

RCCN Workshop: Climate Change and Aging

**Heat (Waves), Climate Change, and
Implications for an Aging Population**

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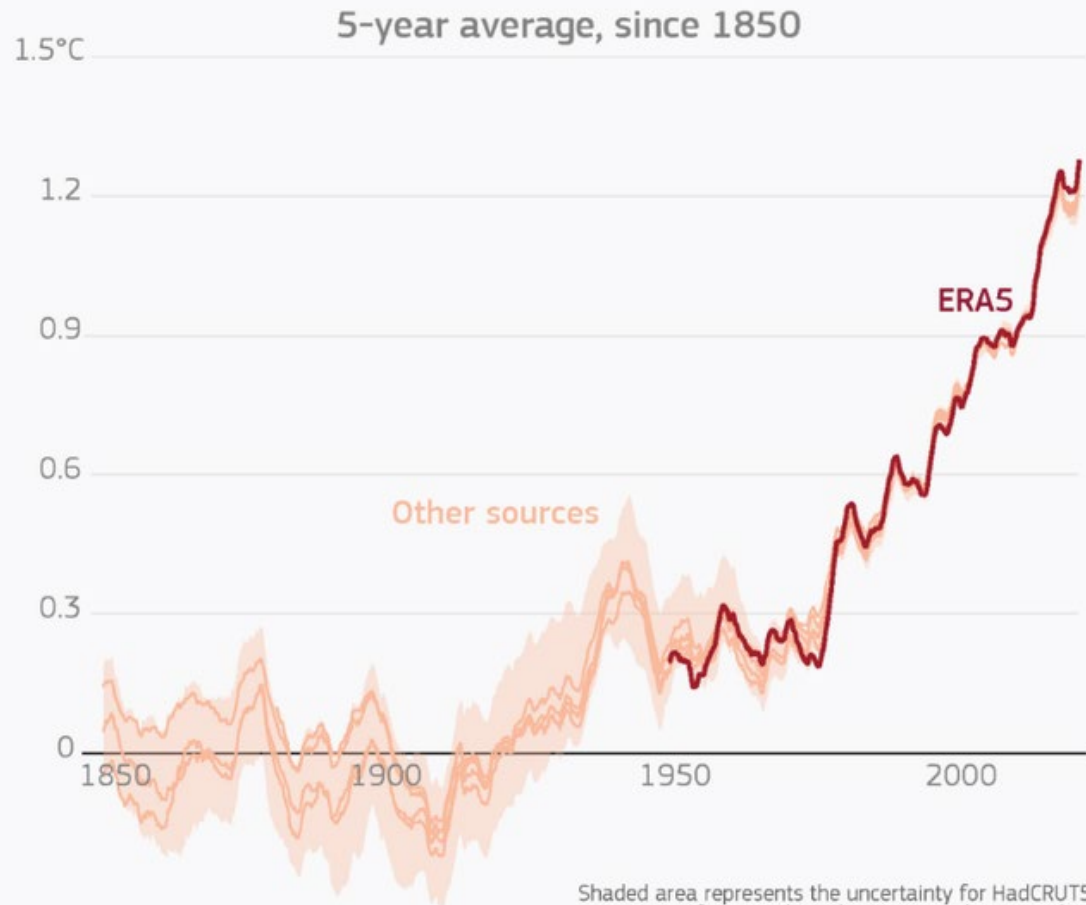
Co-Faculty Director, Yale Center on Climate Change and Health

November 12, 2024

Global average surface temperature increase

GLOBAL SURFACE TEMPERATURE: INCREASE ABOVE PRE-INDUSTRIAL LEVEL (1850-1900)

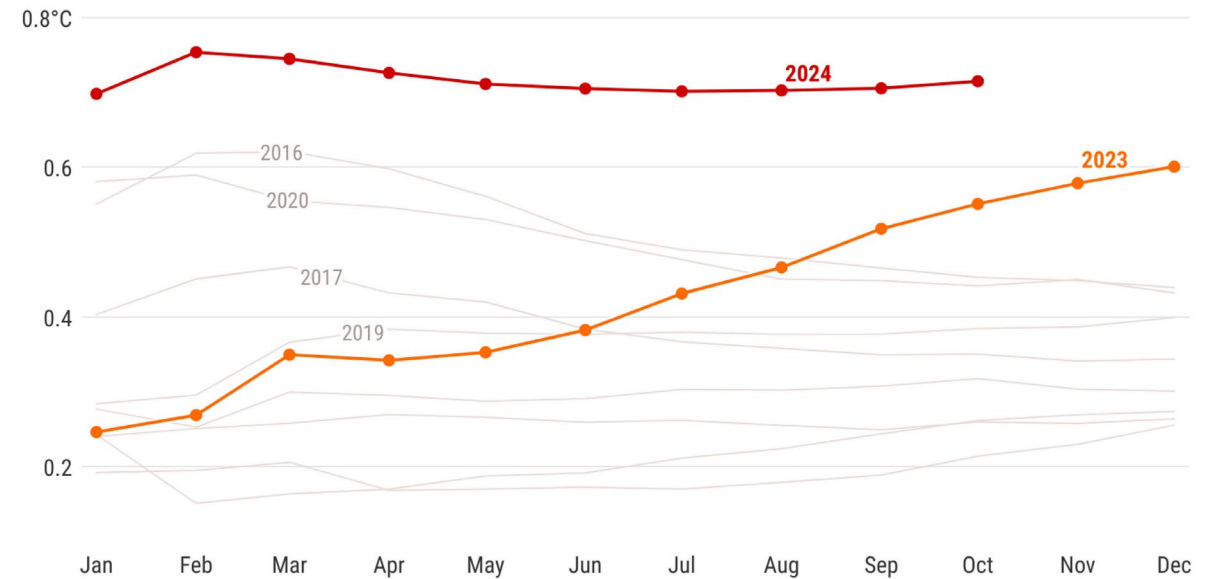
■ ERA5 data ● Other sources* (including JRA-3Q, GISTEMPv4, NOAA GlobalTempv5, Berkeley Earth, HadCRUTS)



