Health Impacts in a Changing Climate

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Projected Increase in the Number of Days Over 90° F
Change in Heavy Rainfall Events

U.S. Increase in the amount falling in very heavy rain events*

2009 Report for the Northeast: 67% increase relative to 1958 to 2007

* Defined as the heaviest 1 percent of all daily events from 1958 to 2010
Heavy Downpours are Increasing Exposure to Disease

Streams and rivers rise, which contributes to flooding of homes, businesses, and critical infrastructure like sewer and storm water systems.

Floodwaters can become contaminated with agricultural waste, chemicals, raw sewage, and other pollutants.

Floodwaters can contain disease-causing bacteria, viruses, and parasites.

Climate change increases heavy downpours.

Sewage overflow from treatment plants, septic fields, and municipal lines can back up into people's homes.

CREDIT: 2013 National Climate Assessment, NOAA/NCDC/CICS
Projected Changes in Tick Habitat

Establishment Probability (%)

0-19  20-39  40-59  60-79  80-99

Present  2020  2050  2080
Elements of Vulnerability to Climate Change
Demonstration Topic: Heat Illness

- **Access** emergency department (ED) visit data from NC DETECT
- **Explore and Summarize** the characteristics of ED visits related to heat illness
  - Spatial and temporal patterns
    - Statewide, county, and Census-level
    - Annual, seasonal, monthly, daily, hourly
  - Patterns by age and gender
  - Raw counts and per capita rates
Enter your ICD-9 Codes
-OR-
- Primary and Secondary Diagnostic Codes
- Secondary Diagnostic Codes

Select your date range:
Start Month / Day: January 01
End Month / Day: January 01

Choose over which year(s) you would like to pull data:
- 2007
- 2008
- 2009
- 2010

Pull records for the following counties or ZCTAs
- Counties:
  - Alamance
  - Alexander
  - Alleghany
  - Anson
  - Ashe

- Include a reference period for hospital admissions

ICD-9 Information - Windows Internet Explorer

http://www.sercc.com/nc_detect/icd9_popup.php

ICD-9 codes can be entered in as ranges and as individual values, separated by commas. The following example depicts how you would enter in codes associated with the effects of heat and light, dehydration, and unspecified cardiovascular disease:

992.0 - 992.3, 276.51, 423.2

Below you will find a list of ICD-9 codes, grouped by classification. For more detailed information, please look here:

- Infectious and Parasitic Diseases (001-139)
- Neoplasms (140-239)
- Endocrine, Nutritional and Metabolic Diseases, and Immunity Disorders (240-279)
- Diseases of the Blood and Blood Forming Organs (280-289)
- Mental Disorders (290-319)
- Diseases of the Nervous System and Sense Organs (320-389)
- Diseases of the Circulatory System (390-459)
- Diseases of the Respiratory System (460-519)
- Diseases of the Digestive System (520-579)
- Diseases of the Genitourinary System (580-629)
- Complications of Pregnancy, Childbirth, and the Puerperium (630-676)
- Diseases of the Skin and Subcutaneous Tissue (680-709)
- Diseases of the Musculoskeletal System and Connective Tissue (710-739)
- Congenital Anomalies (740-759)
- Certain Conditions Originating in the Perinatal Period (760-779)
- Symptoms, Signs, and Ill-Defined Conditions (780-799)
- Injury and Poisoning (800-999)
- Supplementary Classification of Factors Influencing Health Status and Contact with Health Services (V01-V89)
- Supplementary Classification of External Causes of Injury and Poisoning (E800-E999)
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Relationships Between Temperature and Heat Illness – An Application of climate – public health toolbox
Research Questions

• What is the relationship between maximum temperature and heat related illness in North Carolina?

• How does this relationship vary temporally, regionally, and across different demographics?
Data

- **North Carolina Disease Event Tracking and Epidemiologic Collection Tool (NC DETECT)**

- Age, gender, billing address county, and zip code

- Dates Available: 01/01/2007 – 12/31/2012

- Acquire all emergency department visits with ICD-9: 992.xx for both primary and secondary diagnostic codes (May – September)
Use of Toolbox to Examine Heat Morbidity Across North Carolina

Rate of ED visits (per capita) for HRI by county from 2007 to 2008

**Total Visits:**
- Urban: 1186
- Rural: 1404 (+218)

**Annual Visit Rate (per 100,000):**
- Urban: 13.0
- Rural: 15.6 (+2.6)

Age distribution of per capita ED visits for HRI between urban and rural counties
HRI temperature r-ships for the four demographic regions across Piedmont/Coastal Plain
Gender differences in the Rural City Region

Average Annual Frequency of ED visits vs. Temperature

Average Daily Frequency of ED visits by Degree vs. Temperature

Cornell University
Earth and Atmospheric Science
HRI vs. Age & Gender for the Rural City Region

- 0 to 5: 5 times greater
- 5 to 9
- 10 to 14
- 15 to 17
- 18 to 24: 5 times greater
- 25 to 34
- 35 to 44
- 45 to 54
- 55 to 64
- 65 to 74
- 75 to 84
- 85 and older

Female | Male
## Current Work

### Web-Based Heat-Health Vulnerability Tool

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Questions?