Attribution of extreme heat-related mortality events in Europe to climate change

Beck, Thessa; Guðmundsson, Lukas; Geneviratne, Sonia I.; Schumacher, Dominik; Achebak, Hicham; Méndez, Rául & Joan Ballester

ISGlobal Barcelona Institute for Global Health

upf. Universitat Pompeu Fabra Barcelona

EDIPI

MARIE CURIE ACTIONS

Intro: Climate change is health threat

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- Climate change is increasing the occurence of heatwaves[2]
- Heatwaves are the main cause of weather-related death in Europe[1]

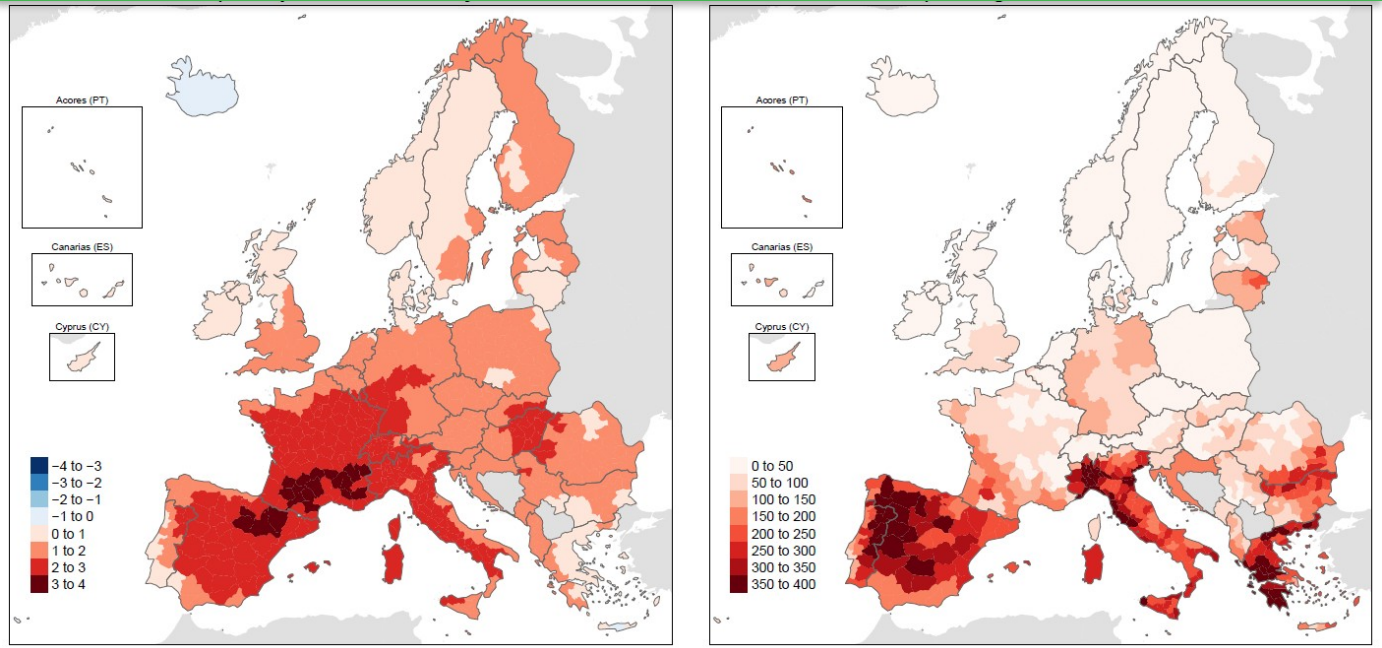

Fig. 1: Left: Temperature anomaly - Summer 2022. Right: heat-related mortality - Summer 2022 (from Ballester et al., in press, 2023)

[1] *EEA 2012*
[2] *IPCC 2021*

Objectives

- Extreme Event Attribution (EEA) aims to answer whether and to what extent an extreme event can be attributed to climate change
- Studies mostly on physical climate variables

