Knowledge, attitudes and practices related to heat vulnerability: Results from a household survey in Houston, TX

Mary Hayden, Olga Wilhelmi, Jamie Cavanaugh, Deborah Bannerjee, Vishnu Nepal, Tamara Greasby, Stephanie Gower, Kaila-Lea Clarke, Rachel Norton

24 October 2013
Household Survey

• The purpose of this survey was to better understand adaptive capacity in Houston, TX.
• Developed in collaboration with the Houston Department of Health and Human Services, Toronto Public Health, Health Canada
• RDD survey conducted by Princeton Data Services in late October/early November 2011 (1/3 cell phone)
• Participants were asked to respond to heat related questions from the summer of 2011
• 901 completed
  – 76% were sampled uniformly across 71 Houston ZIP codes
  – 24% sampled from a subset of 27 ZIP codes with expected large difference in vulnerability based on socio-economic diversity.
Distribution of georeferenced households surveyed in Houston, TX in 2011 (760 households out of 901 shown here)
Participant Demographics

Race

- Caucasian: 57%
- African American: 26%
- Asian: 4%
- Native Hawaiian/Pacific Islander: 0.2%
- American Indian/Alaska Native: 0.8%
- Other: 9%

Ethnicity

- Hispanic: 24.5%
- Non-Hispanic: 74%
Participant Demographics

**Education**

- No...: 1.4%
- Grades 1-8: 6%
- Grades 9-11: 9%
- Grade 1-12: 18%
- College 1-2: 23%
- College 4+: 41.5%

**Language**

- English: 88%
- Spanish: 27%
- French: 2.2%
- Chinese: 1.4%
- Vietnamese: 0.6%
- Other: 5%

**Income**

- Less than $10,000: 11%
- $10,000-$20,000: 10%
- $20,000-$30,000: 11%
- $30,000-$40,000: 6%
- $40,000-$50,000: 5%
- $50,000-$75,000: 8.5%
- $75,000-$100,000: 8%
- More than $100,000: 16%
37% of all respondents said they felt too hot in their homes in the summer of 2011…

<table>
<thead>
<tr>
<th>Demographic factors associated with participants being more likely to feel too hot at home</th>
<th>p-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hispanic/Latino</td>
<td>p&lt;0.001</td>
</tr>
<tr>
<td>African American</td>
<td>p=0.025</td>
</tr>
<tr>
<td>Female</td>
<td>p=0.003</td>
</tr>
<tr>
<td>Not being a homeowner</td>
<td>p&lt;0.001</td>
</tr>
<tr>
<td>Not speaking English in the home</td>
<td>p&lt;0.001</td>
</tr>
<tr>
<td>Older age (negative correlation, OR=.98)</td>
<td>p&lt;0.001</td>
</tr>
</tbody>
</table>

**Health**

<p>| | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Good</td>
<td></td>
</tr>
<tr>
<td>Poor</td>
<td>p&lt;0.001</td>
</tr>
</tbody>
</table>
Heat-related illness

Most commonly reported symptoms*

*14% of the study population reported not knowing any symptoms of heat-related illness.
Among the 179 respondents who reported symptoms…

- Had symptoms more than once: 24%
- Had symptoms while in their homes: 31.5%
Of the 31.5% who had symptoms in their homes...

Percent of participants with air-conditioning

- Use central air conditioning: 66%
- Use window air conditioning: 32%
Of the 31.5% who had symptoms in their homes...

![Barriers to air-conditioning usage](image)

- High cost of electricity: 30%
- Air-conditioners do not work: 36%
- Cost of repairs: 5%
Demographic characteristics associated with difficulty paying electric bill

<table>
<thead>
<tr>
<th>Demographic factors</th>
<th>p-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hispanic/Latino</td>
<td>p&lt;0.001</td>
</tr>
<tr>
<td>African American</td>
<td>p&lt;0.001</td>
</tr>
<tr>
<td>Not a homeowner</td>
<td>p&lt;0.001</td>
</tr>
<tr>
<td>Do not speak English in the home</td>
<td>p&lt;0.001</td>
</tr>
</tbody>
</table>
Awareness of programs/resources for coping

*Less than half (45%) of those who were familiar with a cooling center knew where one was located.
Awareness of programs/resources for coping

Demographic factors associated with:

- **Knowing of programs to help with the electricity bill**
  - *Homeowners* (p<0.001)
  - *Non-Hispanics* (p<0.001)
  - *Speak English at home* (p<0.001)

- **Knowing of heat-specific assistance programs**
  - *Speak English at home* (p<0.001)
  - *Females* (p<0.001)
  - *Non-Hispanics* (p=0.009)

- **Knowing where a cooling center is located**
  - *Homeowners* (p<0.001)
  - *Non-Hispanics* (p<0.001)
  - *Speak English at home* (p<0.001)
  - *Employed* (p=0.002)
45% of all respondents considered people in their neighborhood to be vulnerable to heat...

