Longitudinal Community Assessment for Public Health Emergency Response to Wildfire, Mental and Physical Health Impacts, Bastrop County, Texas

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On September 4, 2011, a wildfire ignited in Bastrop County, Texas:
- 34,068 acres of land burned
- 1,669 homes and 40 commercial buildings destroyed
- $250 million in property damage
- 2 deaths

(National Oceanic and Atmospheric Administration, 2011)
Background

- 340,000 wildfires in U.S. between 2003 – 2012
  - 3 million residents affected by disaster declaration
  - $40 billion in suppression
  - $70 billion in insurance claims

(Bailey, 2013)
Background

- **September 24-25, 2011**: A CASPER was conducted in the weeks following the fire
  - Partnership of Texas Department of State Health Services (DSHS) Health Services Region 7 and Bastrop County Office of Emergency Management

- **April 24-25, 2015**: A follow-up CASPER was conducted 3.5 years later to assess:
  - Long-term progress in recovery
  - Long-term mental, physical and public health
  - Communications preferences
  - Preparedness
### Methods

- **2011 CASPER**
  - 34 questions
  - Residential damage
  - Access to basic services, medical care
  - Physical and mental health status
  - Evacuation behaviors
  - Wildfire-related communications
  - Pet and livestock issues
Methods

- 2015 CASPER
- 33 questions
- Residential rebuilding
- Preparedness
- Physical and mental health status
- Wildfire-related communications
- Recovery status
Methods

• For comparative purposes, BRFSS questions utilized
  – Depressive symptoms including mood
    • Over the last 2 weeks, how often have you felt down, depressed or hopeless?
  – Physical symptoms
    • Over the last 2 weeks, how many days have you had trouble falling asleep, staying awake, or sleeping too much?
  – Cognitive symptoms
    • Over the last 2 weeks, how many days have you had trouble concentrating on things, such as reading the newspaper or watching T.V.?
Methods - Sample
## Results

<table>
<thead>
<tr>
<th></th>
<th>2011 CASPER</th>
<th>2015 CASPER</th>
</tr>
</thead>
<tbody>
<tr>
<td>Household interviews</td>
<td>135</td>
<td>185</td>
</tr>
<tr>
<td>Cooperation rate</td>
<td>91.2%</td>
<td>78.1%</td>
</tr>
<tr>
<td>Contact rate</td>
<td>43.5%</td>
<td>53.9%</td>
</tr>
</tbody>
</table>

Cooperation rate = \( \frac{\text{Completed interviews}}{\text{Housing units contacted}} \)

Contact rate = \( \frac{\text{Completed interviews}}{\text{Housing units attempted}} \)
2011 CASPER

Self-reported injuries due to wildfire

<table>
<thead>
<tr>
<th>Injury Type</th>
<th>% (95% CI)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Respiratory problems</td>
<td>30.9 (23.66-39.12)</td>
</tr>
<tr>
<td>Eye problems</td>
<td>22.4 (16.14-30.14)</td>
</tr>
<tr>
<td>Cardiac problems</td>
<td>6.8 (3.65-12.41)</td>
</tr>
<tr>
<td>Injury due to wildfire</td>
<td>9.5 (5.57-15.64)</td>
</tr>
<tr>
<td>Laceration/abrasion</td>
<td>1.4 (0.38-5.13)</td>
</tr>
<tr>
<td>Strain/sprain</td>
<td>0.8 (0.14-4.12)</td>
</tr>
<tr>
<td>Burn</td>
<td>0.3 (0.02-3.28)</td>
</tr>
<tr>
<td>Other</td>
<td>6.9 (3.69-12.43)</td>
</tr>
</tbody>
</table>

*Weighted frequencies were calculated based on the household probability of being selected.*
## Access to medical care and tetanus immunization status