It is virtually certain that 2024 is going to be the warmest year on record

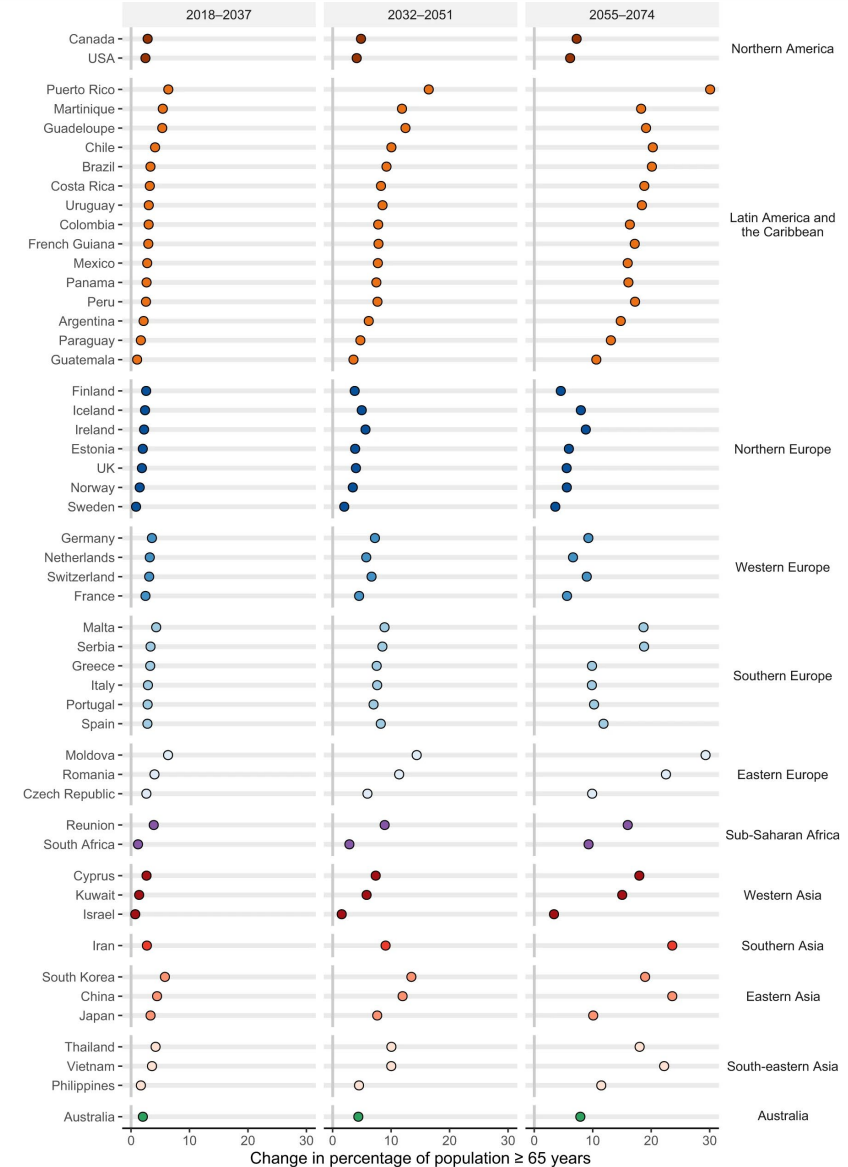
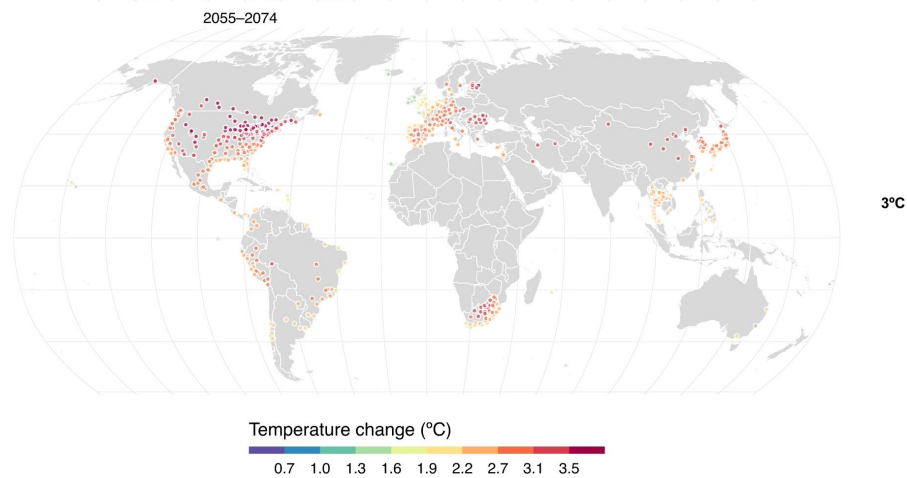
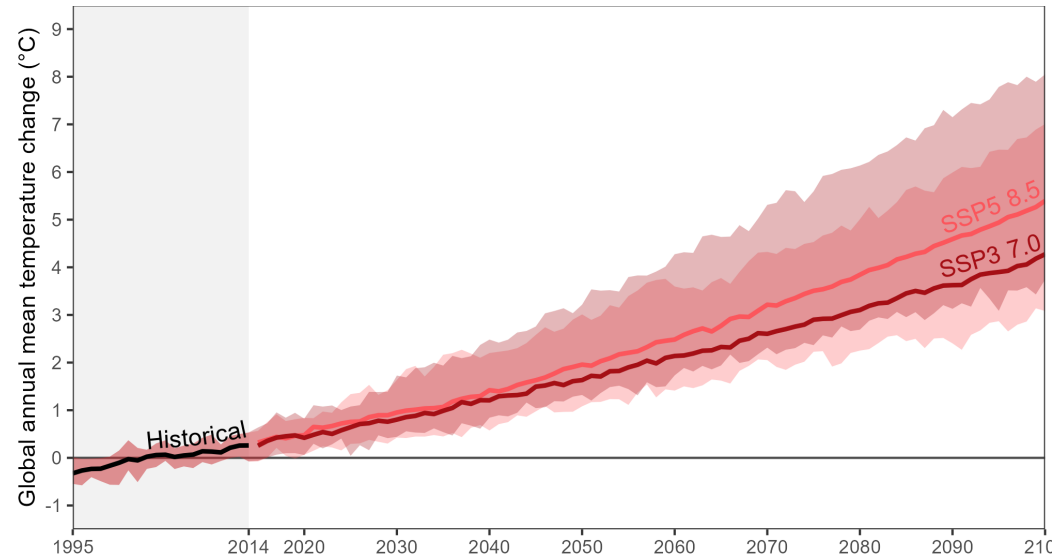
Year-to-date global surface temperature anomalies

