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

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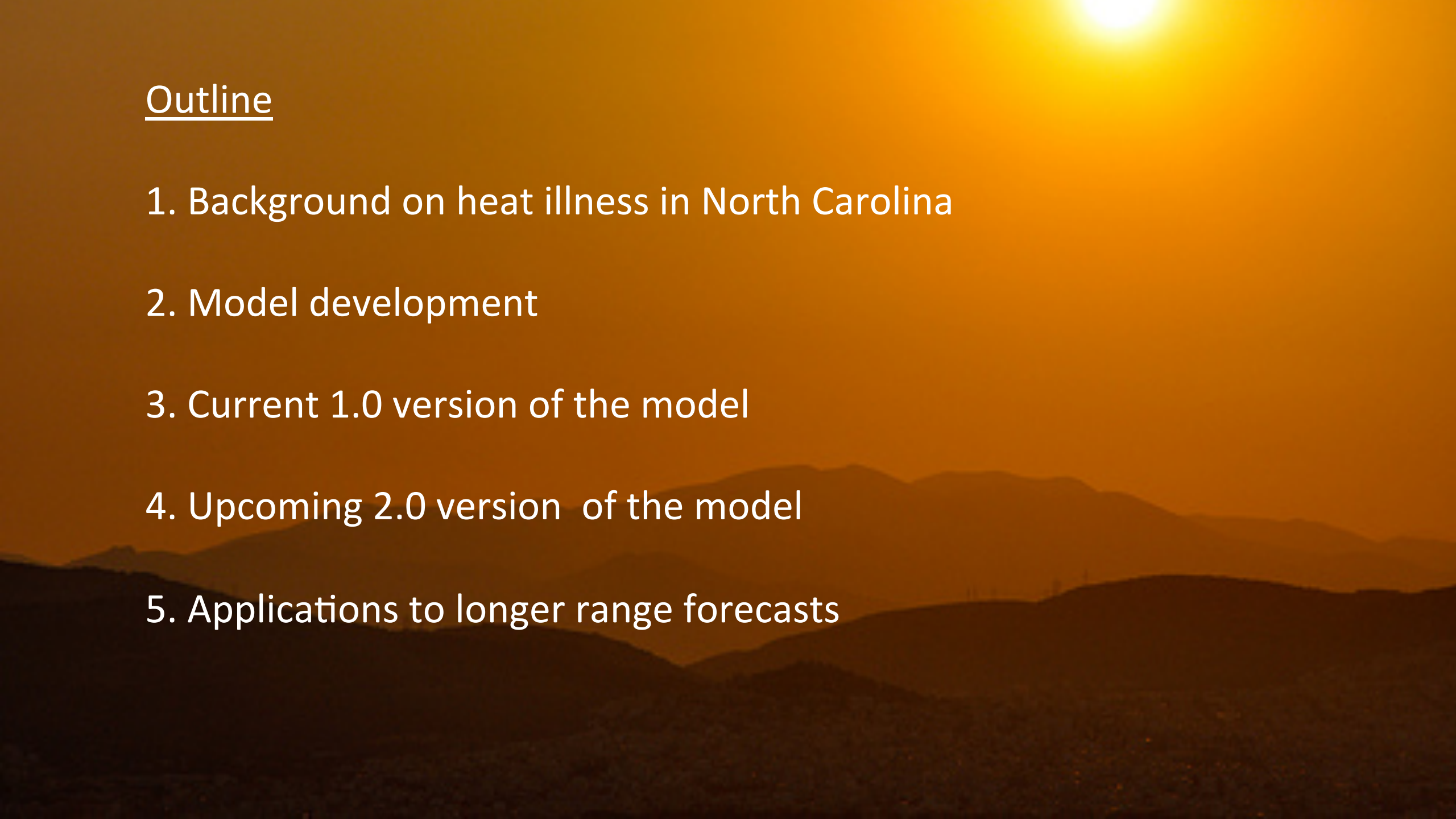
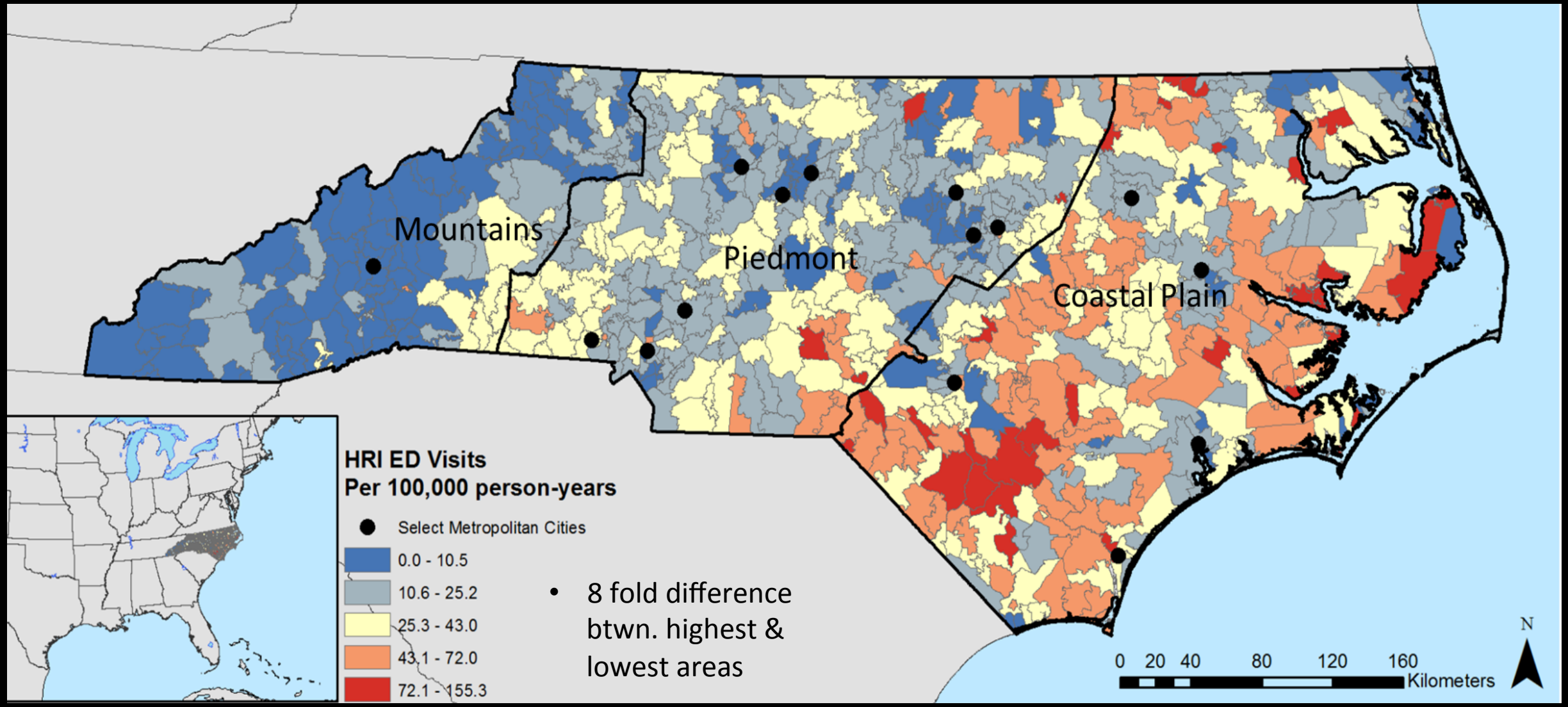


