disaster-affected populations. OFDA, USAID, Washington, DC



## Federal Disaster Recovery Expenses

- Population groups with lower incomes and greater diversity recover less quickly.
- Federal disaster aid including FEMA may not provide funding to cover basic needs of low-income population groups.
- Federal funding for households may take many years to receive.
- Process of rebuilding—the focus of a substantial portion of federal aid—may not send individuals to the resources for an individual’s health and mental needs.

# Examples of Events

Wildfire, Hurricanes, Heat, and Water

## Wildfire Impacts in Two Waves

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First Wave: Smoke/heat/damages/evacuation → Short-Term Impacts (lungs/eyes/cardio/stress)

Second Wave: Financial crises/community loss/water contamination/services disruptions/long recoveries → Long-Term Impacts (Mental health issues / exposures to toxins / exacerbation of pre-existing chronic conditions)

Disadvantaged Populations—Lack of insurance protection, limited cash reserves, high-risk exposure, limited transportation, and insufficient mental health services support

## Wildfire Impacts

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Las Vegas, NM Story:

First Wave: Evacuation (LV two weeks/Mora two months) / 2,000 homes destroyed / Physical impacts unclear

Second Wave: Floods were worse than the fire—compromised water systems (LV water systems/Mora Acequia system destroyed) and land viability compromised / divided community / difficulties with FEMA / increased elderly mortality?



# Water Impacts

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Disproportionate impacts seen in:

- ❖ Variation by location
  - ❖ Urban—Disadvantaged water systems / unfair pricing
  - ❖ Rural—Poor water/sewage systems / competition / unaffordable
- ❖ Drought vs. Flood
  - ❖ SW (Colorado Basin) vs. SE (Jackson, MS)

## Examples of Events—Too Much Water

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### Repeated Flooding in Houston

May 2024—27 inches fell April 28 to May 7. “Not a normal spring flood”

September 2020—Tropical Storm Beta dumps water

September 2019—Imelda meandered along at 5 mph and dumped over 30 inches

July 4, 2018—flooding from excess rain

August 2017—Harvey 60.58 inches over 4 days

April 2016—“Tax Day Flood” 17 inches on April 18. \$2.7 billion in damages

## Health Impacts—Too Little/Too Much Water

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### Too Little Water

Lack of drinkable water → dehydration / infections / stunted growth / Valley Fever

Drop in groundwater → toxins

Thallium (nervous system) / arsenic (organs) / nitrates (blood)

Lead (cancer / kidney / heart / brain / reproduction)

### Too Much Water

Parasites / infectious diseases / diarrhea / cholera



## Heat Impacts

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### The AC Story—Lower Income

Disproportionate impacts seen in:

- ❖ Lower AC use (20<sup>th</sup> percentile vs. 80<sup>th</sup> percentile)
- ❖ Higher % of income spent (8% vs 2%)
- ❖ More exposure to heat (shade, outside labor—10.6C /19F higher in summer...)
- ❖ Less government funding (more for heating, efforts in Medicaid)
- ❖ Loss of income

## Hurricane Impacts

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Most destructive disasters in terms of \$ (seven largest U.S. hurricanes total \$0.67 trillion).

Hurricane Katrina:

- First Wave: \$125 billion in damages, 1,800 deaths, 30% of population displaced.
- Second Wave: 20% of population never came back, long-term services disruption (cell phone / internet / electricity / health care services), studies revealed a high incidence of mental-health issues.

## Hurricane Impacts Are More Than Big Winds

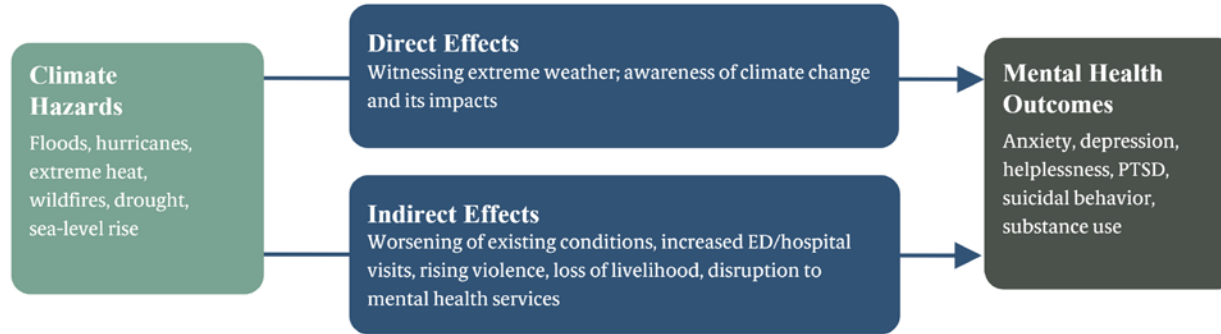
It isn't enough to look at category 5 storms for impacts.

Hurricane Sandy (2012), a category 3 storm at inception in Cuba, but it was only a category 1 when it was most destructive.

- 24 states impacted with rain and flooding.
- Storm surge in New York and NJ was massive and destructive
- Utility disruption, school closure, transportation nightmare

# Mental Health

## The Connection Between Climate Change and Mental Health



Data: Adapted in part from World Health Organization, *Mental Health and Climate Change: Policy Brief* (WHO, June 3, 2022).

Source: Emily Hough and Nathaniel Counts, "How Climate Change Affects Our Mental Health, and What We Can Do About It" (explainer), Commonwealth Fund, Mar. 29, 2023. <https://doi.org/10.26099/rk6r-ne98>

# Possible Solutions

## Possible Solutions—Financing

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More potential solutions than we can describe

Financing solutions:

- State-based solutions—Example: Citizens in Florida

- Parametric insurance—Speeds indemnification to claimants

- Additional financing solutions

  - Alternative insurance entities like captives

## Possible Solutions—Risk Mitigation—Property

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### Examples



Raising the height of furnace and electrical panels in basements



Monitoring of room temperature to prevent freezing pipes



Fortified roofs and shingles rated for fire and/or wind protection



Clearing brush to prevent wildfire spread

## Examples

- Air purifiers
- Air conditioning
- Disaster planning for health care providers to assure operations continue



# What Comes Next for Actuaries

# What Comes Next for Actuaries

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## Inform and Educate

- Actuaries

- Public policymakers

## Topics of Education

- Revised expectations of financial implications

- Input to forecasts of economic impacts of mitigation and resilience

# Definitions

Disadvantaged Population Groups

Extreme Climate-Related disasters

“Loaded Gun” Weather Condition

Atmospheric Rivers

Financial Resilience and Sustainability

Equity Issues

Protection Gap

## Definitions, Continued

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Covariance vs. Idiosyncratic Risk

Captive vs. Traditional Insurance

Parametric Insurance

Liquid Assets

FEMA

ESG

# Questions?

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Thank You

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