Data: ERA5 • Reference period: 1991–2020
Credits: C3S/ECMWF



*Anomalies relative to 1991–2020 for the 10 warmest years

While the climate is warming, the world is also aging



Consideration of population aging in Climate Epidemiology



- ❖ Older adults are projected to account for higher percentages of the total population
- ❖ Older adults have **higher baseline rate** of health outcome
- ❖ Older adults are **more vulnerable** to climate-related health risks (i.e., exposure-response functions)

Health effects of heat exposure: beyond extremes

US weather

This article is more than 2 months old

Record-breaking US Pacific north-west heatwave killed almost 200 people

Officials reported 116 deaths in Oregon and 78 in Washington after extreme temperatures in normally moderate region

Victoria Bekiempis
Thu 8 Jul 2021 19:11 EDT

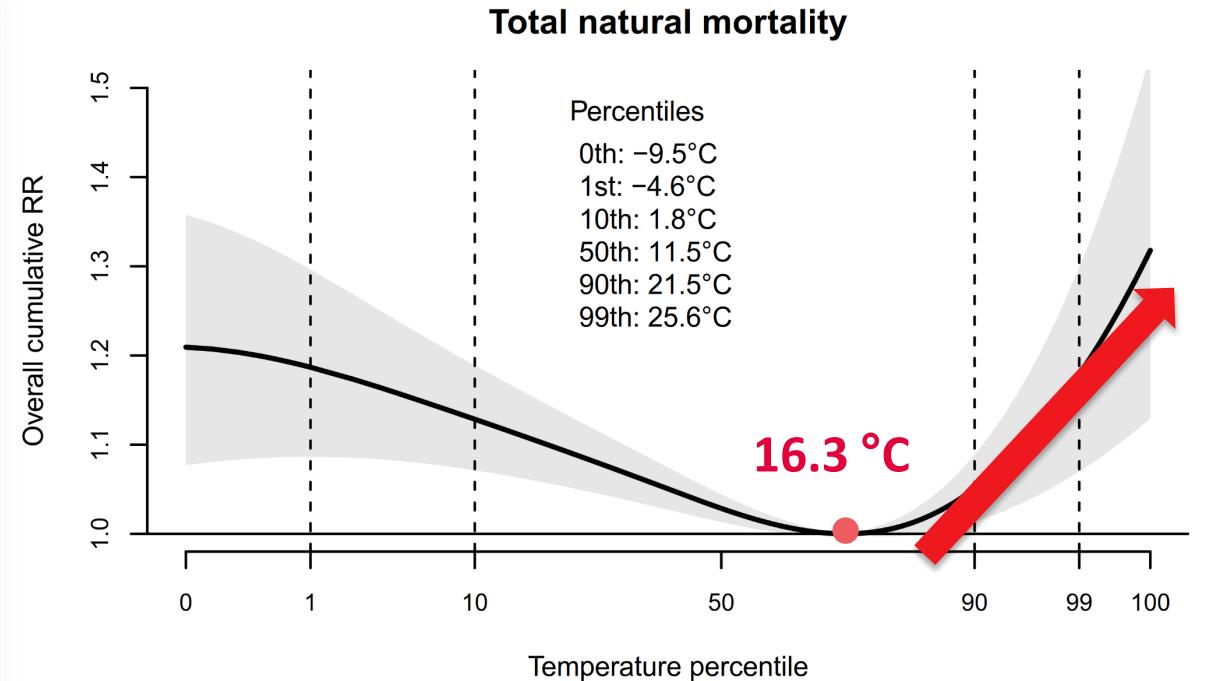



▲ People sleep at a cooling shelter set up during an unprecedented heatwave in Portland, Oregon, 27 June.
Photograph: Maranie Staab/Reuters

CNN World Africa Americas Asia Australia China Europe India Middle East United Kingdom LIVE TV Edition