## Outline

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 btwn. highest & lowest areas

# Model development


# North Carolina Disease Event Tracking and Epidemiologic Tool (NC DETECT)

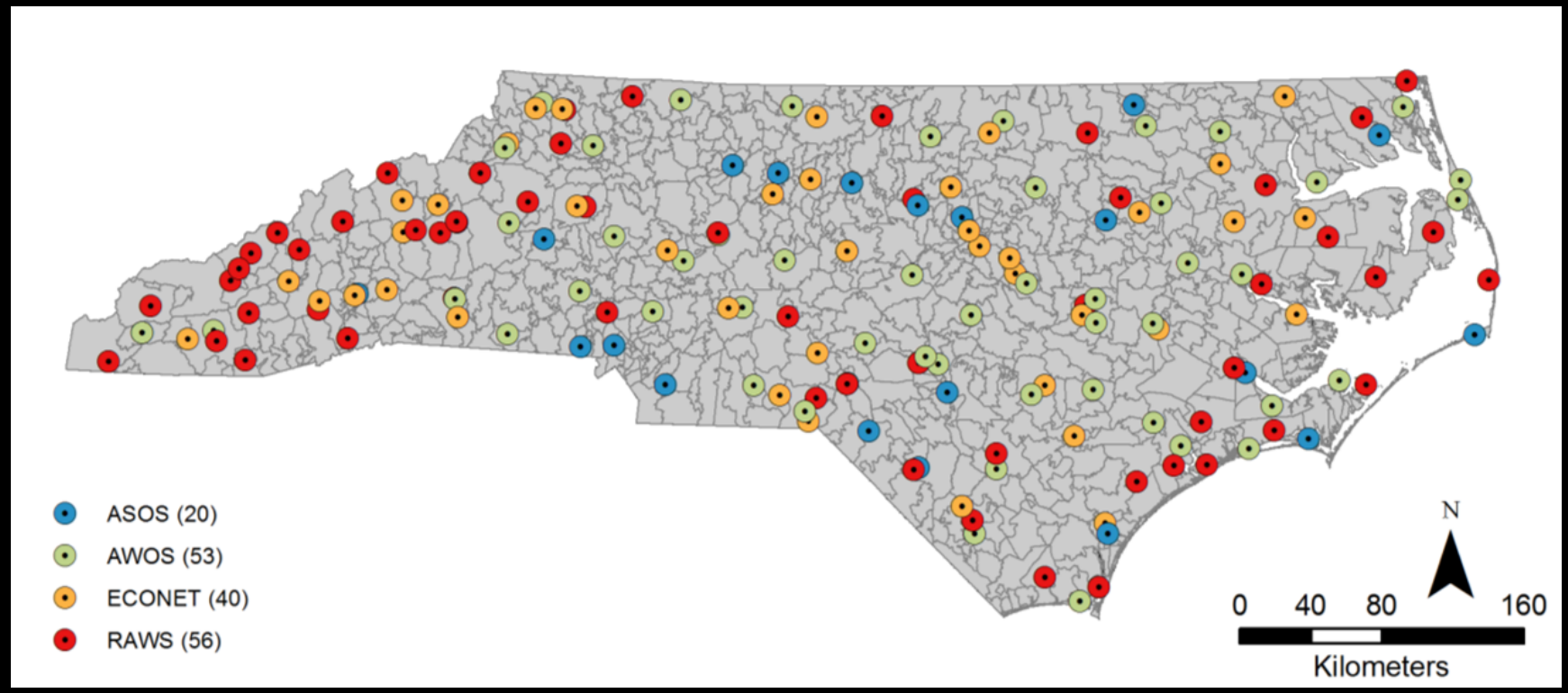
# Model development

- **All ED diagnosed as "heat illness" as a primary, secondary, or tertiary diagnosis**

**NC- DETECT (2007 – 2012)**

- Age
- Gender
- Date of Visit
- All diagnostic codes(992)
- Billing address zip code/County

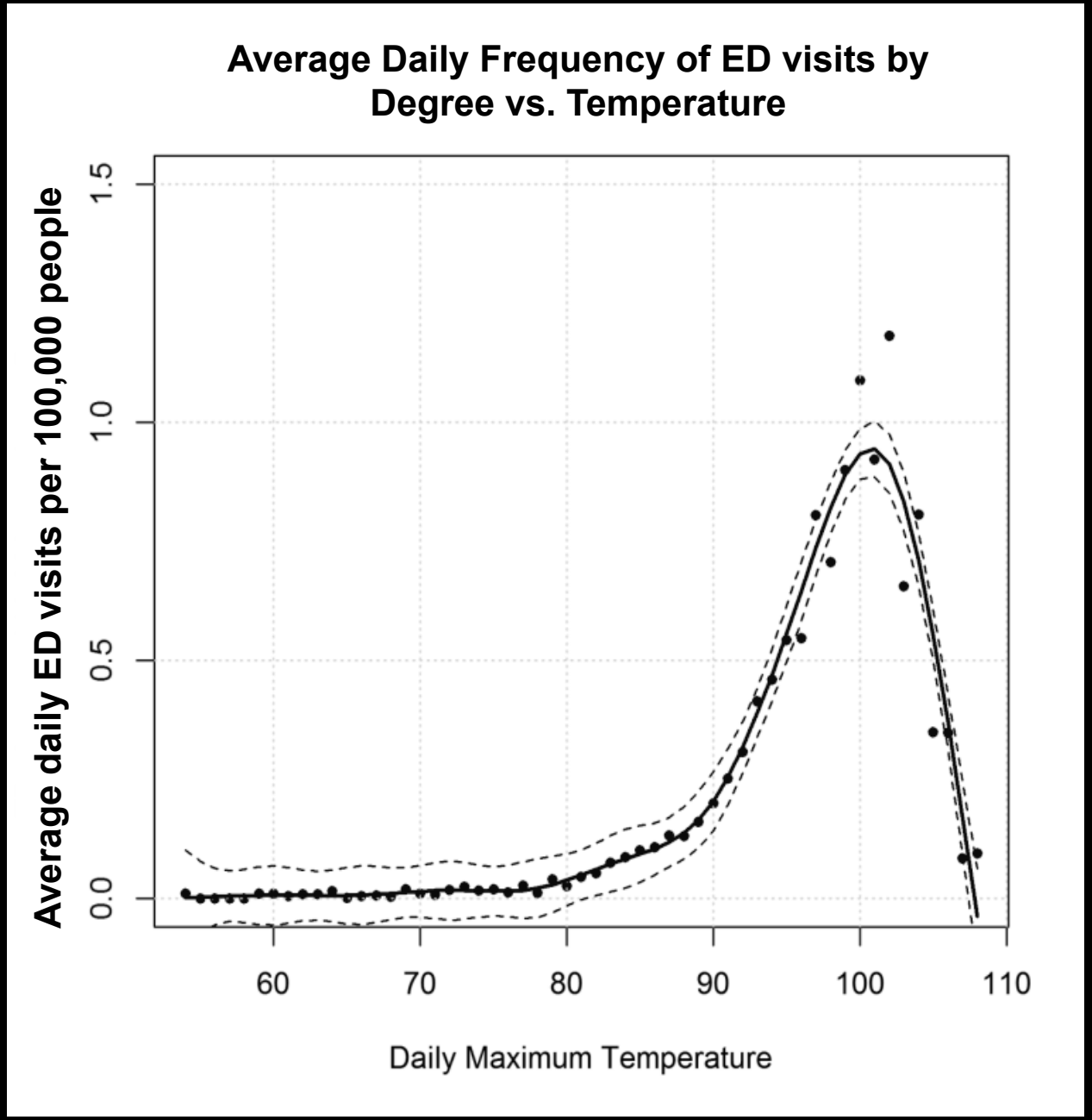
- **Each ED visit linked to the daily maximum temperature at the nearest weather station.**



