

THE ADDED HEAT WAVE EFFECT IN THE ASSOCIATION BETWEEN TEMPERATURE AND HOSPITAL ADMISSIONS AMONG THE ELDERLY IN 129 U.S. CITIES

Carina J. Gronlund, *University of Michigan School of Public Health, Ann Arbor, MI, USA*

Marie S. O'Neill, *University of Michigan School of Public Health, Ann Arbor, MI, USA*

Antonella Zanobetti, *Harvard School of Public Health, Boston, MA, USA*

Greg A. Wellenius, *Brown University School of Medicine, Providence, RI, USA*

Joel Schwartz, *Harvard School of Public Health, Boston, MA, USA*

Background and Aims: With climate change, heat waves will become more severe, and understanding the association between heat waves (HWs) and morbidity outcomes in vulnerable populations can inform heat adaptation strategies. We aimed to determine the association between heat waves and hospital admissions controlling for daily temperature.

Methods: We used a case-crossover analysis to evaluate associations between elderly (Medicare-covered) hospital admissions, regional airport weather data and ozone data (1992-2006) for 129 U.S. cities. HWs were defined as daily mean, minimum or maximum apparent temperatures (ATs) above the 90th, 95th or 99th percentile of summer (May-September) temperatures for at least two days. Admissions by primary discharge diagnoses were regressed on the day in the HW using a time-stratified case-crossover design, stratified by month, controlling for AT and ozone averaged over lags 0-1, and an AT moving average for lags 2-5. Results were pooled by climate region (based on cooling- and heating-degree-days).

Results: The added HW effect depended on the region, the hospital discharge diagnosis and the definition of the HW. At a higher percentile threshold, the magnitude of the association was greater but the 95% confidence interval wider. An added HW effect was seen in colder regions but not warmer regions (e.g., in the coldest region, all-cause admissions increased by 5.9% (0.50%, 12%) on days the mean AT was above the 99th percentile for at least 2 days). An added HW effect was seen for respiratory, renal and heat-related discharge diagnoses. HWs were inversely associated with cardiovascular admissions.

Conclusions: Consistent with other studies of the association between HWs and mortality, results vary by climate, outcome and HW definition. Nevertheless, a small added HW effect was observed in colder climates. Future research will address comorbidities, effect modification by ozone and individual characteristics, and explanations for the regional differences.