More than 230 deaths reported in British Columbia amid historic heat wave

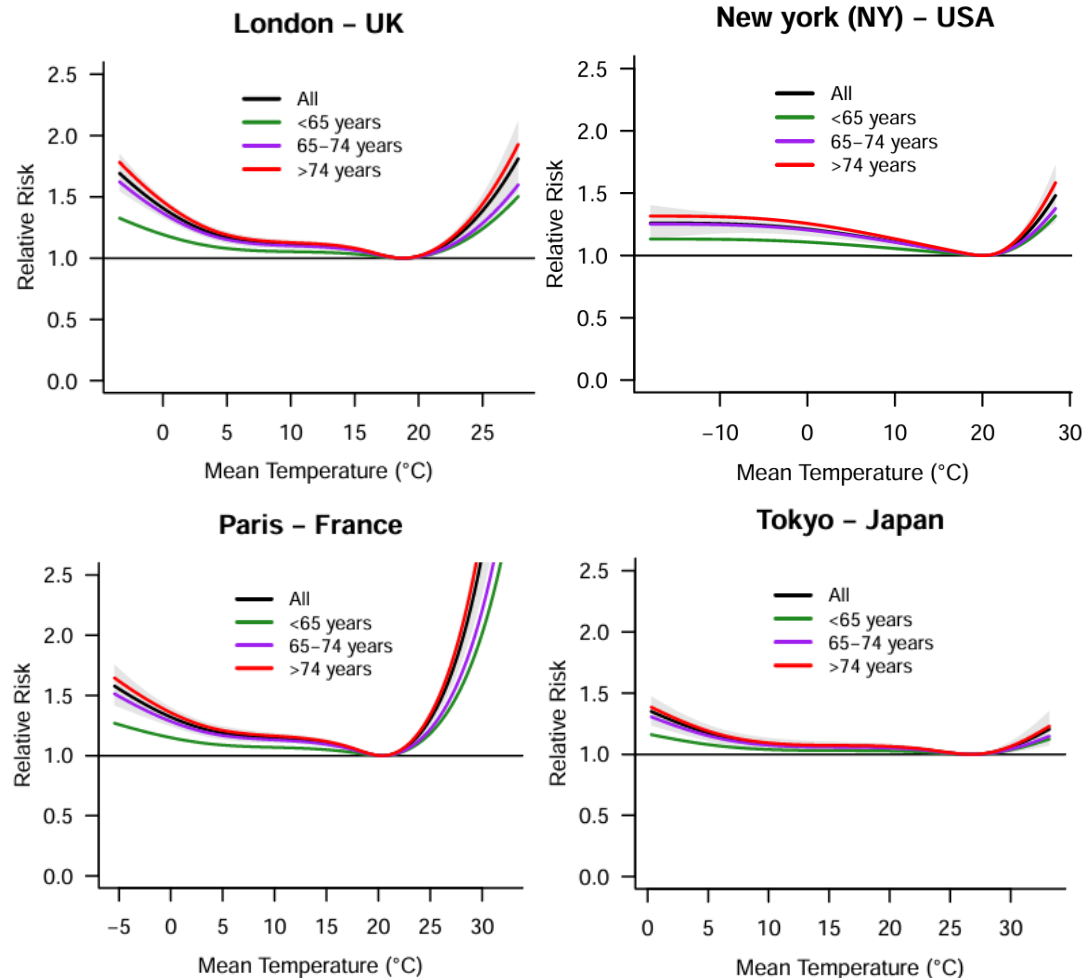
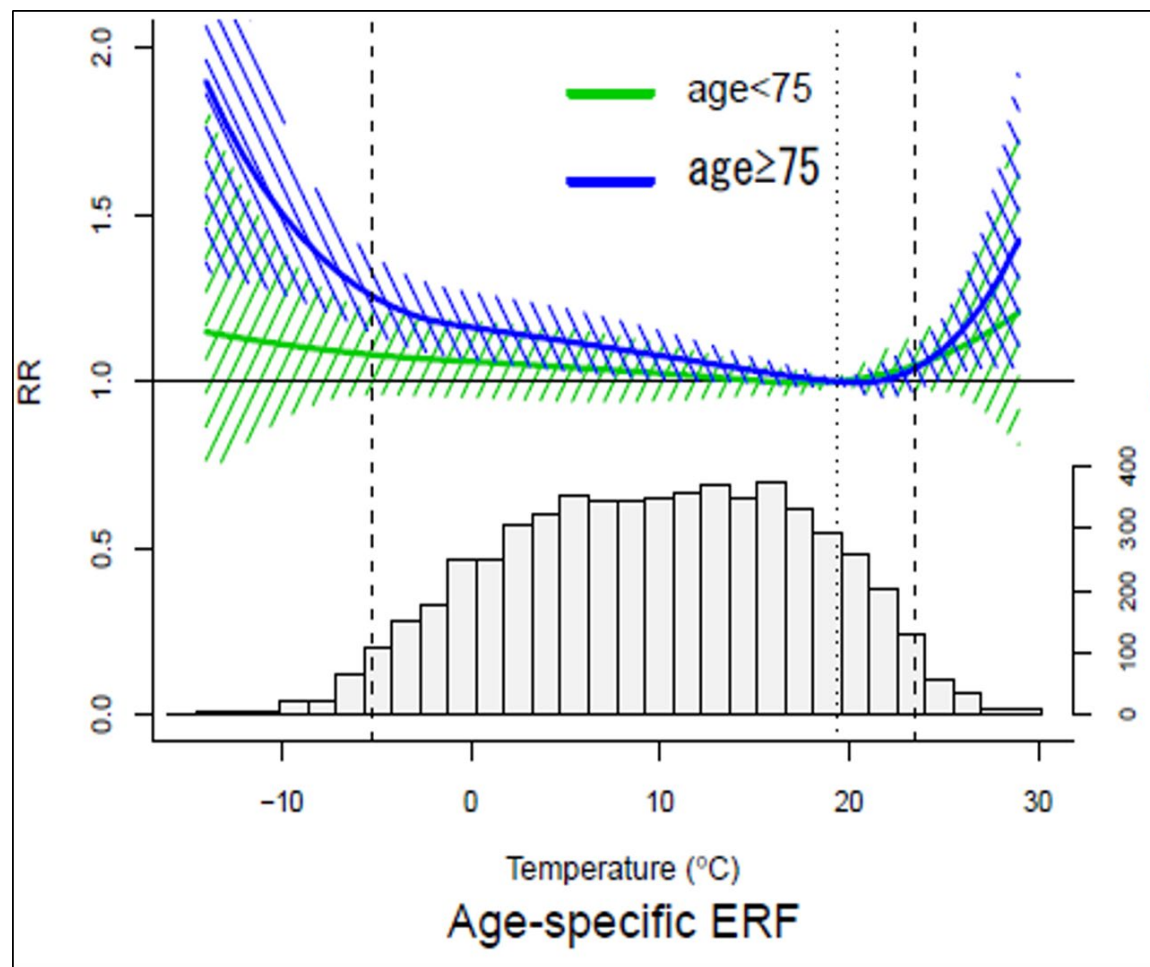
By Sarah Moon, Jon Passantino and Rebekah Riess, CNN
Updated 2:46 PM ET, Wed June 30, 2021



