

Supplementary material for
Diverse impacts of sudden stratospheric warming related cold spells
in 2018 on mortality in the Nordics and the United Kingdom

Philip Rupp¹, Liliana Vázquez Fernández^{2,3}, William J. M. Seviour⁴, and Thomas Birner^{1,5}

¹Meteorological Institute Munich, Ludwig Maximilian University, Munich, Germany

²Division for Climate and Environmental Health, Norwegian Institute of Public Health,
Oslo, Norway

³Department of Biostatistics, Institute of Basic Medical Sciences, University of Oslo, Oslo,
Norway

⁴Department of Mathematics and Statistics and Global Systems Institute, University of
Exeter, Exeter, UK

⁵Division for Climate and Environmental Health, Norwegian Institute of Public Health,
Oslo, Norway

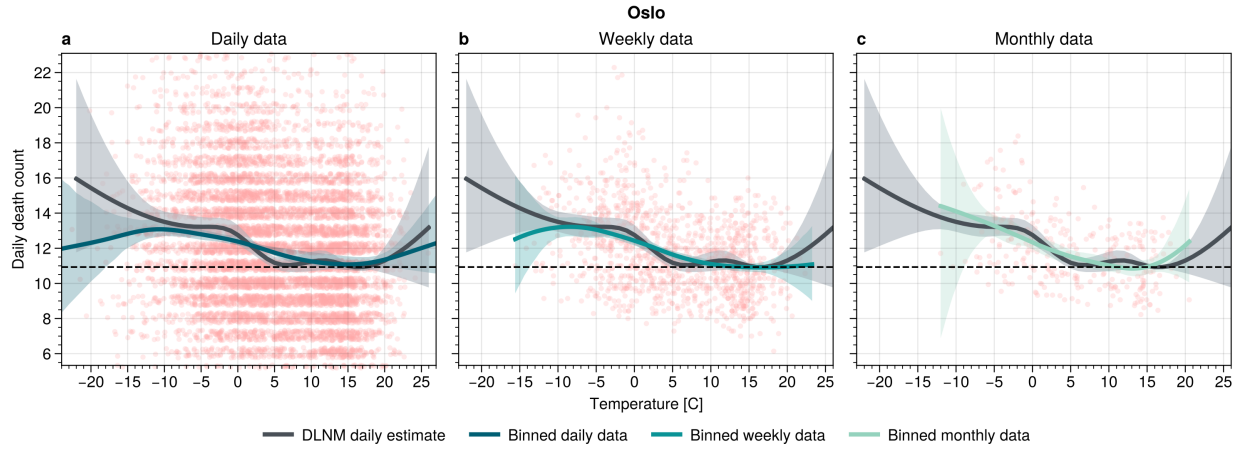


Figure S1: Exposure-response curves for Oslo based on input data as (a) daily, (b) weekly and (c) monthly average. Red dots show death counts versus temperature distribution at the corresponding temporal resolution. Lines show the exposure-response curves using the DLNM or binning approach, with shading indicating the 95% confidence interval. The DLNM line is the same in every panel and is based on daily data only. Horizontal dashed lines indicate the MMT base death count. Some small scale noise is added to daily death counts in (a) to improve the visualisation of discrete data.

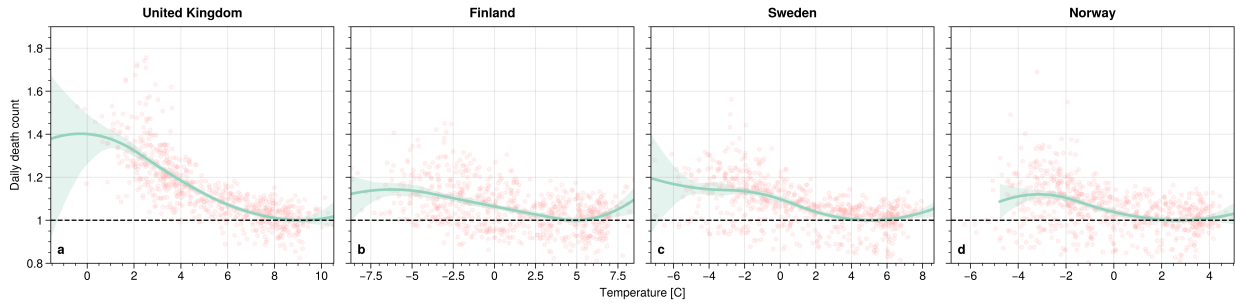


Figure S2: Exposure-response curves showing temperature as monthly means and associated mortality risk for different countries based on the EuroStats dataset. Shading indicates the 95% confidence interval. Red dots show the same-month relationship (i.e. without lag) of temperature and mortality, where death count is normalised by the value at the MMT.

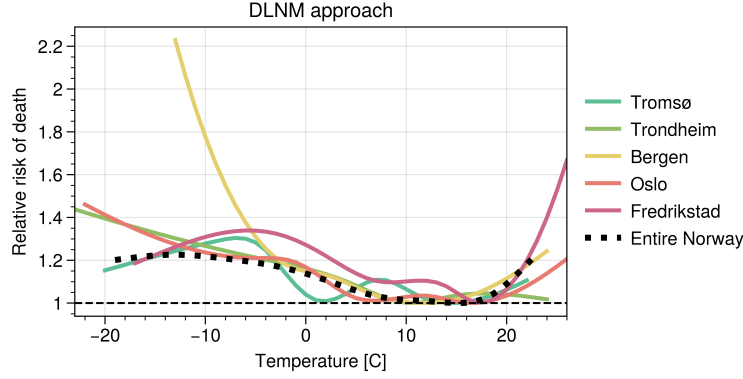


Figure S3: Exposure-response curves for mortality risk as function of temperature for different cities in Norway based on the DLNM approach. Regions are roughly sorted from North (colder colours) to South (warmer colours). The x-range of each curve is determined by the observed range of temperature values. Dashed line gives mortality model based on country-level data for entire Norway.

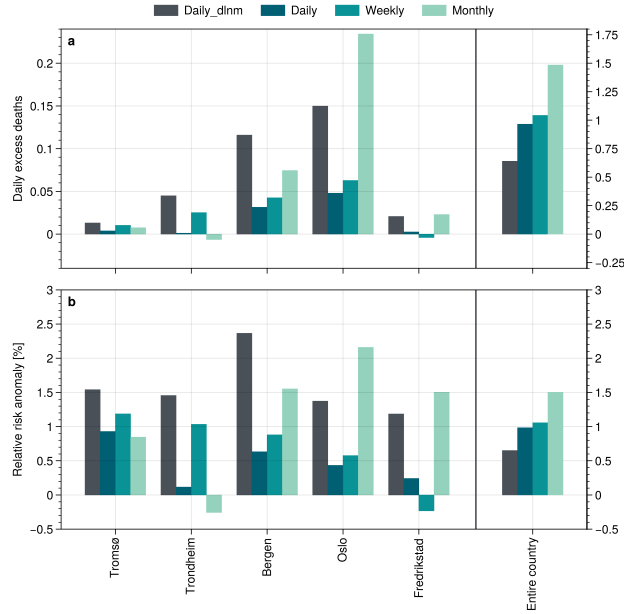


Figure S4: Attributable SSW impacts on mortality for different Norwegian regions. Shown are (a) the daily excess deaths and (b) the relative risk anomaly, both estimated as MMM difference between nudged and control experiments and averaged over the 30 days following the SSW onset. Different bars are based on different exposure-response models, with the DLNM using daily input data and binning approach using daily, weekly, or monthly data. Total death rates for and risk anomaly are computed separately based on country-level data for Norway.