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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

- Climatic Events:
  - Hurricanes
  - Wildfires
  - Tornados
  - Extreme Heat
  - Floods
Connecting Climatic Events to Equity—Who

- Populations disproportionately impacted by disasters include:
  - Low socioeconomic status
  - Children
  - People with disabilities
  - The elderly
  - Rural populations
Connecting Climatic Events to Equity—Impacts

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
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
Climate, Health, and Property—Setting the Stage

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

- Single Event
  - Reactive Response
- Multiple Connected Events
  - Single
  - Proactive Response
Examples of Potential Trends Rather Than Isolated Events

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

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

\(^1\) 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

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

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

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

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

**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

The AC Story—Lower Income

Disproportionate impacts seen in:

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

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

**Climate Hazards**
- Floods, hurricanes, extreme heat, wildfires, drought, sea-level rise

**Direct Effects**
- Witnessing extreme weather; awareness of climate change and its impacts

**Indirect Effects**
- Worsening of existing conditions, increased ED/hospital visits, rising violence, loss of livelihood, disruption to mental health services

**Mental Health Outcomes**
- Anxiety, depression, helplessness, PTSD, suicidal behavior, substance use

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-n498
Possible Solutions
Possible Solutions—Financing

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

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
Possible Solutions—Risk Mitigation—Health

Examples

- Air purifiers
- Air conditioning
- Disaster planning for health care providers to assure operations continue
What Comes Next for Actuaries
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
Definitions

Disadvantaged Population Groups
Extreme Climate-Related disasters
“Loaded Gun” Weather Condition
Atmospheric Rivers
Financial Resilience and Sustainability
Equity Issues
Protection Gap
Definitions, Continued

Covariance vs. Idiosyncratic Risk
Captive vs. Traditional Insurance
Parametric Insurance
Liquid Assets
FEMA
ESG
Thank You

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