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Relationships between Excessive Heat and Daily Mortality over the Coterminous U.S

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In the United States, extreme heat is the most deadly weather-related hazard. In the face of a warming climate and urbanization, it is very likely that extreme heat events (EHEs) will become more common and more severe in the U.S. Using National Land Data Assimilation System (NLDAS) meteorological reanalysis data, we have developed several measures of extreme heat to enable assessments of the impacts of heat on public health over the coterminous U.S. These measures include daily maximum and minimum air temperatures, daily maximum heat indices and a new heat stress variable called Net Daily Heat Stress (NDHS) that gives an integrated measure of heat stress (and relief) over the course of a day. All output has been created on the NLDAS 1/8 degree (~12 km) grid and aggregated to the county level, which is the preferred geographic scale of analysis for public health researchers. County-level statistics have been made available through the Centers for Disease Control and Prevention (CDC) via the Wide-ranging Online Data for Epidemiologic Research (WONDER) system. We have examined the relationship between excessive heat events, as defined in eight different ways from the various daily heat metrics, and heat-related and all-cause mortality defined in CDC's National Center for Health Statistics ‘Multiple Causes of Death 1999-2010' dataset. To do this, we linked daily, county-level heat mortality counts with EHE occurrence based on each of the eight EHE definitions by region and nationally for the period 1999-2010. The objectives of this analysis are to determine (1) whether heat-related deaths can be clearly tied to excessive heat events, (2) what time lags are critical for predicting heat-related deaths, and (3) which of the heat metrics correlates best with mortality in each US region. Results show large regional differences in the correlations between heat and mortality. Also, the heat metric that provides the best indicator of mortality varied by region. Results from this research will potentially lead to improvements in our ability to anticipate and mitigate any significant impacts of extreme heat events on health.