RENCI@ East Carolina University
Department of Public Health at Brody School of Medicine
Coastal Impact Public Health: At-Risk Populations (PHS)

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North Carolina Public Health Directors
Project Aspect Discussion Points

- Determination & Enrollment of Medically Fragile Individuals by Physicians
- Mapping of Potentially Vulnerable Populations in Storm Surge
- Justification for use of Community Outreach for Registry Enrollment
Definition of the Medically Fragile (cont.):

Three Priority Levels

Level 1 (High Priority)
- Patient requires uninterrupted health care
- Medical services required within 24 hours

Level 2 (Moderate Priority)
- Patient requires medical services within 48 hours

Level 3 (Lower Priority)
- Patient requires medical services within 1 week
Delimiting Populations Vulnerable to Storm Surge

The Problem:

1. Develop an emergency management registry for the medically fragile
2. Determine the magnitude and scope of the registry population

Identify the Vulnerable:

1. Medically Fragile: determination based on literature review (8%)
2. Ages 65+ and 75+ years
3. Other groups (poverty, race, etc.), social vulnerability index (SoVI)

Event Example:

1. A slow moving hurricane: category 4/5
Definition of the Medically Fragile¹:

**Insulin Diabetes Calculation**
(National Diabetes Information Clearinghouse of National Institute of Diabetes and Digestive and Kidney Diseases)
Estimated *1.96%--in ENC 49,153*

**Chronic Obstructive Pulmonary Disease (COPD) Calculation**
(National Health Interview Surveys)
Estimated *3.89%--in ENC 97,484*

**Long-term Treatment Calculation (LTOT) Calculation**
(National Health Interview Surveys)
Estimated *0.33%--in ENC 8,377*

¹Appendix 1 from RENCI Coastal Impact on Public Health: At Risk Populations Regional Special Medical Needs Registry Proposal for Eastern North Carolina (12-18-07)
Definition of the Medically Fragile\(^1\) (cont.):

End-Stage Renal Disease (ESRD) Calculation
(Annual Data Report of the National Renal Data System)
Estimated 0.14\%--in ENC 3,511

Congestive Heart Failure Calculation
(National Health and Nutrition Examination Survey)
Estimated 1.76\%--in ENC 44,138

Estimated 8\%--in ENC 202,663 using 2,507,844 as base ENC population\(^2\)

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\(^1\)Appendix 1 from RENCI Coastal Impact on Public Health: At Risk Populations Regional Special Medical Needs Registry Proposal for Eastern North Carolina (12-18-07)

\(^2\)US Census American FactFinder
Method

Clipping census populations using a “surge map” layer and interpolating affected populations where the surge layer intersects census geography.

Spatial Interpolation

1. **areal weighting** (proportion of area × population)
2. **surface smoothing** (algorithms that assume a continuous surface)
3. **dasymetric** (use of ancillary data, imagery, land classification, etc.)
Updating Populations

**Extrapolated** 2006 county level populations down through the census geography hierarchy using population (total and age group) proportions of one level to the next:

**County → Census Tract → Block Group → Block**

**Assumption:** Growth/decline of county populations is continuous and replicated throughout the census hierarchy.

Total Population

2000

2006

2000 - 2006

ENC Population: 2,389,287

ENC Population: 2,568,962

ENC Population Change: 179,675 (+7.5%)

Data Sources: NC State Data Center
US Census Bureau
NC One Map

James L. Wilson, PhD
Center for Health Services Research and Development
East Carolina University
Greenville, NC
Percent of County Populations 65 Years and Older

<table>
<thead>
<tr>
<th>Year</th>
<th>Percent GTE 65 Years (Quartile)</th>
<th>ENC Population GTE 65</th>
</tr>
</thead>
<tbody>
<tr>
<td>2000</td>
<td></td>
<td>281,381 (11.8%)</td>
</tr>
<tr>
<td>2006</td>
<td></td>
<td>311,176 (12.1%)</td>
</tr>
<tr>
<td>2000-06</td>
<td></td>
<td>29,795 (+10.6%)</td>
</tr>
</tbody>
</table>

Data Sources: NC State Data Center
US Census Bureau
NC One Map

James L. Wilson, PhD
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Percent of County Populations 75 Years and Older

2000
ENC Population GTE 75: 120,066 (5.0%)

Percent GTE 65 Years (Quartile)
2.0% - 4.0%
1.0% - 2.0%
0.1% - 0.9%
0.0% - 0.1%

2006
ENC Population GTE 75: 137,568 (5.4%)

Percent GTE 65 Years (Quartile)
2.0% - 4.0%
1.0% - 2.0%
0.1% - 0.9%
0.0% - 0.1%

2000 - 2006
ENC Pop. GTE 75 Change: 17,502 (+7.5%)

Percent Change (Natural/Manual)
0.0% - 0.9%
0.1% - 2.0%
2.0% - 5.0%
5.1% - 10.0%
10.1% - 32.0%
32.1% - 43.3%

