# CHANGES IN THE HEAT-HEALTH RELATIONSHIP ACROSS THE USA, 1975-2010: ADAPTATION AND ITS LIMITS

Scott SHERIDAN, Kent State University, USA Grady DIXON, Fort Hays State University, USA



### OVERVIEW

- The heat-mortality relationship is well established from many studies
- Cooler cities see mortality rise at lower thresholds and generally have greater increases in mortality
- · Longer heat events generally have greater impacts than shorter ones
- Trend analyses have shown a downward trend in vulnerability over time
- This study examines trends in heat-related mortality for the 60 largest US metropolitan areas for 1975-2010

## DEFINITION OF HEAT EVENTS

- Using the Spatial Synoptic Classification
  - Day of sequence MT+ / DT
- Using the Daily Mean Apparent Temperature
  - Day of sequence >= 95th percentile
- Day I-2 of heat event: "Short"
- Day 3+ of heat event: "Long"

## DISTRIBUTED-LAG MODELS

- Used to assess lagged effects and mortality displacement during heat events
- Each lagged predictor is a term in a generalized linear model, e.g.:
- RR = f (HDay0, HDay-1, HDay-2,..., HDay-15, ns(year), ns (Julian Day) + Day of Week, where
- H = heat-wave indicator
- ns = natural spline
- Run in R (dlnm package)



Phoenix

Atlanta







#### 9 LARGEST METROS IN CALIFORNIA



### HEAT VULNERABILITY AND ADAPTATION

#### ENVIRONMENTAL FACTORS

SOCIAL FACTORS

- More heat events moving forward
- Aging population
- Greater urban heat island / sprawl?
- Urbanizing population
- Unequal access to resources
- Changes in ability to regulate one's environment

# CONCLUSIONS

- Broad decline in heat vulnerability between 1975 and 2010 using distributed-lag impacts
- What is the role of the really extreme or unusual heat wave?
- What are the limits to adaptation?

Scott Sheridan – ssherid1@kent.edu