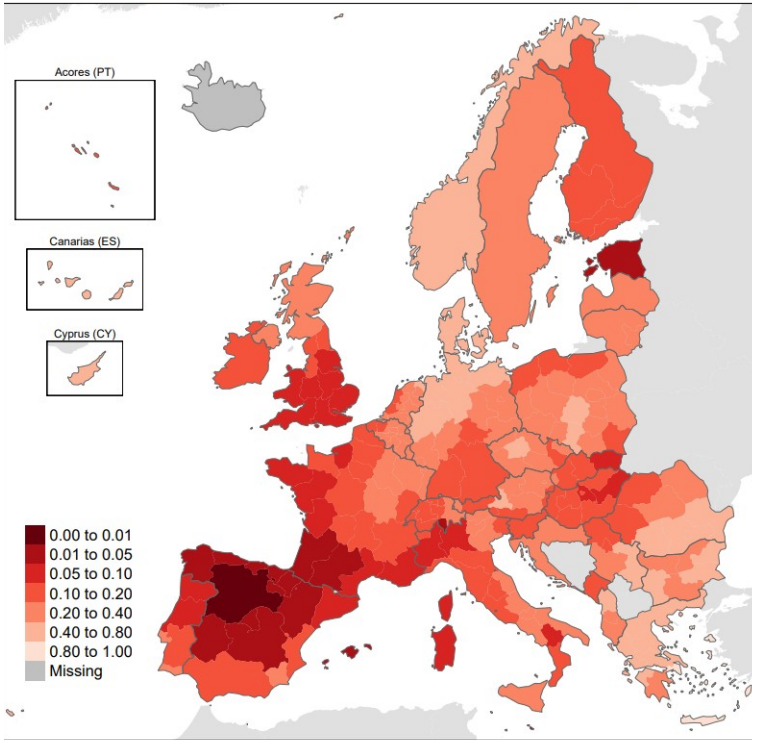

Fig. 2: Probability of the deadliest heat-related mortality

Philip et al., 2020

Methodology (1): Association between Temperature and Mortality

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- Data:
  - Temperature from ERA5-Land
  - Weekly Deaths Counts from Eurostat
- Time series analysis:
  - First Stage: quasi-Poisson regression with a distributed lag non-linear model
  - Second stage: Meta-regression analysis

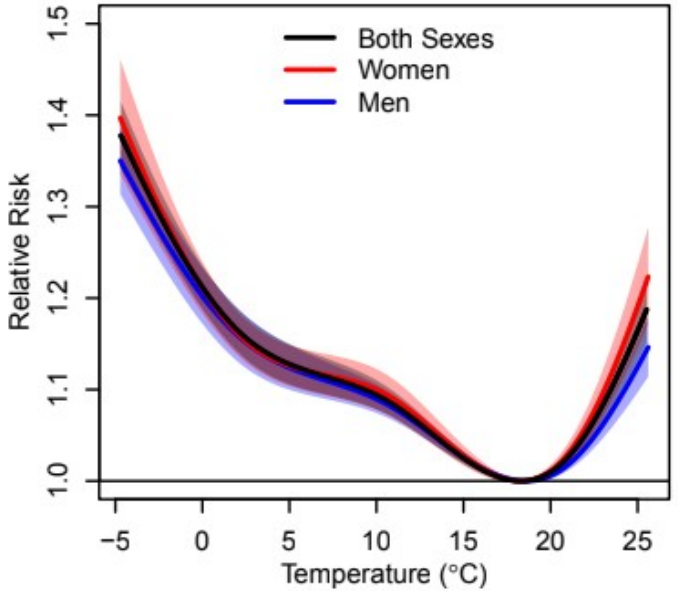

Fig. 3: Relative Mortality Risk in Europe as a function of temperature (from Ballester et al., in press, 2023)

