SHARP GIS: UNC’s Spatial Health Assessment and Research Program

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SHARP GIS Services

- Filling a niche; providing GIS technical service to public health agencies
- Some activities will serve partner states under new Centers for Disease Control and Prevention program
  - Preparedness and Emergency Response Learning Centers (PERLCs)
  - UNC one of 14 centers nationwide
SHARP GIS Mission

- SHARP’s Mission: Assist local, state, regional and national public health agencies with:
  - data collection and spatial analysis projects related to emergency preparedness or other community-wide or regional public health concerns.
  - Community Assessment for Public Health Emergency Response (CASPER)
  - GIS technical support
  - GPS equipment and training
Assessment Methods

- Rapid Needs Assessments or Community Assessment for Public Health Emergency Response (CASPERs) are an objective way to collect information about:
  - External or flood damage to homes
  - Access to household utilities
  - Incidence of hurricane-related illness and injury
  - Access to food, water, medical care, etc.
  - Emotional stress and anxiety (new in 2005)
  - Other non-emergency assessments
CASPER in North Carolina

• A recognized national leader in development and deployment
• 15 + deployments since 2003
• Hurricanes Isabel, Charley, Wilma, Katrina
• Outbreak exercises
• Community health assessments
• Iowa floods
• Other research and planning (H1N1, evacuation, reproductive health needs)
CASPER Methods in NC

• Two-stage cluster sampling (30/7)
  – PSU: Census data, blocks or block groups
  – Stage 1: Weighted average with a probability proportion to population or housing units is used to chose 30 clusters (blocks)
  – Stage 2: 7 random interview locations are chosen and reverse-geocoded

• ArcGIS toolbar called PHRST Tools

• 10 trained interview teams; standard questionnaire
PHRST Tools
Public Health Regional Surveillance Team

Site selection toolkit freely available from UNC (cphp.sph.unc.edu/sharpgis/)
Stage 1: Determine Sampling Frame and Primary Sampling Unit

Photo ID; two NC counties sampled as part of a survey to assess intent to receive H1N1 vaccine.
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Photo ID; two NC counties sampled as part of a survey to assess intent to receive H1N1 vaccine.
Stage 1: Sample with a Probability Proportionate to Population
Stage 2: Random Survey Locations
Interview Team Assignments

Keep track of team assignments
Optimized Driving Directions
ArcPad Studio is used to design custom forms for surveys.
Handheld Data Collection
### Status of household health and needs after Hurricane Isabel — North Carolina, 2003