Heat doesn't have to reach extremes before turning deadly

- Chen et al, *Environ Int.* 2018

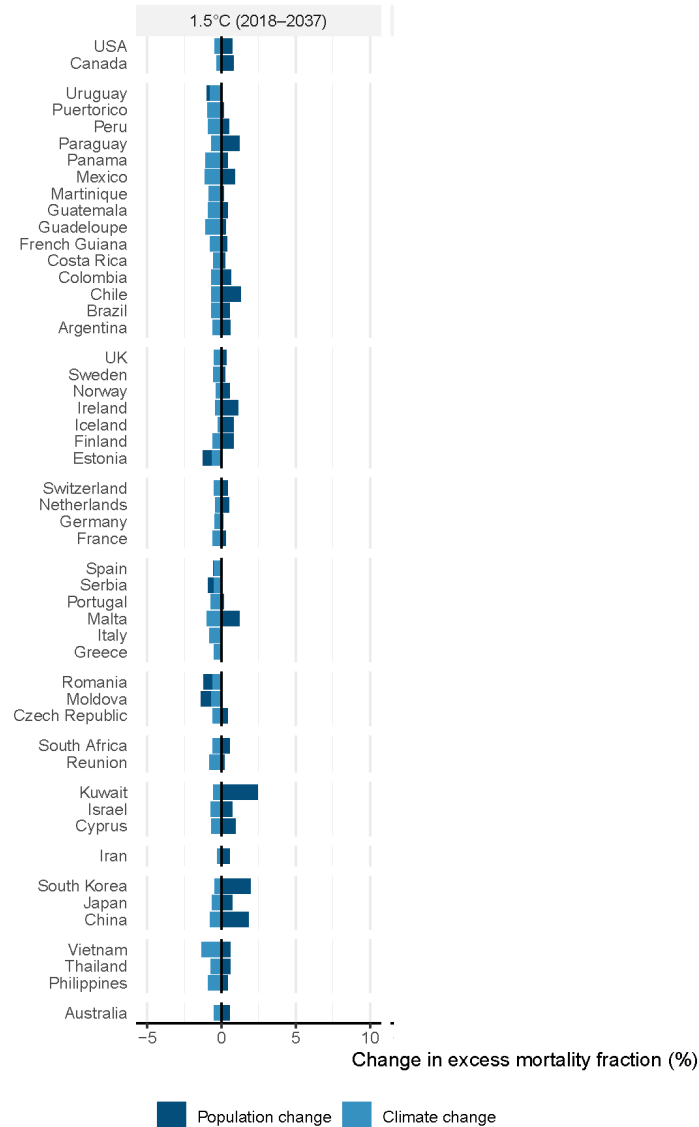
But older adults are more vulnerable to both heat and cold



- Rai et al, *Environ Res Lett*, 2019; Chen et al, *Nature Communications*. 2024

Population aging will amplify future cold- and heat-related mortality burden in 800 locations from 50 countries/regions

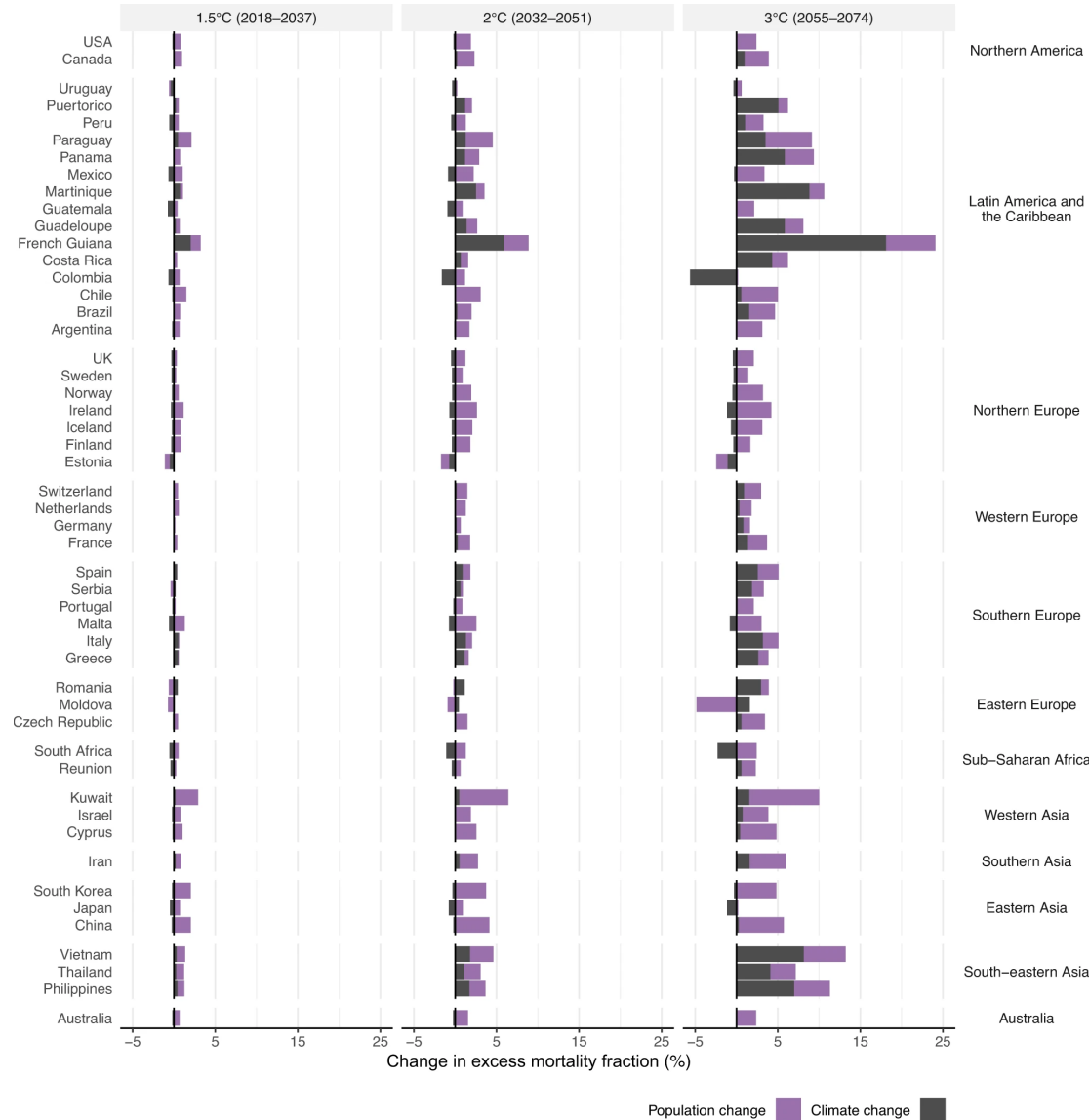
Net increase in cold-related mortality: 0.1%–0.4% at 1.5–3 °C global warming.