# Model Development

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**

**Rural Urban Commuting Areas (RUCA) Classification**

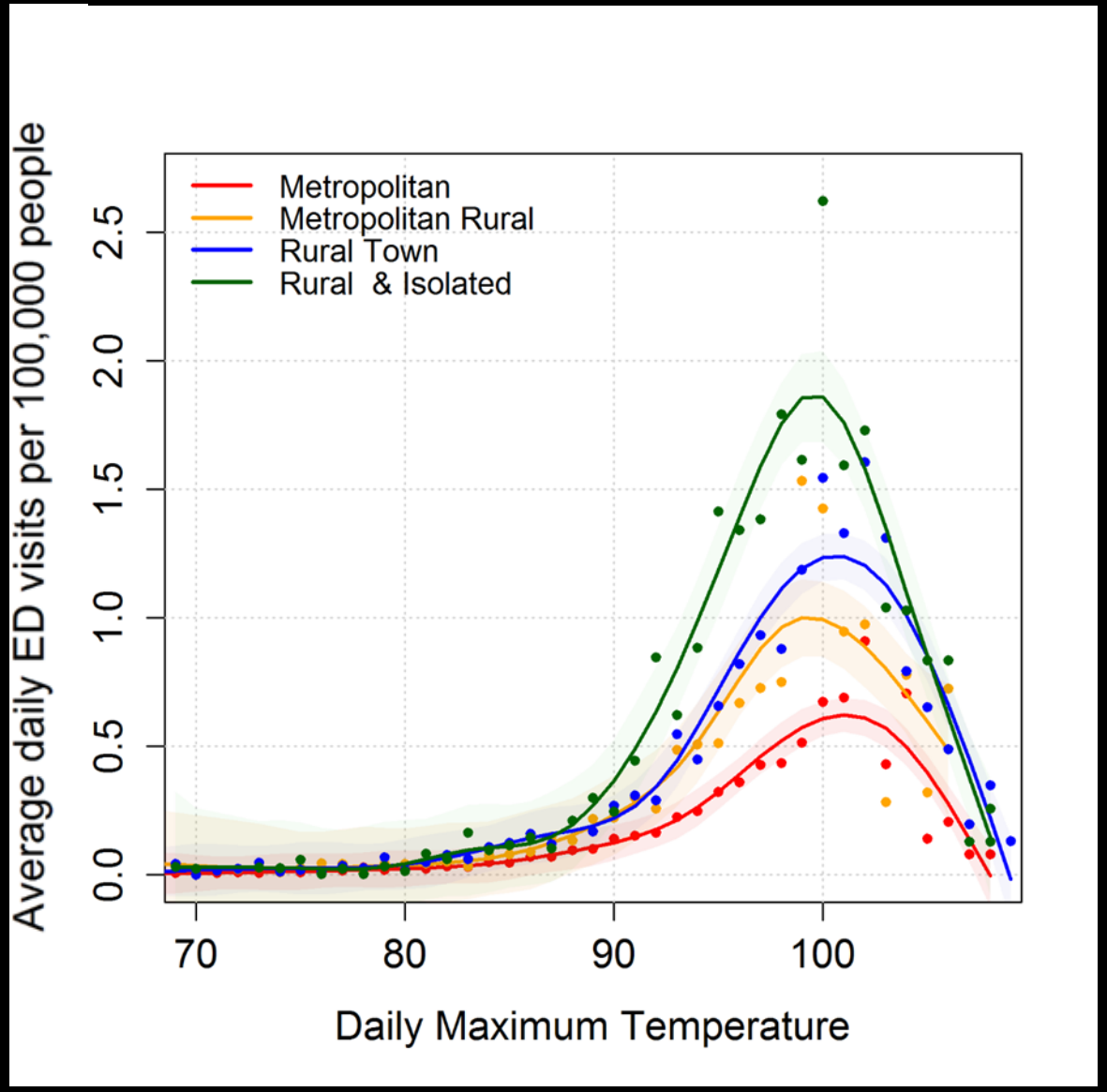
**Metropolitan** | **Rural Metropolitan** | **Rural Town** | **Rural Isolated**