<table>
<thead>
<tr>
<th>Status</th>
<th>Households</th>
<th>(95% CI)</th>
<th>No. of households projected, 14-county area</th>
<th>(95% CI)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>External home</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Minimal or no damage</td>
<td>65.3 (%)</td>
<td>(55.6–75.0)</td>
<td>61,240</td>
<td>(52,143–70,337)</td>
</tr>
<tr>
<td>Damaged, habitable</td>
<td>32.3 (%)</td>
<td>(22.8–41.7)</td>
<td>30,292</td>
<td>(21,383–39,108)</td>
</tr>
<tr>
<td>Damaged, uninhabitable</td>
<td>2.4 (%)</td>
<td>(0.2–4.6)</td>
<td>2,251</td>
<td>(188–4,314)</td>
</tr>
<tr>
<td><strong>Flood water in home</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>None</td>
<td>96.6 (%)</td>
<td>(93.6–99.6)</td>
<td>90,594</td>
<td>(87,781–93,408)</td>
</tr>
<tr>
<td>1–12 inches</td>
<td>2.3 (%)</td>
<td>(0.2–4.5)</td>
<td>2,251</td>
<td>(188–4,220)</td>
</tr>
<tr>
<td>13–36 inches</td>
<td>1.1 (%)</td>
<td>(0.0–2.6)</td>
<td>1,032</td>
<td>(0–2,438)</td>
</tr>
<tr>
<td><strong>Household utilities</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>No running water</td>
<td>23.8 (%)</td>
<td>(10.7–37.0)</td>
<td>22,320</td>
<td>(10,035–34,700)</td>
</tr>
<tr>
<td>No electricity</td>
<td>65.2 (%)</td>
<td>(47.3–83.2)</td>
<td>61,147</td>
<td>(44,359–78,027)</td>
</tr>
<tr>
<td>No functioning indoor toilet</td>
<td>7.0 (%)</td>
<td>(3.1–10.8)</td>
<td>6,565</td>
<td>(2,907–10,129)</td>
</tr>
<tr>
<td>No working telephone</td>
<td>21.0 (%)</td>
<td>(9.4–32.5)</td>
<td>19,694</td>
<td>(8,816–30,479)</td>
</tr>
<tr>
<td>No battery-operated radio</td>
<td>22.6 (%)</td>
<td>(12.8–32.4)</td>
<td>21,195</td>
<td>(12,004–30,386)</td>
</tr>
<tr>
<td>Generator used</td>
<td>30.5 (%)</td>
<td>(18.8–42.3)</td>
<td>28,604</td>
<td>(17,631–39,670)</td>
</tr>
<tr>
<td><strong>Hurricane-related illness or injury</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Injury in household</td>
<td>1.3 (%)</td>
<td>(0.0–3.1)</td>
<td>1,219</td>
<td>(0.0–2907)</td>
</tr>
<tr>
<td>Illness in household after hurricane</td>
<td>4.7 (%)</td>
<td>(1.7–7.6)</td>
<td>4,408</td>
<td>(1,994–7,128)</td>
</tr>
<tr>
<td>Experiencing stress</td>
<td>29.5 (%)</td>
<td>(20.0–39.1)</td>
<td>27,666</td>
<td>(18,757–36,669)</td>
</tr>
<tr>
<td>Requiring medical care</td>
<td>8.4 (%)</td>
<td>(0.3–16.5)</td>
<td>7,878</td>
<td>(281–15,474)</td>
</tr>
<tr>
<td>Problems obtaining medical care</td>
<td>4.9 (%)</td>
<td>(1.5–8.3)</td>
<td>4,595</td>
<td>(1,407–7,784)</td>
</tr>
<tr>
<td>Problems obtaining medication</td>
<td>6.0 (%)</td>
<td>(1.8–10.2)</td>
<td>5,627</td>
<td>(1,688–9,566)</td>
</tr>
<tr>
<td><strong>Food and water</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Using well water</td>
<td>8.3 (%)</td>
<td>(1.0–15.7)</td>
<td>7,784</td>
<td>(938–1,4724)</td>
</tr>
<tr>
<td>Using public water</td>
<td>48.6 (%)</td>
<td>(35.6–61.6)</td>
<td>45,579</td>
<td>(33,387–57,770)</td>
</tr>
<tr>
<td>Using bottled water</td>
<td>43.1 (%)</td>
<td>(30.3–55.8)</td>
<td>40,420</td>
<td>(28,416–52,331)</td>
</tr>
<tr>
<td>Without access to a 3-day food supply</td>
<td>12.6 (%)</td>
<td>(4.2–20.0)</td>
<td>11,817</td>
<td>(3,030–10,601)</td>
</tr>
</tbody>
</table>

* N = 210.

1 Confidence interval.

Based on combined 2000 U.S. Census estimates for the following counties: Bertie, Camden, Chowan, Currituck, Dare, Gates, Hertford, Hyde, Martin, Northampton, Pasquotank, Perquimans, Tyrrell, and Washington.
Durham County Community Health Assessment

• SHARP provided GIS and GPS technical assistance to the Durham County Health Department

• Designed digital survey instrument in ArcPad Studio

• Mapped potential survey sites for the two-stage cluster sample

• Provided on-site training and technical assistance to survey volunteers and staff
H1N1 Rapid Survey