Methodology (2): Fitting of a Generalized Extreme Value (GEV) Distribution

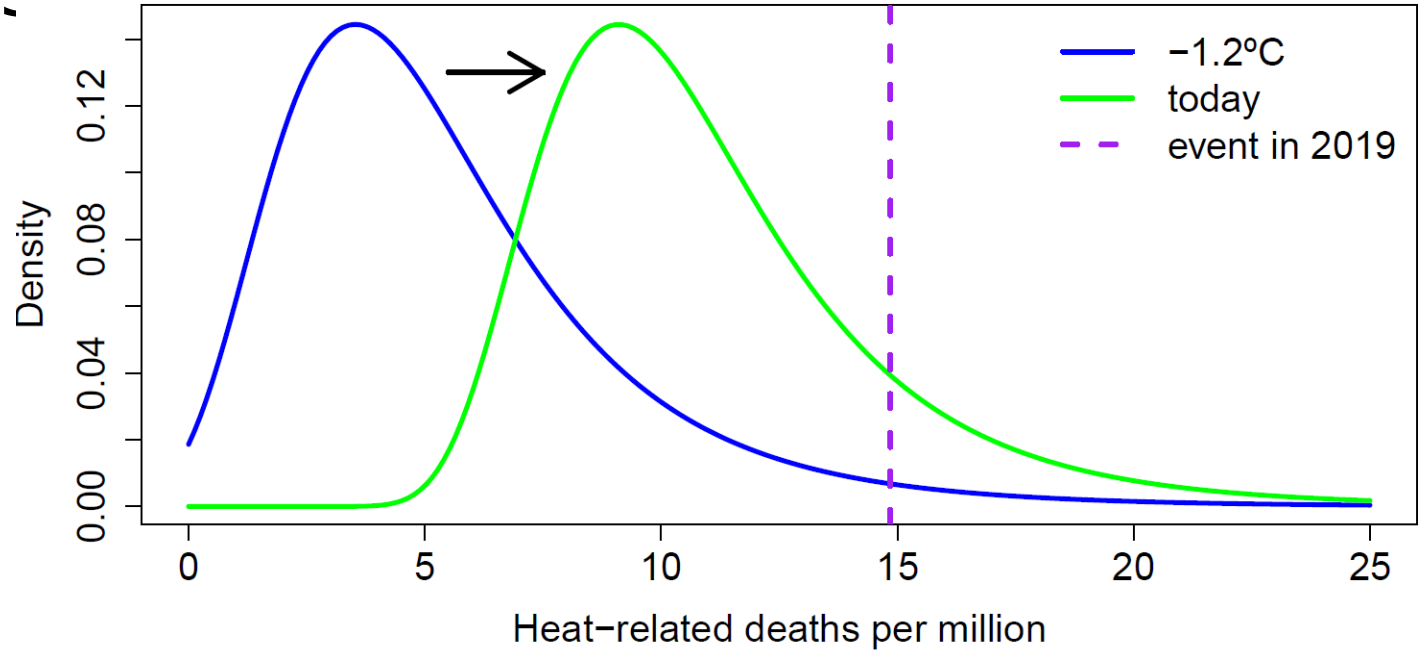

Fig. 4: Shifted GEV distribution for today`s and an -1.2ºC colder climate

Results: Probability increase of extreme heat-related mortality

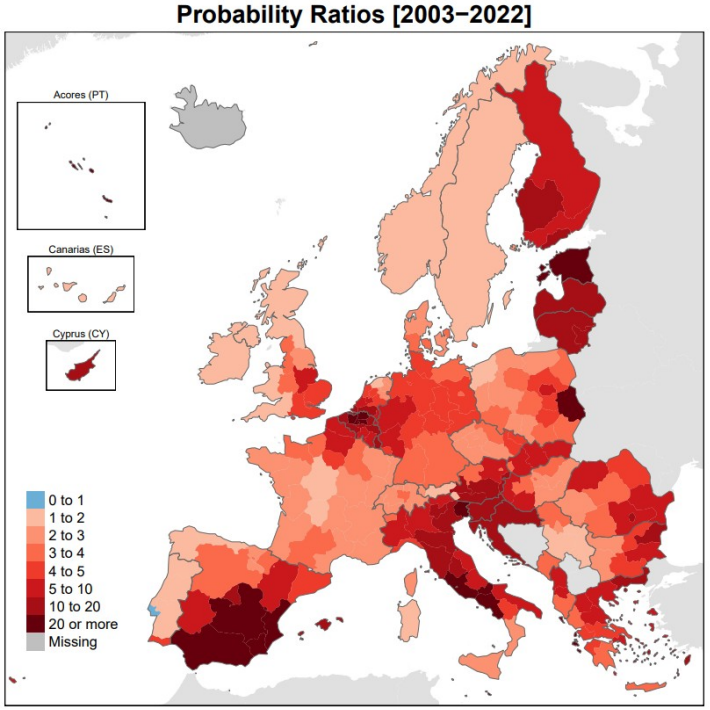

Figure 5: Median of probability ratios between 2003-2022

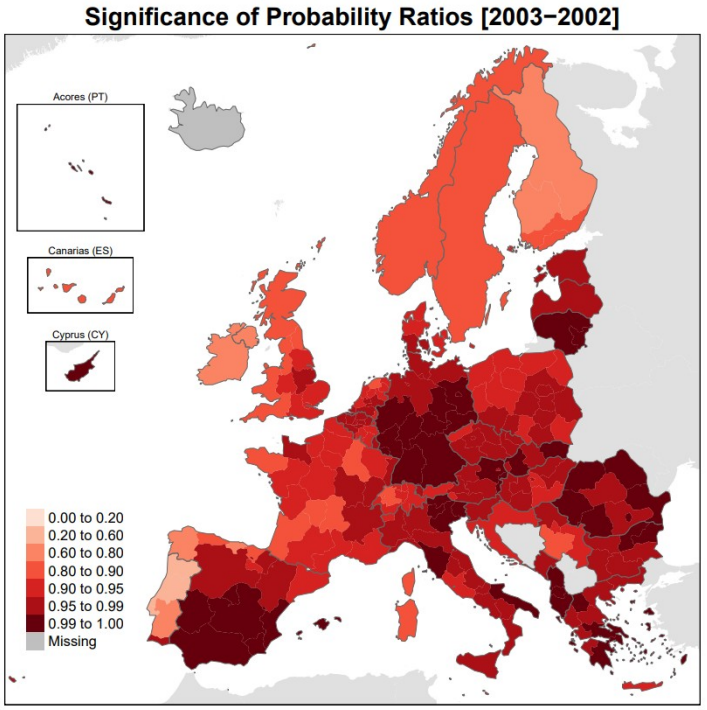