**Most Urban** ⟷ **Most Rural**

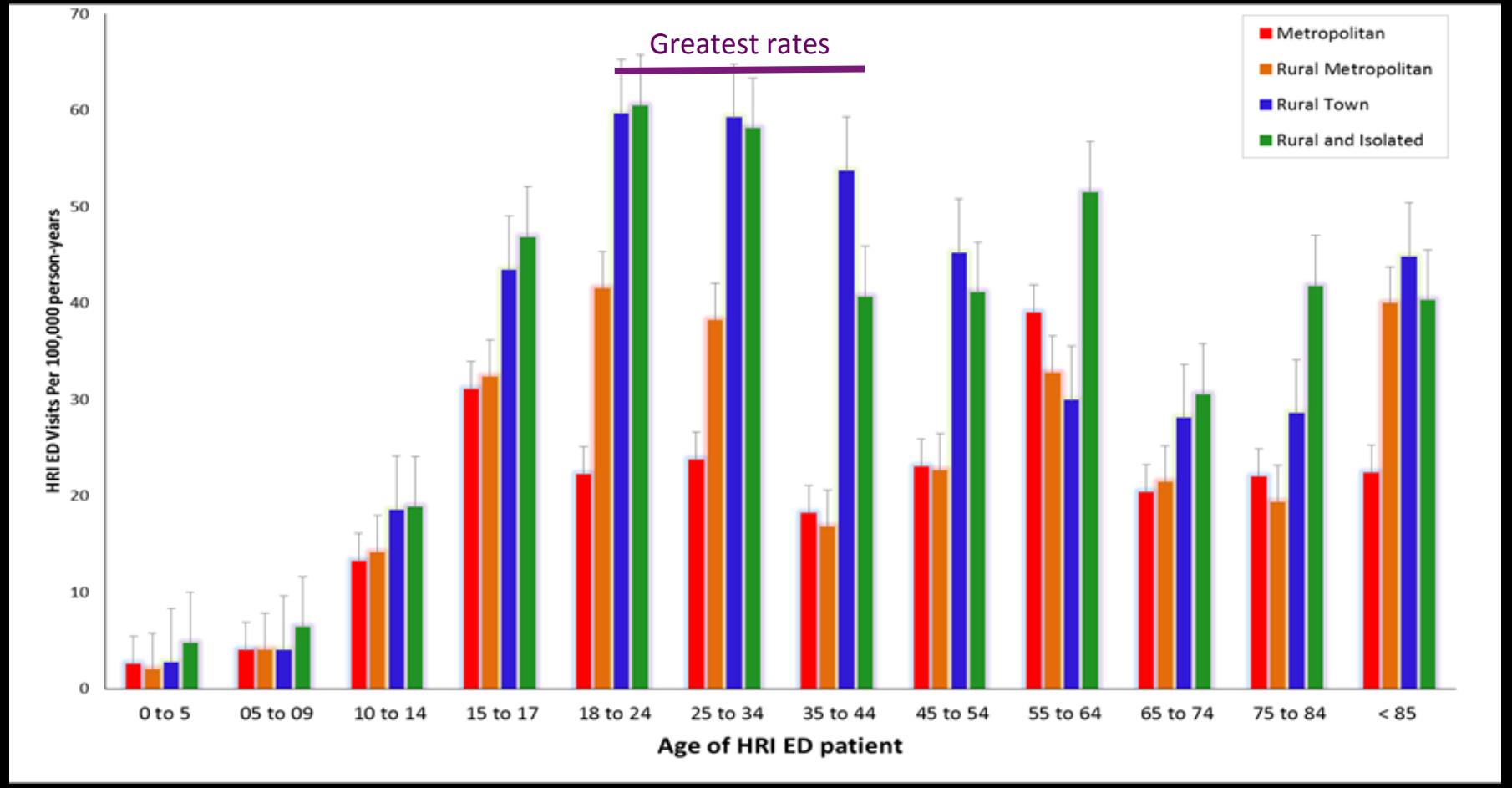
# Model Development

**Differences in rates of heat illness across four regions**



# Model Development

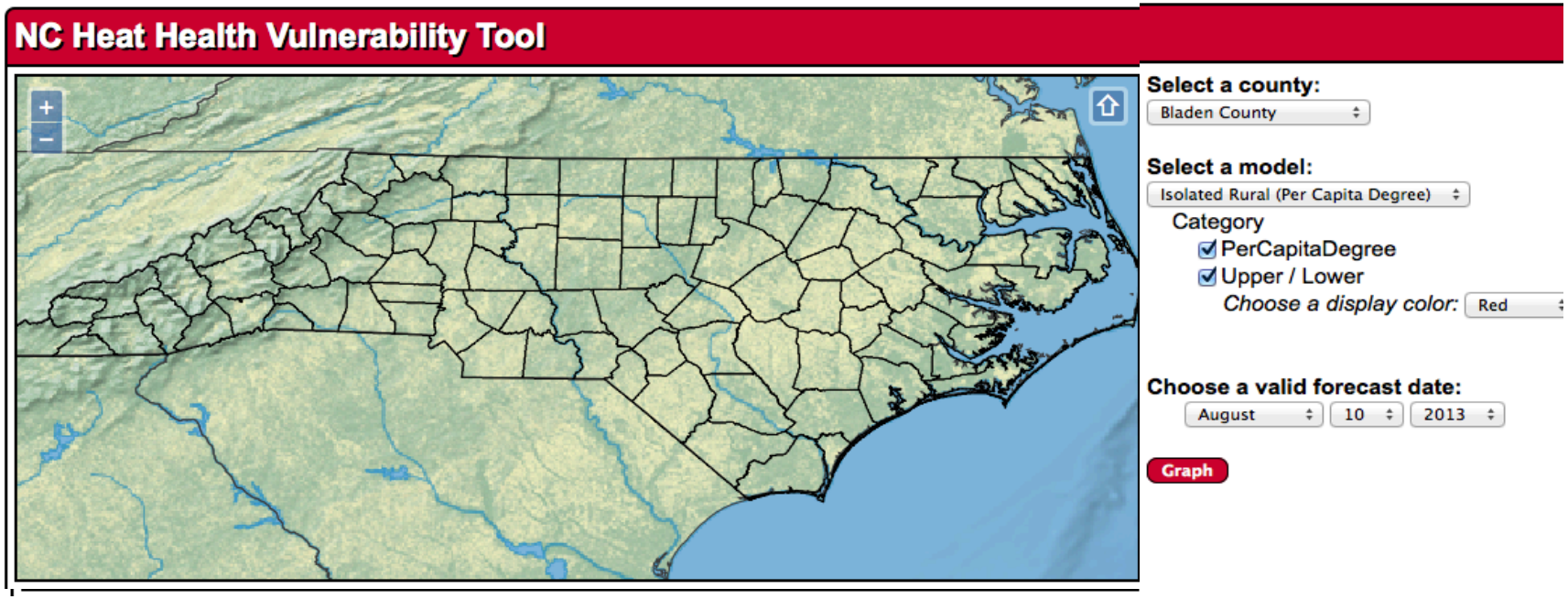
## Rates of heat illness by region & age groups