0.5% ↑ 1.0% ↑ 2.5% ↑

- **Chen et al, *Nature Communications*. 2024**

Larger role of population aging compared to climate change



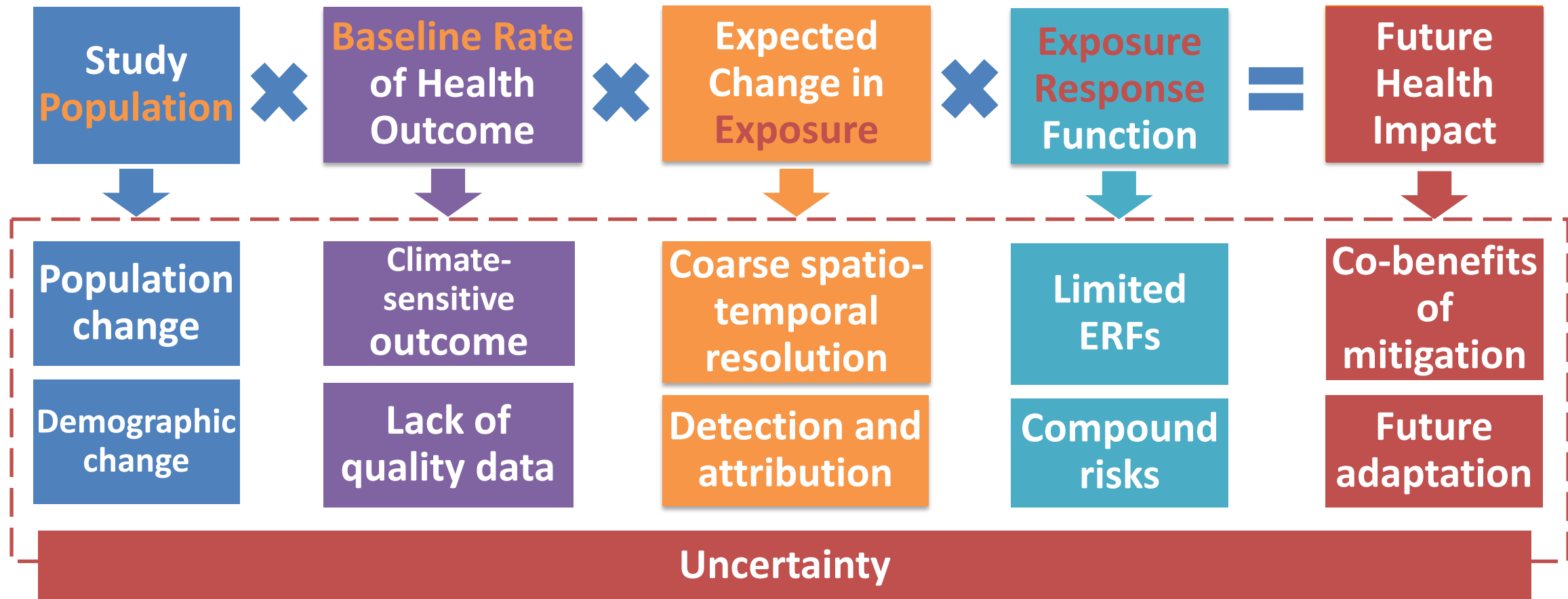
At 3 degree C warming,

Climate change → 3%

Population aging → 97%