<table>
<thead>
<tr>
<th></th>
<th>% (95% CI)(^a)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Difficulty obtaining medical care</td>
<td>6.8 (3.60-12.40)</td>
</tr>
<tr>
<td>Difficulty obtaining general medications</td>
<td>7.8 (4.38-13.61)</td>
</tr>
<tr>
<td>Difficulty obtaining nebulizer</td>
<td>2.4 (0.83-6.62)</td>
</tr>
<tr>
<td>Difficulty obtaining glucometer</td>
<td>0.2 (0.01-3.11)</td>
</tr>
<tr>
<td>Difficulty obtaining other medical items</td>
<td>3.2 (1.32-7.75)</td>
</tr>
</tbody>
</table>

**Tetanus immunization in the last 10-years**

<table>
<thead>
<tr>
<th></th>
<th>% (95% CI)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Yes</td>
<td>71.6 (63.45-78.6)</td>
</tr>
<tr>
<td>No</td>
<td>17.3 (11.82-24.63)</td>
</tr>
<tr>
<td>Do not know</td>
<td>11.1 (6.79-17.32)</td>
</tr>
</tbody>
</table>

\(^a\) Weighted frequencies were calculated based on the household probability of being selected.
## Mental health indicators

<table>
<thead>
<tr>
<th></th>
<th>N (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Adults</strong></td>
<td></td>
</tr>
<tr>
<td>Depressed mood / hopelessness</td>
<td>74 (54.8%)</td>
</tr>
<tr>
<td>Sleeping problems</td>
<td>74 (54.8%)</td>
</tr>
<tr>
<td>Problems concentrating</td>
<td>52 (38.5%)</td>
</tr>
<tr>
<td><strong>Children</strong></td>
<td></td>
</tr>
<tr>
<td>Sleep disturbances</td>
<td>15 (38.5%)</td>
</tr>
<tr>
<td>Clinging behavior</td>
<td>12 (30.8%)</td>
</tr>
<tr>
<td>Irritability / loss of concentration</td>
<td>10 (25.6%)</td>
</tr>
<tr>
<td>Physical complaints</td>
<td>8 (20.5%)</td>
</tr>
</tbody>
</table>
2015 CASPER

Of the households that resided in Bastrop in 2011:

- Home damage was reported by 42.7% (95% CI: 39.49, 45.89)
- Destruction of home by 34.7% (95% CI: 31.67, 37.83)
- No damage by 22.7% (95% CI: 20.05, 25.49)
- Ninety-one percent (95% CI: 88.64, 92.95) of damaged and destroyed homes were repaired or rebuilt
• Since the 2011 wildfires, households reported newly developed or worsened:
  – Breathing problems (15.8%)
  – Eye problems (7.3%)
  – Heart problems (1.9%)

• Signs of wildfire (trees / slabs)
  – 67.4% reported feeling sad
  – 13.6% reported feeling hopeful

• Signs of recovery (new trees / new homes)
  – 59.1% reported feeling hopeful
  – 48.8% reported feeling happy
Emergency plan elements in affected households

<table>
<thead>
<tr>
<th>Plan Element</th>
<th>2011 CASPER % (95% CI)</th>
<th>2015 CASPER % (95% CI)</th>
<th>% Change (2015-2011)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Food/water for 3 days</td>
<td>54.2 (41.0-66.7)</td>
<td>82.7 (80.4-84.8)</td>
<td>28.5</td>
</tr>
<tr>
<td>Family meeting place</td>
<td>44.5 (32.0-57.7)</td>
<td>43.9 (41.0-46.8)</td>
<td>-0.6</td>
</tr>
<tr>
<td>Evacuation route</td>
<td>84.8 (72.9-92.0)</td>
<td>73.1 (70.5-75.6)</td>
<td>-11.7</td>
</tr>
<tr>
<td>Copies of important paperwork</td>
<td>66.7 (53.4-77.8)</td>
<td>73.0 (70.5-75.6)</td>
<td>6.3</td>
</tr>
<tr>
<td>Plan for pet(s)</td>
<td>51.3b (38.3-64.1)</td>
<td>76.4c (73.3-79.2)</td>
<td></td>
</tr>
<tr>
<td>Plan for livestock</td>
<td>35.0c (27.4-43.7)</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