# Current version of model

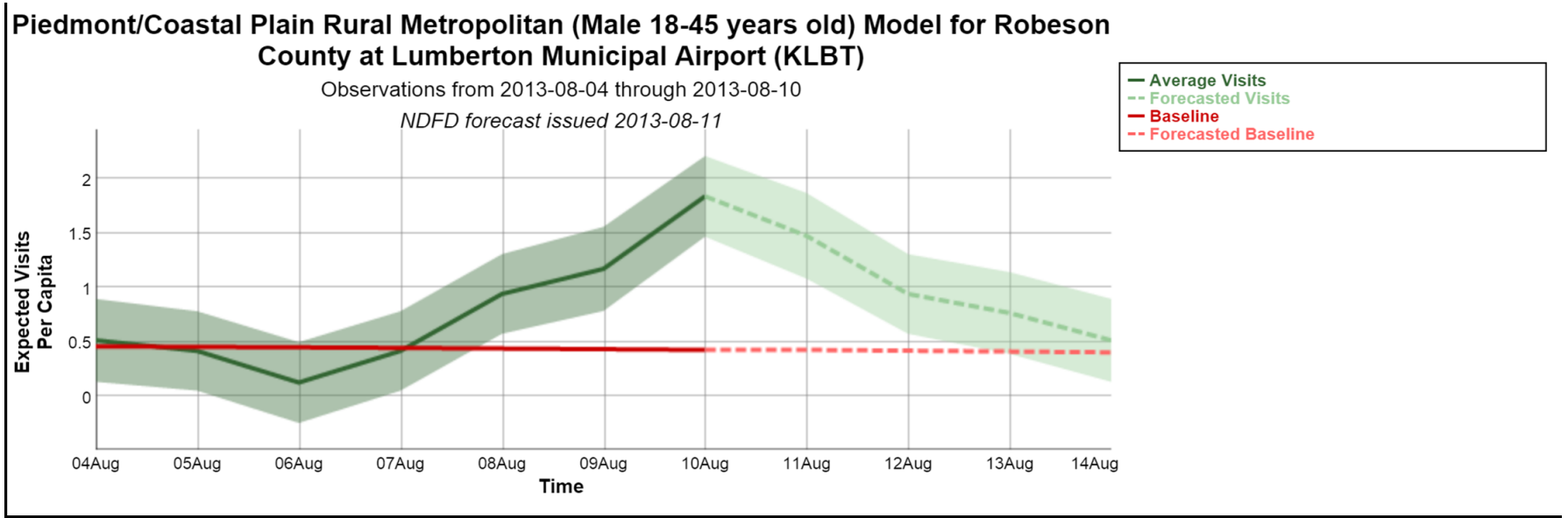
Inputs NWS maximum temperature forecasts and translates these values into predictions of the number of cases of heat illness.

