**Title: Excess mortality after tropical cyclones in the United States**

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**Abstract:** XX

**One-Sentence Summary:** There was a large variation in excess mortality after tropical cyclones in the United States, with the greatest burden on the most vulnerable counties and greater excess mortality in recent years.

**Main Text:**

Tropical cyclones have a devastating impact on society throughout many parts of the world.(*1*–*3*) Trends in more active recent hurricane seasons, and stronger, longer-lasting hurricanes indicate that tropical cyclone exposure is and will remain a public health concern (*4*, *5*). In the United States, states in the Atlantic and Guld Coasts, most frequently exposed to tropical cyclones, have among the fast-growing populations in the United States and contain nearly half the population of the entire country. Some of the richest and poorest communities in the United States reside in tropical cyclone-affected areas; though tropical cyclones are not selective of communities they have affected; the impact of public health depends on community resilience.

Knowledge of excess mortality is essential for understanding the total public health burden of climate-related disasters. However, methodology to calculate excess mortality after hurricanes has varied across hurricanes, and are therefore not directly comparable with each other; even estimates of the same hurricane can vary greatly, such as Hurricane Maria in 2017, for which official death counts were up to seventy times lower than the total number of excess deaths.

Here we use publicly available data across more than three decades to directly estimate the number of excess deaths after tropical cyclones in entirety of the United States impacted by tropical cyclones. We present not only national results but also estimates for every county by year and strength of tropical cyclone, which shows where the current death toll after tropical cyclones is largest. We also investigate how excess mortality after tropical cyclones has varied by social vulnerability.

RESULTS

INTERPRETATION

References and Notes

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**Author contributions:**

Conceptualization: RMP, MAK

Methodology: RMP, VK, FD, ME, MAK

Data collection: RMP, GBA, GD, ME, MAK

Investigation: RMP, MAK

Visualization: RMP, MAK

Funding acquisition: RMP, MAK

Project administration: MAK

Supervision: RT, FD, ME, MAK

Writing – original draft: RMP, MAK

Writing – review & editing: RMP, VK, GBA, GD, RT, FD, ME, MAK

**Competing interests:**

Dr Anderson reported receiving grants from the National Institute of Environmental Health Sciences (NIEHS) (R00 ES022631. Dr Ezzati reported receiving a charitable grant from AstraZeneca Young Health Programme and receiving personal fees from Prudential, Scor, and Third Bridge. Dr Kioumourtzoglou reported receiving grants from NIEHS, American Heart Association, and NASA. No other authors reported disclosures.

**Data and materials availability:**

All data, code, and materials used in the analysis must be available in some form to any researcher for purposes of reproducing or extending the analysis. Include a note explaining any restrictions on materials, such as materials transfer agreements (MTAs). Note accession numbers to any data relating to the paper and deposited in a public database; include a brief description of the data set or model with the number. If all data are in the paper and supplementary materials, include the sentence “All data are available in the main text or the supplementary materials.”

Supplementary Materials

Materials and Methods

Supplementary Text

Figs. S1 to S#

Tables S1 to S#

References (*##*–*##*)

Movies S1 to S#

Audio S1 to S#

Data S1 to S#

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