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Additional information
Supplementary Information is available in the online version of the paper.

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CORRESPONDENCE:

A note of caution about the excess winter deaths measure

To the Editor — The Letter by Staddon *et al.*[1] draws the emphatic conclusion that "climate warming will not decrease winter mortality" based on an analysis of the determinants of annual excess winter deaths (EWDs) — a measure derived by considering the number of deaths occurring during the period December–March compared with other periods during the year. Although there is value in characterizing interannual variations in cold-risk, to attempt this using EWDs is flawed as it is an inappropriate metric with which to draw conclusions about weather-related health impacts associated with either current or future climate.

As the authors report, not all EWDs are due to cold weather; but it is also the case that not all deaths due to cold weather are restricted to these four months. Cold-related deaths also occur on days with moderate temperatures falling outside this period, and these deaths bias the EWD measure because they unavoidably contribute to the comparison months in the calculation. Owing to the greater frequency of moderate temperature days, the number of cold-related deaths associated with these days is far from small — for example, in London over 70% of all cold-related deaths occur on days warmer than 5 °C, based on models adjusted for seasonal factors[2]. The calculation of EWDs is also sensitive to unusual mortality patterns occurring at other times of the year; this is particularly pertinent for any statements about future climate change because increasing heat-related deaths in the summer months would mean that a winter mortality index ostensibly reduces even if the true winter burden remains the same. Furthermore, winter and summer burdens may not be independent[3].

For these reasons, epidemiologists use more sophisticated techniques that account for seasonal factors and quantify the specific contribution of weather variables, rather than a seasonal excess. There may have been some confusion about this distinction, as Staddon *et al.* quoted studies that did not assess EWDs[4,5], incorrectly stating that they did. The authors also note similarities in EWDs across regions, although regional differences in cold-related risk are well established[6]. Typically, day-to-day associations are analysed using these epidemiologic methods, but for sufficiently long series the analysis can be applied to annual data to assess longer-term impacts. So, for a credible assessment of changes in population response to cold over time, quantification of cold-specific risk for each year being studied is needed rather than calculations of EWDs — analysis of the latter shouldn't be used to draw conclusions about the former.

Studies analysing relatively recent data confirm that most of the seasonal excess in mortality is related to cold, with a smaller component attributable to influenza and other factors[7]. Moreover, empirically-based assessments of future climate change impacts for the UK, which consider specific characterizations of cold-risk, project a reduction in future cold-related health burdens due to milder winters[8–10]. Indeed, a look at the supplementary material of a more recent *Nature Climate Change* Letter reveals the same finding[11]. Climate change is an important public health challenge for the UK and elsewhere and policymakers need to be informed by the best available evidence on the probable harms and benefits to human health. ❐

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