- Quick Strike funding from RWJF
- Partner with NC DPH and 2 counties to assess barriers to receiving seasonal and pandemic flu vaccine
- Used CASPER methods
• 133 (64%) respondents expressed intent to receive the pandemic H1N1 vaccine
  – Intent to receive strongly associated with:
    • 2008–09 seasonal vaccination (PR=1.47; 95%CI: 1.18, 1.82)
    • intent to receive 2009–10 seasonal vaccine (1.27; 1.14, 1.42)
    • being “very concerned” about H1N1 (1.55; 1.30, 1.85)
  – Main reasons to refuse: unlikely to be infected, not severe illness, belief vaccine will not be effective
• Most respondents (83%) reported they received information about H1N1 vaccine from television
Potassium Iodide (KI) Survey

- Partnered with the NC DPH, NRC, and county health departments
- Assess coverage rates, knowledge & distribution models
- Used CASPER methods
- KI coverage rate 5.1% (non weighted results)
Rapid Assessment of reproductive health needs

- CDC funded pilot survey
- Community sampling for pregnant and post-partum women
- 2 stage sample with referral
  - Increased sample proportion of women of reproductive age who were pregnant/post-partum from 5% to 20%
- Will be surveying flood-damaged coastal NC
Conclusions

- SHARP has adopted CASPER methods to help public health and emergency management officials make informed, data driven decision.
- Handheld computers, GIS, and GPS add value to field-based data collection
- SHARP hopes to provide the tools and training to continue building technical capacity statewide
Form Building Software Alternatives

- NCPH Rapid Survey Builder
  - (beta release available upon request)
- FAST (Field Adapted Survey Toolkit)
- Mobile Phone Technology
  - EpiSurveyor
    - http://www.datadyne.org/episurveyor
  - EpiCollect
    - http://www.spatalepidemiology.net/epicollect/
Questions?

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• Extra slides
Hurricane Wilma (2005)

- Category 3 Hurricane with 125 mile per hour winds
- Landfall 10/24/05 near Naples, Florida
- Moved northeast through Florida causing damage from Miami to West Palm Beach
  - NC Division of Public Health received request through EMAC from Florida DOH for assistance with RNAs using handhelds
Hendry County, Florida

- Hendry County
  - Identified by F-DOH as most severely impacted rural area
  - Montura Ranch Estates
    - 81.3% mobile homes
    - 91% reported receiving disaster relief
  - Pioneer Plantation
    - 63.5% mobile homes
    - 80% reported receiving disaster relief
Broward County, Florida

- 1.7 million residents
- 1000 stoplights, only 124 working
- 69.1% of sample live in building with 6 or more units
- 17.6% still without power 10 days after landfall – approximately 66,000 households
  - Of these 30.9% using generators: 12 reported deaths in Broward Co. from CO poisoning
Hurricane Wilma Improvements

- Educational and information materials in multiple languages
  - Safe clean up, mold, generator safety
- Liaison with County and Florida Departments of Health for referrals
- Tracking interviews and sampling (particularly in multi-level residences)
- Communications
  - Use of VIPER 800 Mhz radios
Iowa Floods (2008)
Key Findings Cedar Rapids

- Only 12.8% (5.3%, 20.2%) of residents in the assessment area are sleeping in their homes (71.2% with family and friends).
  - 87.3% are using bottled water as their primary source of drinking water.
  - 18.3% of households have a household member who does not have access to a 3 day supply of medication because of the flood.
  - 58.5% of households have a member with difficulty concentrating since the flood, and 47.0% of households have a member that has sleep disturbance since the flood.
  - 54.6 (46.6%, 62.7%) report mosquitoes are worse than normal
  - 75% (64.4%, 85.1%) report mold in their homes
CASPER Standard Operating Guidelines (SOG)

- Team make-up
- Job Action Sheets
- Templates

COMMUNITY ASSESSMENT FOR PUBLIC HEALTH EMERGENCY RESPONSE (CASPER)

STANDARD OPERATING GUIDELINES VERSION 2.0

Available at: http://www.epi.state.nc.us/epi/phpr/casper.html