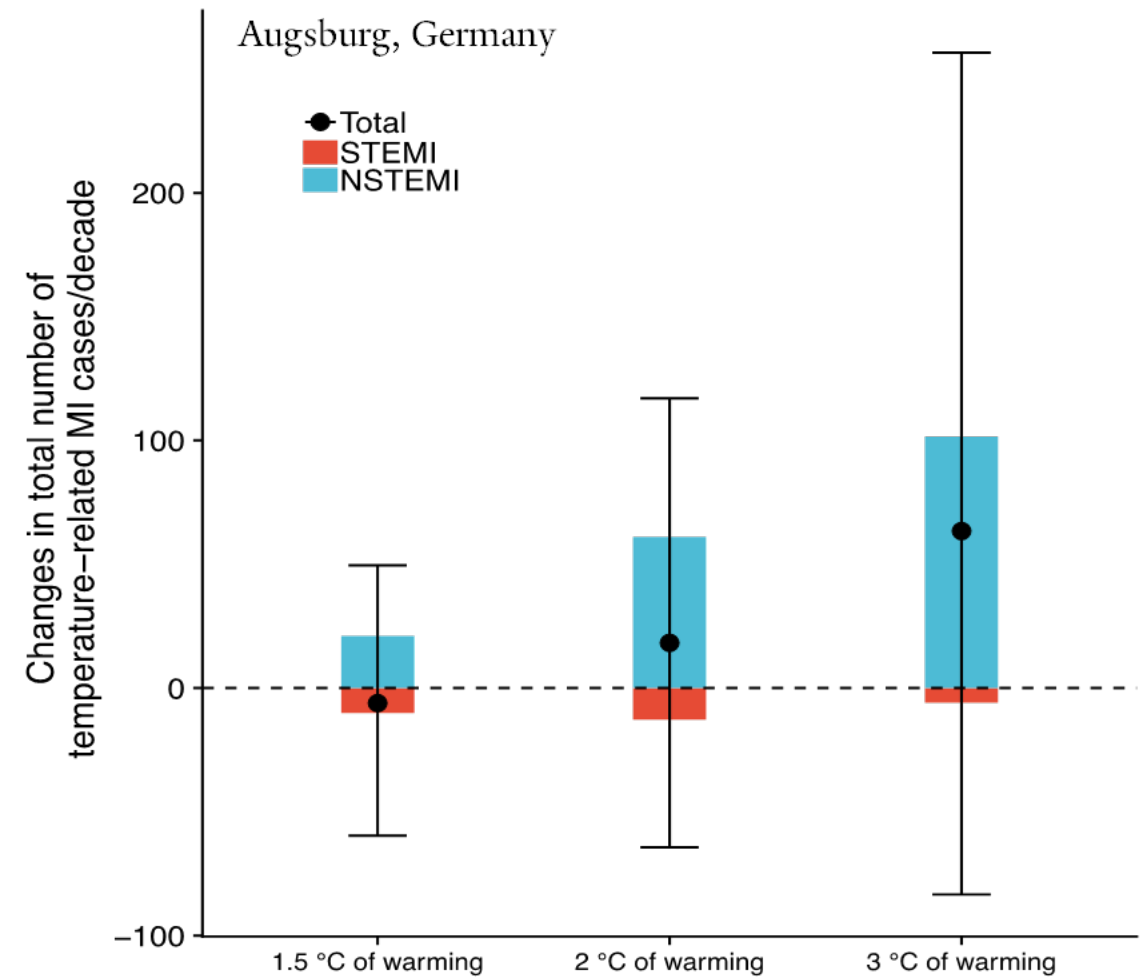
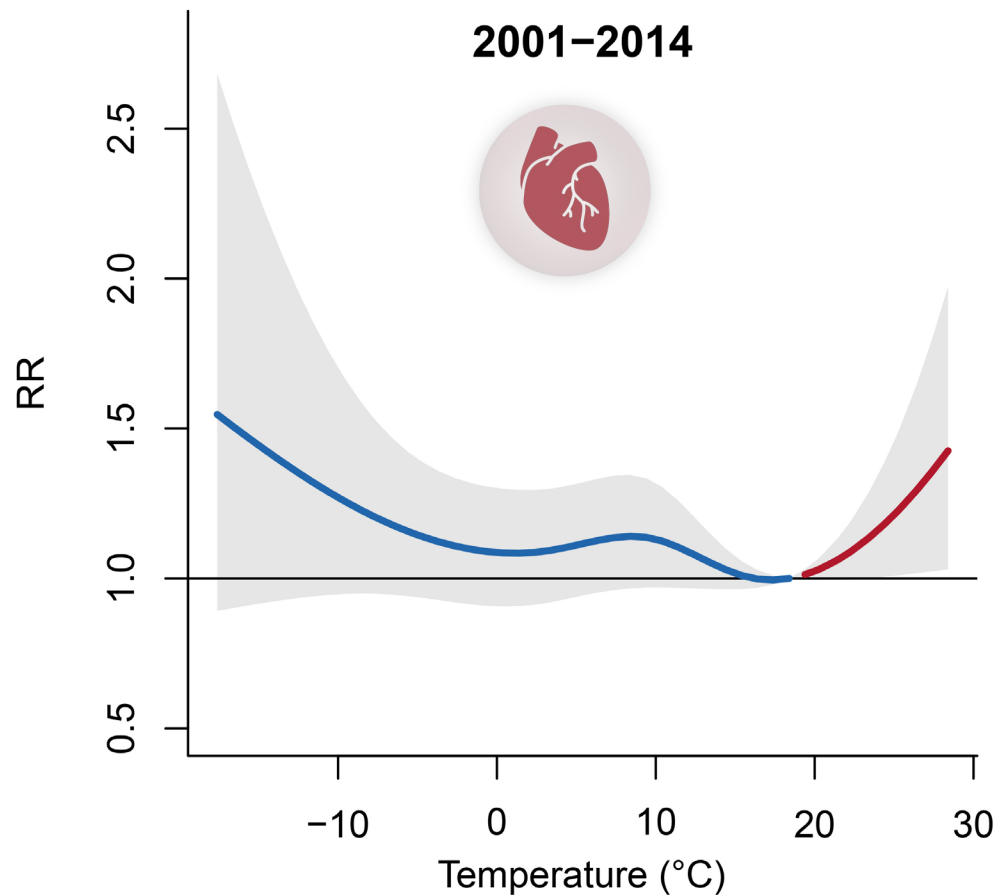
- Chen et al, *Nature Communications*. 2024

Challenges and opportunities in assessing future health impacts of climate change on an aging population