*a Weighted frequencies were calculated based on the household probability of being selected. b 2011 CASPER did not differentiate between animal types; therefore, data shown includes plans for both livestock and pets. Data represents only households with pets (n=102) or livestock (n=12). c 2011 CASPER did not differentiate between animal types; therefore, data shown includes plans for both livestock and pets.*
### Mental health indicators in children, Bastrop, TX

<table>
<thead>
<tr>
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<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Sleep disturbances</td>
<td>33.2 (21.26-47.81)</td>
<td>11.5 (8.04-15.92)</td>
<td>-21.7</td>
</tr>
<tr>
<td>Clinging behavior</td>
<td>26.8 (16.03-41.13)</td>
<td>15.5 (11.47-20.34)</td>
<td>-11.3</td>
</tr>
<tr>
<td>Irritability / loss of concentration</td>
<td>44.6 (31.12-59.02)</td>
<td>12.6 (8.87-16.97)</td>
<td>-32.0</td>
</tr>
<tr>
<td>Physical complaints</td>
<td>19.4 (10.48-33.19)</td>
<td>4.8 (2.53-7.90)</td>
<td>-14.6</td>
</tr>
</tbody>
</table>

*a Weighted frequencies were calculated based on the household probability of being selected.
2011 v. 2015 CASPER

Mental Health by Home Damage

• Compared to those whose homes remained structurally intact, individuals residing in wildfire damaged homes in 2011
  – 31.0% more likely to experience concentration problems (95% CI: 14.2, 45.6)
  – 19.3% more likely to experience feelings of depression or hopelessness (95% CI: 1.6, 35.8)
  – 28.7% more likely to experience trouble sleeping (95% CI: 11.2, 44.6)

• Compared to those whose homes remained structurally intact, individuals residing in wildfire damaged homes in 2015
  – 6.8% less likely to experience concentration problems (95% CI: -20.7, 5.7)
  – 5.6% more likely to experience feelings of depression or hopelessness (95% CI: -9.1, 18.1)
  – 4.4% more likely to experience trouble sleeping (95% CI: -16.2, 15.8)
2011 v. 2015 CASPER

Physical Health by Home Damage

- Compared to those whose homes remained structurally intact, individuals residing in wildfire damaged homes in 2011
  - 1.3% more likely to experience respiratory problems (95% CI: -16.0, 18.2)
  - 0.10% more likely to experience eye problems (95% CI: -16.4, 16.1)
  - 0.98% more likely to experience cardiac problems (95% CI: -8.0, 8.6)

- Compared to those whose homes remained structurally intact, individuals residing in wildfire damaged homes in 2015
  - 15.8% more likely to experience respiratory problems (95% CI: 1.5, 27.2)
  - 2.4% more likely to experience eye problems (95% CI: -9.5, 11.9)
  - 0.56% more likely to experience cardiac problems (95% CI: -8.1, 6.6)
Discussion

• Home damage or destruction significant risk factor for long-term mental and physical health concerns
  – Great Hanshin-Awaji Earthquake of 1995 had lower overall life satisfaction and more health problems (Oishi et al., 2015)

• Another opportunity to enhance community preparedness
  – Overall fewer plans with evacuation routes and family meeting locations, but significantly more likely (p < 0.05) to be included in 2011 resident’s plans
Discussion

• High level of confidence in local government’s ability to respond to a disaster (>75%)
  – Compare to 45.1% in LA post-earthquake and 37.3% in New Orleans post-Katrina (Basolo et al., 2009)

• Continued need for mitigation and planning in wildland urban interface areas
  – Even with fire reminders, population growing quickly
  – By 2015, 55% preferred text messages for notification
    • Greatly increased use of social media
References


Acknowledgments

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Questions?

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