The Association Between Major Disasters and Health-Related Behaviors: Using BRFSS Data from Mississippi

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Presenter Disclosures
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(1) The following personal financial relationships with commercial interests relevant to this presentation existed during the past 12 months:

“No relationships to disclose”

The Adverse Effect of Disasters on Physical and Mental Health

- Short-term effects
  - Direct physical injuries
  - Psychological stress symptoms
  - Lack of healthcare access

- Long-term effects
  - Depression, Posttraumatic Stress Disorder (PTSD) symptoms
  - More general health complaints
The Adverse Effect of Disasters on Risk Behaviors

- Risk Behaviors
  - An increased use in tobacco and alcohol among disaster-affected populations
  - Stressed people are more likely to engage in risk behaviors

Data Source

- Mississippi Behavioral Risk Factor Surveillance System (BRFSS) data from 2004 through 2010
- BRFSS: National annual telephone survey by CDC
  - A random digit dialing system
  - 18yr and older non-institutionalized civilian adults state residents

Research Questions

- Is physical health associated with disasters?
- Is mental health associated with disasters?
- Is the risk behavior of smoking associated with disasters?
- Is the risk behavior of binge drinking associated with disasters?
Data Description

- Valid Sample Size: 9511
- Average age: 54 yr
- 38% males, 81% white
- 42% employed, 26% retired, and 11% unable to work
- 58% married, 31% had children living with them, 33% had a high school diploma, 50% had annual household income ≤ $35,000
- 23% current smokers, 8% binge drinkers

BRFSS Variables Used as Outcomes

- Health Outcome Indicators
  - Physical health (0-30 days): self-reported number of physically unhealthy days in the past 30 days
  - Mental health (0-30 days): self-reported number of mentally unhealthy days in the past 30 days

- Risk Behaviors
  - Current Smoker (1 or 0)
  - Binge drinker (1 or 0): on one occasion, males having ≥ 5 drinks or females having ≥ 4 drinks
### Key Predictors – Disaster Days / Lagged (365 days)

<table>
<thead>
<tr>
<th>Year</th>
<th>Disaster</th>
<th>Region 2 (Days)</th>
<th>Region 9 (Days)</th>
</tr>
</thead>
<tbody>
<tr>
<td>2004</td>
<td>Hurricane Ivan 9/13-9/20</td>
<td>0</td>
<td>8</td>
</tr>
<tr>
<td>2005</td>
<td>Hurricane Dennis 7/10-7/15</td>
<td>6*0.31=1.86</td>
<td>6</td>
</tr>
<tr>
<td>2005</td>
<td>Hurricane Katrina 8/29-10/14</td>
<td>47*0.9=42.3</td>
<td>47</td>
</tr>
<tr>
<td>2008</td>
<td>Hurricane Gustav 8/28-9/8</td>
<td>0</td>
<td>12</td>
</tr>
<tr>
<td>2009</td>
<td>Severe Storms, flooding and tornadoes 3/25-3/28</td>
<td>0</td>
<td>1.36</td>
</tr>
<tr>
<td>2010</td>
<td>Severe Storms, tornadoes and flooding 4/23-4/24, 5/1-5/2</td>
<td>2<em>0.62+0.08</em> 2=1.4</td>
<td>0</td>
</tr>
</tbody>
</table>

### Demographic Predictors

- Age
- Gender
- Race
- Marital status
- Children
- Employment
- Education
- Income
- Region

### Healthcare Access Predictors

- Self-reported general health status (1-5)
- Health insurance plans (1 or 0)
- Personal doctors (1 or 0)
- Having avoided doctor visits due to costs (1 or 0)
Data Analysis

- Physically Unhealthy Days Fixed Effects Models
  - Physically_unhealthy_days = Disaster_days + Mtq3
    + Disaster_days*Mtq3 + Mentally_unhealthy_days +
    (Demographic) + (Healthcare_Access) + i.year

- Mentally Unhealthy Days Fixed Effects Models
  - Mentally_unhealthy_days = Disaster_days + Mtq3
    + Disaster_days*Mtq3 + Physically_unhealthy_days +
    (Demographic) + (Healthcare_access) + i.year

- Data Analysis

- Physically Unhealthy Days Fixed Effects Models
  - Physically_unhealthy_days = Disaster_days + Mtq3
    + Disaster_days*Mtq3 + Mentally_unhealthy_days +
    (Demographic) + (Healthcare_Access) + i.year