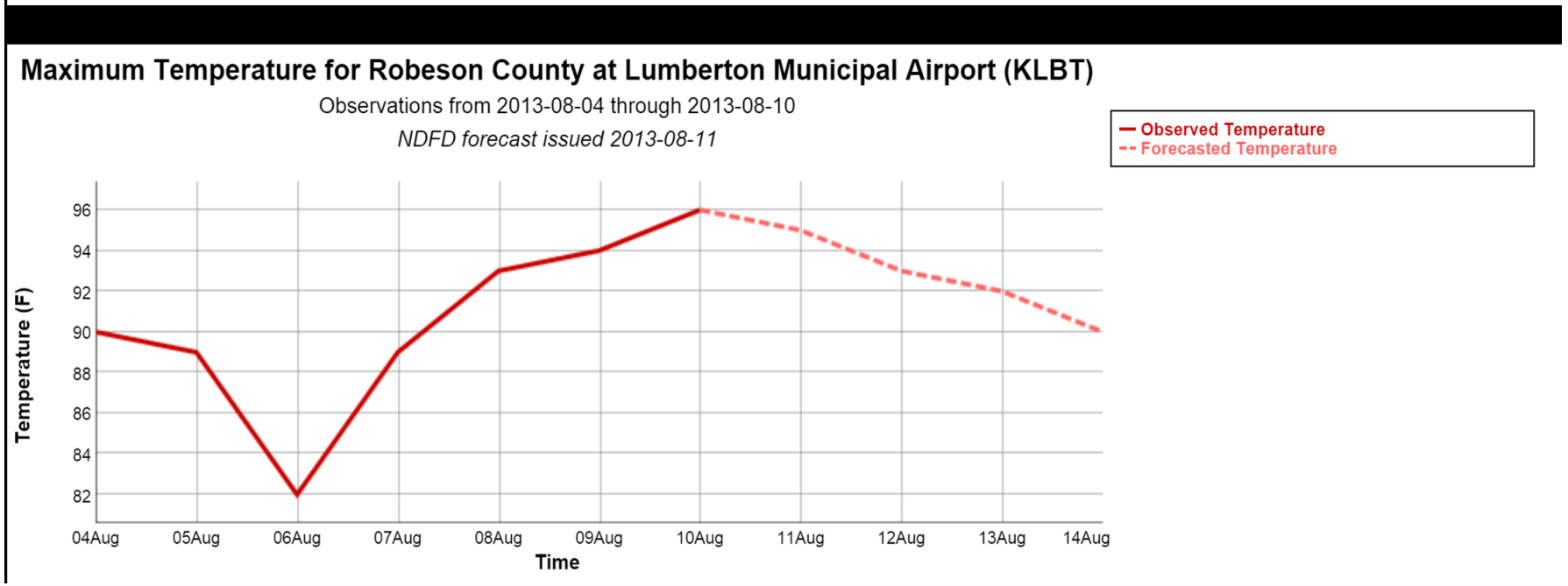
- County or region level
- Rural-ness/urban-ness
- Age group & gender



