Heat-Health Vulnerability in North Carolina:
The Heat – Health Vulnerability Tool (HHVT)

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Outline

1. Background on heat illness in North Carolina
2. Model development
3. Current 1.0 version of the model
4. Upcoming 2.0 version of the model
5. Applications to longer range forecasts
Background: Heat Illness in North Carolina

- 8 fold difference between highest and lowest areas
North Carolina Disease Event Tracking and Epidemiologic Tool (NC DETECT)
Model development

- All ED diagnosed as “heat illness” as a primary, secondary, or tertiary diagnosis

- Each ED visit linked to the daily maximum temperature at the nearest weather station.

NC-DETECT (2007 – 2012)

- Age
- Gender
- Date of Visit
- All diagnostic codes(992)
- Billing address zip code/County
HRI rates are adjusted for the frequency of temperature observations → **Average daily HRI ED Visits Per 100,000 people**

More ED visits on abnormally hot (95 to 100F) days but marked decrease in HRI rates at the highest temperatures (greater than 100F)
Model Development

- All heat illness cases pooled together across four regions according to the urban-ness/rurality.
Model Development

Differences in rates of heat illness across four regions
Model Development

Rates of heat illness by region & age groups

![Graph showing rates of heat illness by region & age groups. The graph displays bars for different age groups and regions, with the highest rates indicated.]

Legend:
- Metropolitan
- Rural Metropolitan
- Rural Town
- Rural and Isolated

Greatest rates
Current version of model

Inputs NWS maximum temperature forecasts and translates these values into predictions of the number of cases of heat illness.

- County or region level
- Rural-ness/urban-ness
- Age group & gender
Current version of model

Example of Output
Upcoming 2.0 version of model

Major upgrades
1. Use the 18Z heat index. Model provides a better fit
Upcoming 2.0 version of model

**Major upgrades**

2. Provide a measure of the level of danger

Model after the Air Quality Index (AQI)

<table>
<thead>
<tr>
<th>Air Quality Index (AQI) Values</th>
<th>Levels of Health Concern</th>
<th>Health Effects</th>
</tr>
</thead>
<tbody>
<tr>
<td>0 to 50</td>
<td>Good</td>
<td>Little or no risk</td>
</tr>
<tr>
<td>51 to 100</td>
<td>Moderately</td>
<td>Acceptable quality</td>
</tr>
<tr>
<td>101 to 150</td>
<td>Unhealthy for Sensitive Groups</td>
<td>General Public not likely affected</td>
</tr>
<tr>
<td>151 to 200</td>
<td>Unhealthy</td>
<td>All may experience some effects</td>
</tr>
<tr>
<td>201 to 300</td>
<td>Very Unhealthy</td>
<td>All may experience more serious effects</td>
</tr>
<tr>
<td>301 to 500</td>
<td>Hazardous</td>
<td>Emergency conditions</td>
</tr>
</tbody>
</table>
Upcoming 2.0 version of model – Example of output
Application to long range forecasts

Categorical long range forecast outputs

- “Below normal”
- “Equal chances”
- “Above normal”

- Over period in which emergency room visit data is available, identify rates of heat illness for each category of temperature departure.

- This can be broken down by region, demographic, and socioeconomic group (e.g. 18-45 year males in rural NC)
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The NC DETECT Data Oversight Committee does not take responsibility for the scientific validity or accuracy of methodology, results, statistical analyses or conclusions presented.

Heat Health Vulnerability Tool--http://sercc.com/hhvt