- Mentally Unhealthy Days Fixed Effects Models
  - Mentally_unhealthy_days = Disaster_days + Mtq3
    + Disaster_days*Mtq3 + Physically_unhealthy_days +
    (Demographic) + (Healthcare_access) + i.year
Data Analysis

Smoking Fixed Effects Model

\[ \text{Smoker} = \text{Disaster} + \text{Mtq3} + \text{Disaster} \times \text{Mtq3} + \text{Physically unhealthy} + \text{Mentally unhealthy} + (\text{Demographic}) + (\text{Healthcare access}) + i.\text{year} \]

\[ \text{Smoker} = \text{Lagged disaster} + \text{Mtq3} + \text{Lagged disaster} \times \text{Mtq3} + \text{Physically unhealthy} + \text{Mentally unhealthy} + (\text{Demographic}) + (\text{Healthcare access}) + i.\text{year} \]

Data Analysis

Drinking Fixed Effects Models

\[ \text{Drinker} = \text{Disaster} + \text{Mtq3} + \text{Disaster} \times \text{Mtq3} + \text{Physically unhealthy} + \text{Mentally unhealthy} + (\text{Demographic}) + (\text{Healthcare access}) + i.\text{year} \]

\[ \text{Drinker} = \text{Lagged disaster} + \text{Mtq3} + \text{Lagged disaster} \times \text{Mtq3} + \text{Physically unhealthy} + \text{Mentally unhealthy} + (\text{Demographic}) + (\text{Healthcare access}) + i.\text{year} \]

Risk Factors for Physical Health

- More disaster days
- More mentally unhealthy days
- Demographic Predictors
  - White
  - Unable to work
  - Without a high school diploma
- Healthcare Access Predictors
  - Worse general health status
  - With health plans
  - With personal doctors
  - Having avoided medical visits due to costs
- Binge drinkers reported fewer physically unhealthy days
Risk Factors for Mental Health

- More lagged disaster days
- More physically unhealthy days
- Demographic Predictors
  - Unmarried
  - Unable to work
  - Without a high school diploma
  - Income ≤ $35,000

Risk Factors for Smoking

- Fewer lagged disaster days
- Fewer mentally unhealthy days
- Demographic Predictors
  - Age 18-35, age ≥ 66
  - Female
  - Non-white
  - Married
  - Retired
  - High school and higher
  - Income ≥ $50,000

Risk Factors for Binge Drinking

- More lagged disaster days
- More physically unhealthy days
- Demographic Predictors
  - Any age group other than 18-35
  - Female
  - Married
  - Without high school diploma
  - Income ≤ $35,000

Healthcare Access Predictors
- Worse general health status
- With health plans
- Having avoided medical visits due to costs
- Smokers reported more mentally unhealthy days

Better general health status
- With health plans
- Not having avoided medical visits due to costs
- Obese
- Non-drinker
- Non-stressed

Worse general health status
- With personal doctors
- Obese
- Non-smoker
- Non-stressed
Limitations

- BRFSS Data
  - Selection bias, non-response and recall bias
  - Under-report or over-report
  - Cross-sectional data
- Disaster days are measured as community collective exposure

Summary

- Disaster days: ( - ) physical health
- Lagged disaster days: ( - ) mental health
  (+) drinking ( - ) smoking
- Physical health: (+) mental health
- Being stressed: ( - ) smoking ( - ) drinking

Summary

- Smokers vs. Drinkers
  - Common Characteristics
    - Married
    - Retired
    - Obese
  - Different Characteristics

<table>
<thead>
<tr>
<th>Income</th>
<th>Education</th>
<th>Unhealthy Days</th>
</tr>
</thead>
<tbody>
<tr>
<td>Current Smokers</td>
<td>High</td>
<td>High</td>
</tr>
<tr>
<td>Binge Drinkers</td>
<td>Low</td>
<td>Low</td>
</tr>
</tbody>
</table>
Conclusions

- Disasters correlated with short term physical health and long term mental health
- Drinkers and smokers similar in some ways different in others
- Obesity correlated with smoking and binge drinking
- Stressed population less likely smoking and binge drinking
- Provide strategies to develop evidence-based and tailored interventions

References