# Current version of model

## Example of Output

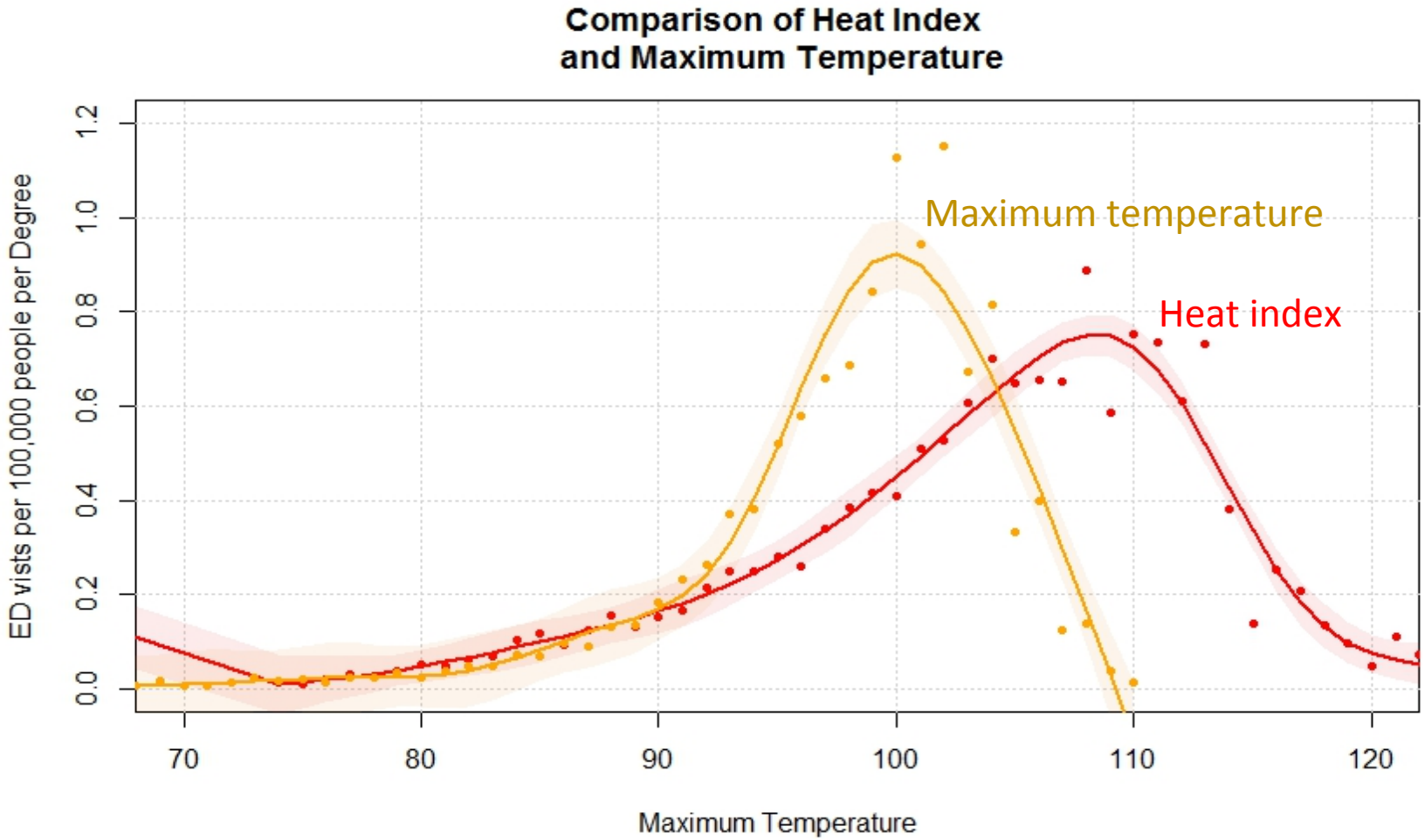


# Upcoming 2.0 version of model

<u>Major upgrades</u>

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

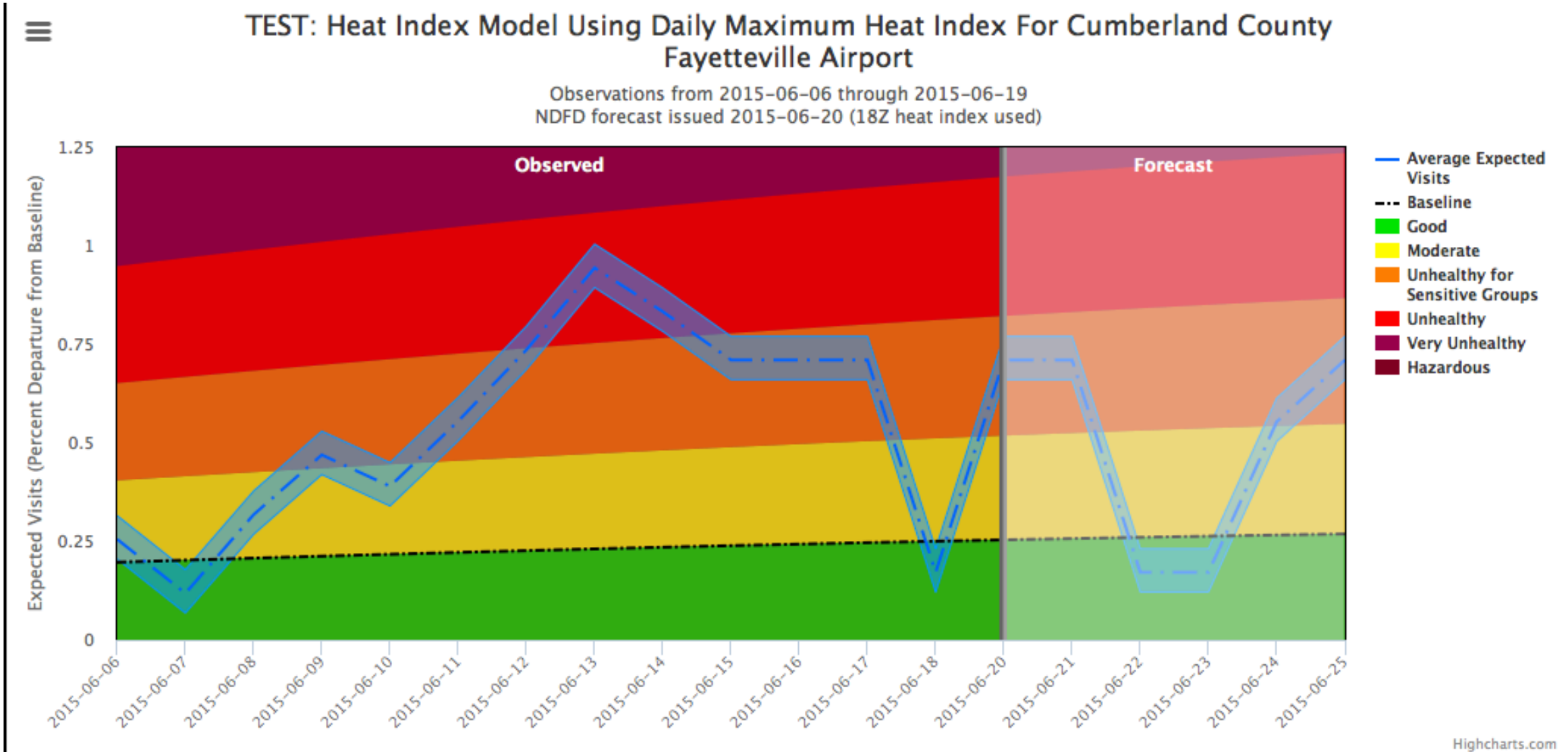
### Model after the Air Quality Index (AQI)

Rates of heat illness

AIR QUALITY INDEX

| Air Quality Index (AQI) Values | Levels of Health Concern | Health Effects |
|---|---|---|
| 0 to 50 | Good | Little or no risk |
| 51 to 100 | Moderate | Acceptable quality |
| 101 to 150 | Unhealthy for Sensitive Groups | General Public not likely affected |
| 151 to 200 | Unhealthy | All may experience some effects |
| 201 to 300 | Very Unhealthy | All may experience more serious effects |
| 301 to 500 | Hazardous | Emergency conditions |

# 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)

# Acknowledgements

Maggie Sugg
EPA Science to Achieve Results Fellowship (STAR) for Graduate Environmental Study
NSF Doctoral Dissertation Improvement Grant
North Carolina Department of Health & NC-CDC BRACE program
North Carolina Public Health and Climate Change Work Group
North Carolina State Climate Office



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