**Excess deaths after tropical cyclones in the United States**

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**Background and aim**

In the US, hurricanes and other tropical cyclones have a devastating impact on society and are an important public health concern. Knowledge of excess deaths is essential for understanding the true public health burden of climate-related disasters. However, methodology to calculate post-tropical cyclone deaths has been hitherto inconsistent; even estimates for the same tropical cyclone can vary greatly, such as for Hurricane Maria in 2017, for which official death counts were up to seventy times lower than the total number of excess deaths.

**Methods**

We used mortality data from the National Center for Health Statistics and a comprehensive record of tropical cyclone occurrence in the US over 31 years (1988 – 2018). For each tropical cyclone, we formulated a Bayesian ensemble of forecasting models to estimate monthly all-cause and cause-specific death rates for the six months after exposure of tropical cyclone-impacted counties—defined as counties with a sustained maximal wind speed ≥34 knots—for the counterfactual scenario that these counties were not exposed to the tropical cyclone. We compared actual death rates to counterfactual rates and used population estimates to calculate excess deaths. We also examined how excess deaths varied by age group, sex, and social vulnerability.

**Results**

There were 106 named tropical cyclones which contributed to US exposures in 1,206 counties during 1988 – 2018. In initial estimates, we found that for Hurricane Sandy in 2012, there were 172 [95%CrI,125–226] post-tropical cyclone excess deaths; the official figure is 72. For Hurricane Katrina in 2005, there were 1,793 [95%CrI,1,559–2,105] post-tropical cyclone excess deaths; the official figure is 1,836.

**Conclusions**

A full cataloguing of excess deaths by cause, age group, sex, and social vulnerability with a consistent methodology improves understanding of the true public health burden of hurricanes and other tropical cyclones.

**Keywords**tropical cyclones; hurricanes; climate; weather; climate change; excess death; excess mortality.

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