EVALUATION OF A HEAT VULNERABILITY INDEX ON ABNORMALLY HOT DAYS: AN APPLICATION OF ENVIRONMENTAL PUBLIC HEALTH TRACKING DATA

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Background and Aims: Heat waves and extreme hot weather conditions have been associated with increased morbidity and mortality, but the risks are not evenly distributed throughout the population. Previously, a heat vulnerability index (HVI) was created that combined factors of socio-economic and environmental vulnerability, social isolation, air conditioning prevalence, and pre-existing health conditions to geographically locate populations with increased vulnerability to heat in metropolitan areas throughout the United States. Our study aims to determine whether the intra-urban spatial distribution of heat vulnerability, as characterized by the HVI, is consistent with increased rates of morbidity and mortality on abnormally hot days.

Methods: We defined abnormally hot days as days where the difference between the maximum temperature for that day and the 30-year normal warm season maximum temperature was in the 95th percentile for that weather station for all warm season days (May-September) for 2000-2007. We used Poisson generalized estimating equations to assess the interaction between the HVI and abnormally hot days on hospitalization and mortality counts by zip code, controlling for daily ozone levels and day of week in five states from the Environmental Public Health Tracking Network.

Results: The HVI was consistently associated with higher hospitalization and mortality rates, but abnormally hot days were not associated with increased morbidity or mortality after adjustment for the HVI. The interaction of HVI with abnormally hot days was not significant. Division of the HVI into three categories showed different trends from state to state, indicating potentially nonlinear relationships between the HVI and health outcomes.

Conclusions: Our results demonstrate that the HVI denotes increased health vulnerability that was independent of the measure of heat that we used. Further investigation of our heat measure compared to other heat measures and the HVI as a measure of vulnerability in other areas of the country is warranted.