Epidemiologic Studies of Ambient Temperature in California: Implications for Environmental Justice

Rupa Basu, PhD, MPH, Research Scientist

Air Pollution Epidemiology Section/OEHHA

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Background

- Few epidemiologic studies of health effects from ambient temperature quantifying risk, especially in California
- Previous studies did not always control for confounding by pollutants and other factors
- Heat-related deaths underreported
Study Objectives

• To assess the association of apparent temperature on deaths and hospital admissions in 9 CA counties
  – Apparent temp incorporates temp and humidity; “heat index”
  – Limited analyses to May 1-September 30
• To determine how the associations differ by cause-specific outcomes, race, age, education level, gender
• To determine how the mortality association changes during a heat wave (CA 2006 heat wave as an example)
Mean Daily Apparent Temperature (°F) for Nine California Counties, May-September 1999-2003
Data Analysis

• Time-stratified case-crossover study
  – Often used for epidemiologic studies of air pollution and temperature

• Separate analyses by county

• County estimates combined in meta-analysis
Results
Apparent Temperature per 10°F and All-cause Mortality Adjusted by Pollutant
Apparent Temperature per 10°F and Mortality
Apparent Temperature per 10°F and All-cause Mortality by Race
Summary of Mortality Studies

- 2.3% increase in deaths associated with 10°F increase apparent temperature
- Increased risk also found for cardiovascular mortality, elderly, young children, infants, race/ethnic group
- No difference found by gender or education level
- Temperature effect independent of air pollutants
- Heat wave not necessary to find a temperature effect in California
California July 2006 Heat Wave

• Included counties with at least 5 reported deaths
• Effects on death/degree are ~4 times greater than non-heat wave study
• Estimated number of deaths during the heat wave of 2006 may be 1.5-3 times larger than coroner reports (147)
Articles Published in Peer-Reviewed Journals


Future Research

• Mitigation/warning system
  – Emergency room visits using climate zones, use of air conditioning and socioeconomic status from census data

• Further quantification of effects (i.e., number of deaths associated with temperature)

• Adverse birth outcomes
Thank you for your attention! 😊