<table>
<thead>
<tr>
<th>Demographic factors associated with this response:</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Hispanic/Latino</td>
<td>p&lt;0.001</td>
</tr>
<tr>
<td>African American</td>
<td>p&lt;0.001</td>
</tr>
<tr>
<td>Non-homeowners</td>
<td>p&lt;0.001</td>
</tr>
<tr>
<td>Do not speak English in the home</td>
<td>p&lt;0.001</td>
</tr>
<tr>
<td>Unemployed</td>
<td>p&lt;0.001</td>
</tr>
<tr>
<td>Income:&lt;$75,000</td>
<td>p&lt;0.001</td>
</tr>
<tr>
<td>Health: Fair/poor</td>
<td>p&lt;0.001</td>
</tr>
</tbody>
</table>
Of the 89% of respondents who reported knowing some or all of their neighbors...

Demographic factors associated with lower likelihood of knowing any of their neighbors:

<table>
<thead>
<tr>
<th>Demographic Factor</th>
<th>p-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>African-American</td>
<td>p&lt;0.001</td>
</tr>
<tr>
<td>Non-homeowners</td>
<td>p&lt;0.001</td>
</tr>
<tr>
<td>Income &lt;$40,000</td>
<td>p&lt;0.001</td>
</tr>
<tr>
<td>Health: poor</td>
<td>p=0.007</td>
</tr>
</tbody>
</table>
Sources of heat-related information (for those participants who recalled hearing warnings)

- Local Television: 70%
- Radio: 30%
- Newspaper: 14%
Sources of information for preventing heat-related illness

- Local Television: 66%
- Internet: 29%
- Radio: 27%
- Cable Television: 26%
- Newspaper: 24%
- Weather Channel: 22%
- Word of mouth (friends, family, co-...: 27%
How to protect oneself from the heat

- Staying indoors: 55%
- Drinking plenty of water: 54%
- Using sunscreen: 7%
- Alter daily activities: 76%
Summary

- Knowledge, Attitudes and Practices – 14% of the survey population had no knowledge of symptoms of heat stress; 7% suggested using sunscreen to reduce negative impacts of heat. Additionally, few knew what a cooling center was and even fewer where one was located.

- Multiple demographic factors may interact to compound vulnerability, including lack of social capital. Those who reported heat related Illness:
  - Non-homeowners
  - African Americans and Hispanic/Latinos
  - Incomes less than $20,000 per year
  - Unemployed
  - Poor health

- Those who reported poor health were significantly less likely to know their neighbors, be non-homeowners, or feel safe in their neighborhoods, suggesting that they may be at risk if no one checks on them during extreme heat.
Stakeholder Survey

- Developed in collaboration with the Houston Department of Health and Human Services, Toronto Public Health, Health Canada
- Conducted via SurveyMonkey in early 2012
- Sent to representatives from multiple sectors in Houston
- Eighty-nine surveys sent out with 32 respondents for a response rate of 36%
Stakeholder survey

How much do you think risks to the health of people living in Houston from extreme heat events will grow in the future?
Stakeholder survey

Describe how you think vulnerability to health risks from extreme heat may increase in the future. Please check all that apply:

- Growth in population of those with underlying medical conditions (e.g. obesity, diabetes, mental health issues, etc.)
- Growth in population of seniors
- Potential for additional extreme weather-related impacts that will overwhelm the system.
- Reduced financial resources
- Growth in population of minorities
- Growth in population of homeless
- Aging housing infrastructure
- Increased urban heat island effect
- Increased urbanization
- Increased unemployment
Stakeholder survey

What actions does your organization recommend to your clients during an extreme heat event? Please check all that apply:

- Stay indoors in an air conditioned place
- Avoid outdoor activity during the hottest…
- Drink plenty of water/stay hydrated
- Wear light, loose-fitting clothing
- Wear a hat
- Modify your physical activity
- Exercise indoors in a cool place
- Reschedule strenuous outdoor activity
- Take cool showers
- Use a swimming pool
- Check on neighbors/elderly
- Reduce alcohol intake
- Do not leave children/pets in vehicles
- Don’t know
- Do not leave children/pets in vehicles
- Reduce alcohol intake
- Check on neighbors/elderly
- Use a swimming pool
- Take cool showers
- Reschedule strenuous outdoor activity
- Exercise indoors in a cool place
- Modify your physical activity
- Wear a hat
- Wear light, loose-fitting clothing
- Drink plenty of water/stay hydrated
- Avoid outdoor activity during the hottest…
- Stay indoors in an air conditioned place
Stakeholder survey

What might prevent your clients from taking recommended actions during extreme heat events?

“Some patrons cannot choose when to make their trips; lack of bathroom facilities may want them to limit their water intake.”

“Not receiving communication about extreme heat events or not having a way to get to a cooling shelter.”

“Lack of access to service and facilities.”

“Lack of access to media messages. Lack of social connections for vulnerable populations.”

“We have poor utilization with cooling centers probably because air conditioning is abundant throughout Houston.”

“Reduced perception of the actual risk/threat.”

“Choosing to ignore the warnings and/or having limited knowledge to the dangers of extreme heat events.”


“Communication barriers”

“Economic”

“Not knowing what to do.”
Thank you!

• mhayden@ucar.edu