Figure 6: Fraction of probability ratios greater than one (2003-2022)

Conclusions:

- Global warming is increasing the likelihood of extreme heat-related mortality event:

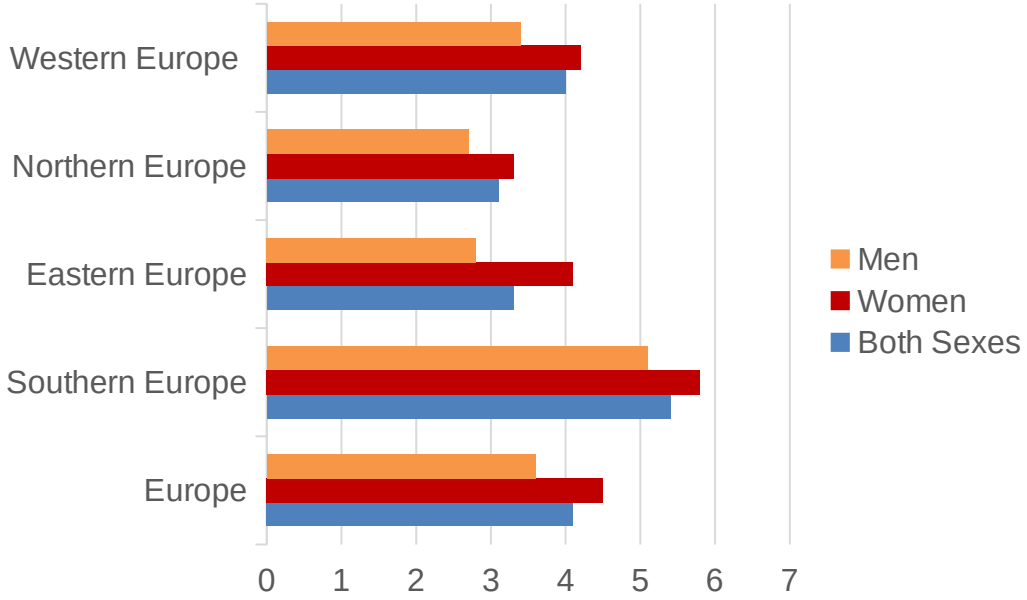

Figure 7: Probability Ratios stratisfied by sex and region

Thanks to everyone!

Feel free to contact me: thessa.beck@isglobal.org

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