Data Sources:
NC State Data Center
US Census Bureau
NC One Map

James L. Wilson, PhD
Center for Health Services Research and Development
East Carolina University
Greenville, NC
Estimating the Medically Fragile Population in Eastern North Carolina Affected by a Surge Zone Produced by a Slow Moving Category 4/5 Hurricane
Eastern North Carolina Counties: Medically Fragile (0.08) Block Group Populations Affected by a Storm Surge Generated by a Slow Moving Category 4 or 5 Hurricane

ENC Population: 2,568,962
ENC Population Medically Fragile (0.08): 205,517
Surge Affected ENC Population: 398,169
Surge Affected ENC Medically Fragile (0.08): 31,853
Eastern North Carolina Counties:
Block Group Populations Age 75 Years and Older Affected by a Storm Surge Generated by a Slow Moving Category 4 or 5 Hurricane

2006

ENC Population: 2,568,962
ENC Population 75+: 137,568

Surge Affected Total ENC Population: 398,169
Surge Affected ENC Population 75+: 26,731

Data Sources: NC State Data Center
US Census Bureau
NC One Map

James L. Wilson, PhD
Center for Health Services Research and Development
East Carolina University
Greenville, NC
ENC Vulnerable Populations for 2006 (Slow Moving Hurricane Cat. 4/5)

<table>
<thead>
<tr>
<th>Census Unit</th>
<th>Medically Fragile (0.08)</th>
<th>Population 65+</th>
<th>Population 75+</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>No Fractions¹</td>
<td>Fractions²</td>
<td>No Fractions</td>
</tr>
<tr>
<td>County n = 25</td>
<td>92,446</td>
<td>28,194</td>
<td>156,728</td>
</tr>
<tr>
<td>Census Tract n = 154</td>
<td>75,761</td>
<td>30,128</td>
<td>132,323</td>
</tr>
<tr>
<td>Block Group n = 490</td>
<td>66,014</td>
<td>31,853</td>
<td>114,464</td>
</tr>
<tr>
<td>Block n = 17,972</td>
<td>48,747</td>
<td>30,806</td>
<td>88,132</td>
</tr>
</tbody>
</table>

¹The entire population of the census unit intersected by the surge zone is included—no areal weighting is used.
²Areal weighting is used in calculating the population of the census unit intersected
Results

Using smaller census units provide closer estimates of the actual geographic distribution of population.

Delimited/reduced medically fragile (0.08) population from 200,000+ in ENC (41 county) to 32,000 in ENC’s storm surge affected zone.

Delimited/reduced elderly 75+ years population from 137,000+ in ENC (41 county) to almost 27,000 in ENC’s storm surge affected zone.

Analysis at higher spatial resolutions shows that population age groups are not distributed uniformly throughout ENC. For example, the age group 75+ years represents 15.5% of ENC’s total population, but within the region’s storm surge zone they represent 19.4% of the zone’s population—a 25% increase in the geographic concentration of this group.

Determines an approximate target size for populating a registry for the vulnerable and medically fragile.
Two Demonstration Practices

Federally-Qualified Health Center/Local Health Department
Jones County Health Department, Trenton, NC
Kristen Hoover, MPH, Health Director

Private Primary Care Practice
Medical Park Family Physicians, Greenville, NC
Dr. Wilton Gay, Jr.
Dr. Lara Surles
## Practice Demonstration Summary

<table>
<thead>
<tr>
<th>Category</th>
<th>Jones County Health Department</th>
<th>Medical Park Family Physicians</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total Number of Patients Seen By Physician</td>
<td>65</td>
<td>156</td>
</tr>
<tr>
<td>Age Range</td>
<td>1.5 to 74 years</td>
<td>11 to 94 years</td>
</tr>
<tr>
<td></td>
<td>Median= 30 Mean= 31</td>
<td>Median= 64 Mean= 62</td>
</tr>
<tr>
<td>Number &amp; Percent Deemed Medically Fragile by Physician</td>
<td>5 (8%)</td>
<td>110 (71%)</td>
</tr>
<tr>
<td>Number &amp; Percent of Patients Who Self-Registered</td>
<td>19 (29%)</td>
<td>36 (23%)</td>
</tr>
</tbody>
</table>
Conclusion and Discussion

Percent patient population categorized as medically fragile by physician correlates with the mapping hypothesis that the very aged population ($\geq 75$ years) comprises the largest medically fragile population.

The increasing uninsured population often lacks a medical home precluding physician enrollment. This population is disproportionately comprised of ethnic minorities.

Use of lay health advisors and faith-based approaches have demonstrated effective mechanisms for engaging minority populations.

In a 2008 survey to all North Carolina public health departments, 73 out of 84 (87%) responded. 25 (43.9%) health departments use Faith-Based Interventions to address disaster preparedness.
Discussion (cont.)

Outreach efforts at the local level are essential for the continued identification and enrollment of the medically fragile population in eastern North Carolina and beyond.

We must continue to identify and implement multichannel mechanisms for ensuring the safety and treatment of the medically and economically vulnerable.