Beyond mortality outcome: Heat triggers more heart attacks

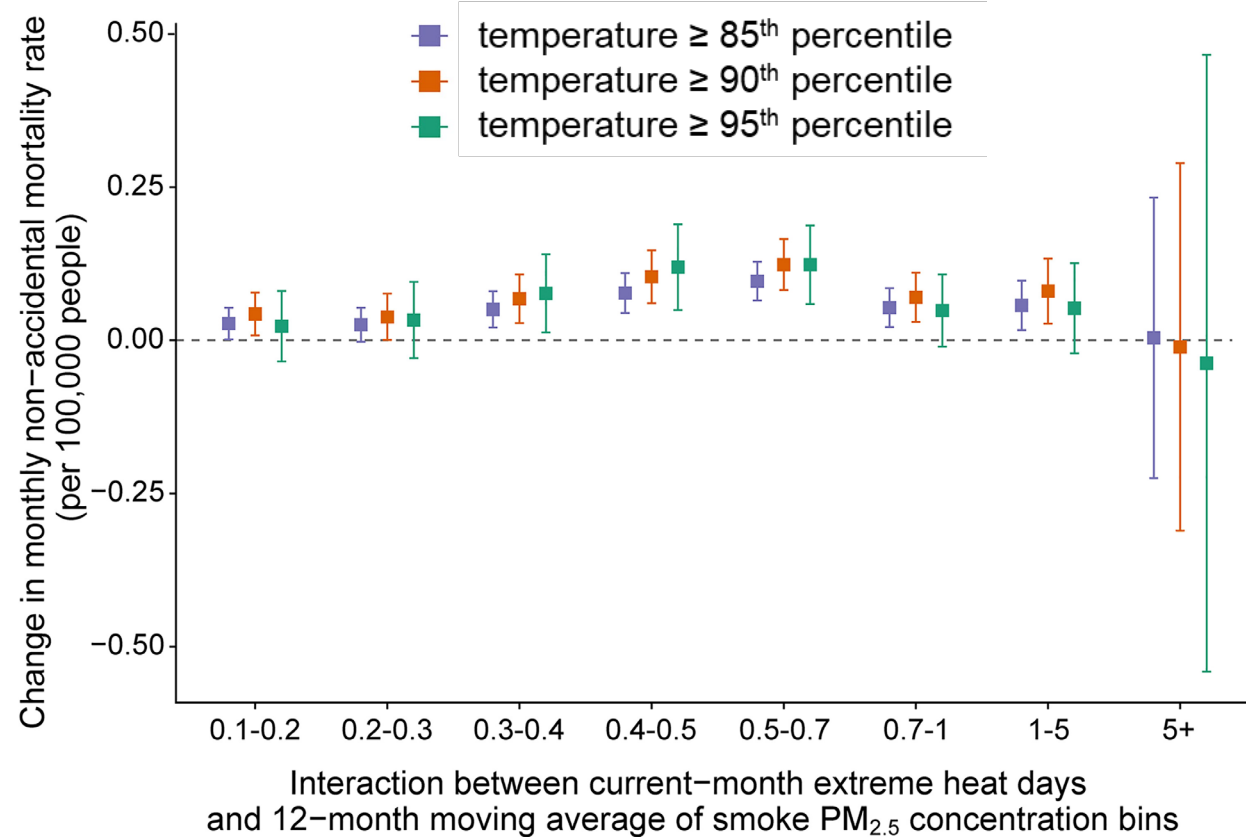
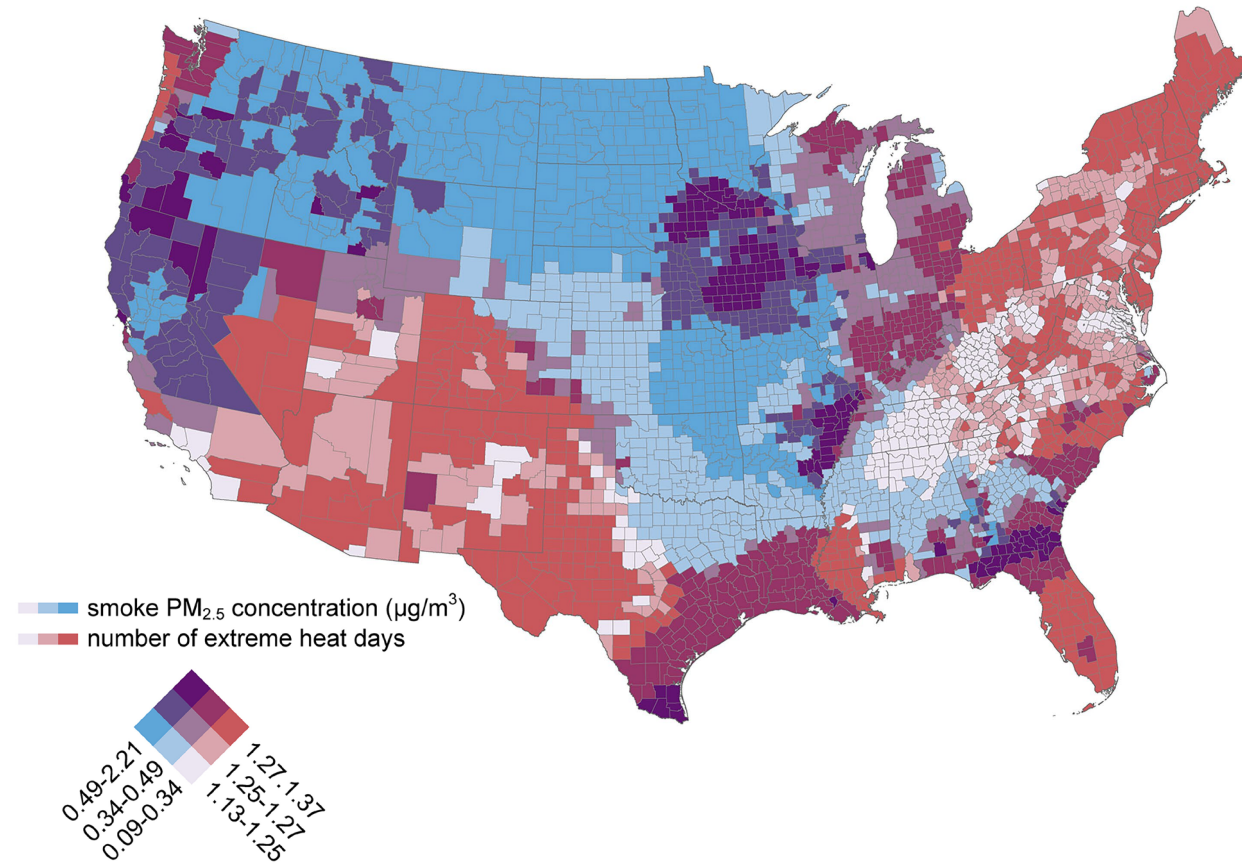
Myocardial Infarction Registry in Augsburg, Germany [Mean age: 62.3 yr]



- **Chen** et al, *Eur Heart J*, 2019; **Chen** et al, *Dtsch Arztebl International*, 2019 .

Co-occurring extreme heat increased the health effects of wildfire smoke PM_{2.5} on mortality

A



- Ma et al, *Proc Natl Acad Sci USA*. 2024.

Acknowledgement



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and Blood Institute



Reckitt Global
Hygiene Institute



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Studies



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Thank you!

