Rebuilding the frame post-disaster

Assessing the impact of infrastructure damage to landline in Houston

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Presentation Overview

- Study Background
- Post-Disaster Challenges
- Post-Harvey Methodology
- Results
- Conclusions
Study Background

- The Health of Houston Survey (HHS) is a comprehensive health survey of City of Houston and Harris County, Texas residents conducted by the University of Texas Health Science Center at Houston School of Public Health (UT Health).

- Content – The survey collects data on resident health status and chronic conditions, health risk behaviors, psychosocial factors, and neighborhood characteristics.

- Study Design
  - Targeted 6,500 completed interviews; 60% Cell / 40% Landline split
  - Random Digit Dial (RDD); household adult with the nearest birthday; must live in the Greater Houston Area

- Data collection began on June 8, 2017 but was suspended on August 27, 2017 when Hurricane Harvey (Pre-Harvey) made landfall.
  - ICF completed ~50% of our target interviews
Post-Disaster Research Challenges

- **Challenges of surveying post-disaster areas**
  - Infrastructure damage to landline telephone
  - Accessibility issues for mail surveys
  - Increased cost (e.g., lower productivity, increased cell complete proportions)
  - Questionable representation of non-probability methods

- **Current Study Purpose**
  - Evaluate the application of phone number validation services in assessing landline abandonment and infrastructure damage
  - Results of the study will help better inform the utility of landline as a means of surveying respondents in post-disaster areas.
Post-Harvey Methodology

- Resumed fielding in February 2018; scheduled to end on April 23rd

- Methodological revisions
  - Revised Cell / LL proportions, 75% and 25%, respectively
  - Reduced attempts on Cell (8 down to 5) and LL (15 down to 8)
  - Reduced target # of completes to 5,500

- Key research questions
  - To what extent have landline numbers previously classified as working become newly classified as non-working?
  - Do cell-only households increase post-disaster?
  - Does the percentage of landline numbers unavailable for dialing increase post-disaster?
  - To what extent do clusters of numbers classified as non-working compare to area damage post-Harvey?
Results – Pre-screening Connectivity

<table>
<thead>
<tr>
<th></th>
<th>Pre-Harvey</th>
<th>Post-Harvey</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Connected</td>
<td>Disconnected</td>
<td>Total</td>
</tr>
<tr>
<td>Connected</td>
<td>56,198</td>
<td>5,042</td>
<td>61,240</td>
</tr>
<tr>
<td>Disconnected</td>
<td>4,024</td>
<td>116,838</td>
<td>120,862</td>
</tr>
<tr>
<td>Total</td>
<td>60,222</td>
<td>121,880</td>
<td>182,102</td>
</tr>
</tbody>
</table>

- 8.2% of pre-Harvey connected numbers were disconnected
- 3.3% of pre-Harvey disconnected numbers were connected
- Net loss: \((61,240 - 60,222)/61,240 = 1.7\%\)

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## Results - Before and After

<table>
<thead>
<tr>
<th></th>
<th>Before</th>
<th>After</th>
<th>Pvalue</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Cell phone interviews</strong></td>
<td>1649</td>
<td>2031</td>
<td></td>
</tr>
<tr>
<td>% cell phone only</td>
<td>72.2%</td>
<td>76.1%</td>
<td>&lt;0.01*</td>
</tr>
<tr>
<td><strong>Landline interviews</strong></td>
<td>1045</td>
<td>408</td>
<td></td>
</tr>
<tr>
<td>% landline only</td>
<td>15.1%</td>
<td>14.2%</td>
<td>0.6598</td>
</tr>
<tr>
<td><strong>Landline dials</strong></td>
<td>341,956</td>
<td>199,920</td>
<td></td>
</tr>
<tr>
<td>% prescreened nonworking</td>
<td>66.4%</td>
<td>69.6%</td>
<td>&lt;0.0001*</td>
</tr>
<tr>
<td>% additional nonworking</td>
<td>3.7%</td>
<td>4.5%</td>
<td>&lt;0.0001*</td>
</tr>
<tr>
<td>% no answer</td>
<td>37.6%</td>
<td>39.8%</td>
<td>&lt;0.0001*</td>
</tr>
<tr>
<td>% busy</td>
<td>7.6%</td>
<td>10.2%</td>
<td>&lt;0.0001*</td>
</tr>
<tr>
<td>% answering machine</td>
<td>35.3%</td>
<td>33.4%</td>
<td>&lt;0.0001*</td>
</tr>
</tbody>
</table>

*statistically significant*
Results – Change in % Connected numbers

- Zip code associated with telephone exchange
  - Based on zip code with largest number of directory listed phone numbers
  - At least 500 numbers sampled
- Max loss = 7.1%
- Max gain = 9.5%
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City of Houston assessments and FEMA damage estimates of structures with damage:

Note: City damage assessments are still in progress and are estimated based on available data.
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911 and 311 calls received for rescues and to report flooding during the storm:
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Total debris collected by the City of Houston and contractors:

-7.1% - -3.6%
-3.6% - -0.3%
-0.3% - 1.8%
1.8% - 6.2%
6.2% - 9.5%
Conclusions

- **Validation services**
  - Reported a significant increase in non-working numbers post-Harvey
  - Net loss of pre-Harvey numbers only increased by 1.7%
  - Only 8.2% of pre-Harvey connected numbers were disconnected post-Harvey
    - Seems low given the migration from landline to cell

- **There was a significant decrease in landline connectivity 6 months post-disaster**
  - Reduced productivity of landline dialing, combined with the increase in cell-only households supports previous research suggesting that post-disaster areas should focus on larger cell dialing proportions

- **Damage maps do seem to align with reported landline connectivity issues**
  - Damage maps can potentially be used as a proxy for areas that may be hard to target with RDD studies that rely more heavily on landline dials
Thank you!

For more information – please contact Thomas Brassell at ICF
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