

Publication

A multi-country analysis on potential adaptive mechanisms to cold and heat in a changing climate

JournalArticle (Originalarbeit in einer wissenschaftlichen Zeitschrift)**ID** 4160237**Author(s)** Vicedo-Cabrera, Ana M.; Sera, Francesco; Guo, Yuming; Chung, Yeonseung; Arbuthnott, Katherine; Tong, Shilu; Tobias, Aurelio; Lavigne, Eric; de Sousa Zanotti Stagliorio Coelho, Micheline; Hilario Nascimento Saldiva, Paulo; Goodman, Patrick G.; Zeka, Ariana; Hashizume, Masahiro; Honda, Yasushi; Kim, Ho; Ragettli, Martina S.; Rösli, Martin; Zanobetti, Antonella; Schwartz, Joel; Armstrong, Ben; Gasparrini, Antonio**Author(s) at UniBasel** [Ragettli, Martina](#) ; [Rösli, Martin](#) ;**Year** 2017**Title** A multi-country analysis on potential adaptive mechanisms to cold and heat in a changing climate**Journal** Environment International**Volume** 111**Pages / Article-Number** 239-246

Temporal variation of temperature-health associations depends on the combination of two pathways: pure adaptation to increasingly warmer temperatures due to climate change, and other attenuation mechanisms due to non-climate factors such as infrastructural changes and improved health care. Disentangling these pathways is critical for assessing climate change impacts and for planning public health and climate policies. We present evidence on this topic by assessing temporal trends in cold- and heat-attributable mortality risks in a multi-country investigation.; Trends in country-specific attributable mortality fractions (AFs) for cold and heat (defined as below/above minimum mortality temperature, respectively) in 305 locations within 10 countries (1985-2012) were estimated using a two-stage time-series design with time-varying distributed lag non-linear models. To separate the contribution of pure adaptation to increasing temperatures and active changes in susceptibility (non-climate driven mechanisms) to heat and cold, we compared observed yearly-AFs with those predicted in two counterfactual scenarios: trends driven by either (1) changes in exposure-response function (assuming a constant temperature distribution), (2) or changes in temperature distribution (assuming constant exposure-response relationships). This comparison provides insights about the potential mechanisms and pace of adaptation in each population.; Heat-related AFs decreased in all countries (ranging from 0.45-1.66% to 0.15-0.93%, in the first and last 5-year periods, respectively) except in Australia, Ireland and UK. Different patterns were found for cold (where AFs ranged from 5.57-15.43% to 2.16-8.91%), showing either decreasing (Brazil, Japan, Spain, Australia and Ireland), increasing (USA), or stable trends (Canada, South Korea and UK). Heat-AF trends were mostly driven by changes in exposure-response associations due to modified susceptibility to temperature, whereas no clear patterns were observed for cold.; Our findings suggest a decrease in heat-mortality impacts over the past decades, well beyond those expected from a pure adaptation to changes in temperature due to the observed warming. This indicates that there is scope for the development of public health strategies to mitigate heat-related climate change impacts. In contrast, no clear conclusions were found for cold. Further investigations should focus on identification of factors defining these changes in susceptibility.

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