



Llywodraeth Cymru
Welsh Government

Science Evidence Advice (SEA)

Exploring the effect of temperature on mortality, Wales

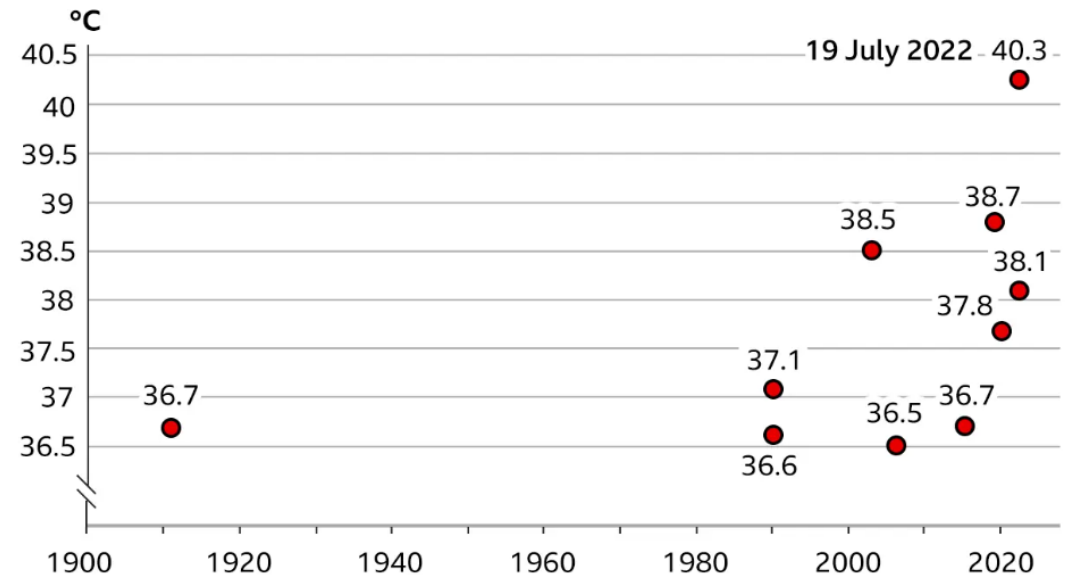
5 September 2024



Background

- Temperatures vary considerably in the UK between Summer and Winter, and between different parts of the UK.
- 2022 was the warmest year on record for the UK. The ten warmest years for the UK have occurred in the 21st century.
- Despite the warmer months getting warmer in recent years, we rarely hear of deaths relating to higher temperatures.
- We will explore deaths attributed to relative extremes of temperatures in Wales due to both higher and lower than optimum temperatures for human health.

Top 10 hottest UK days on record



Source: Met Office

BBC

Sources:

1. [2022 provisionally warmest year on record for UK - Met Office](#)
2. [Annual 2020 Global Climate Report | National Centers for Environmental Information \(NCEI\) \(noaa.gov\)](#)
3. [Heatwave: The UK and Europe's record temperatures in maps and charts - BBC News \[2022\]](#)



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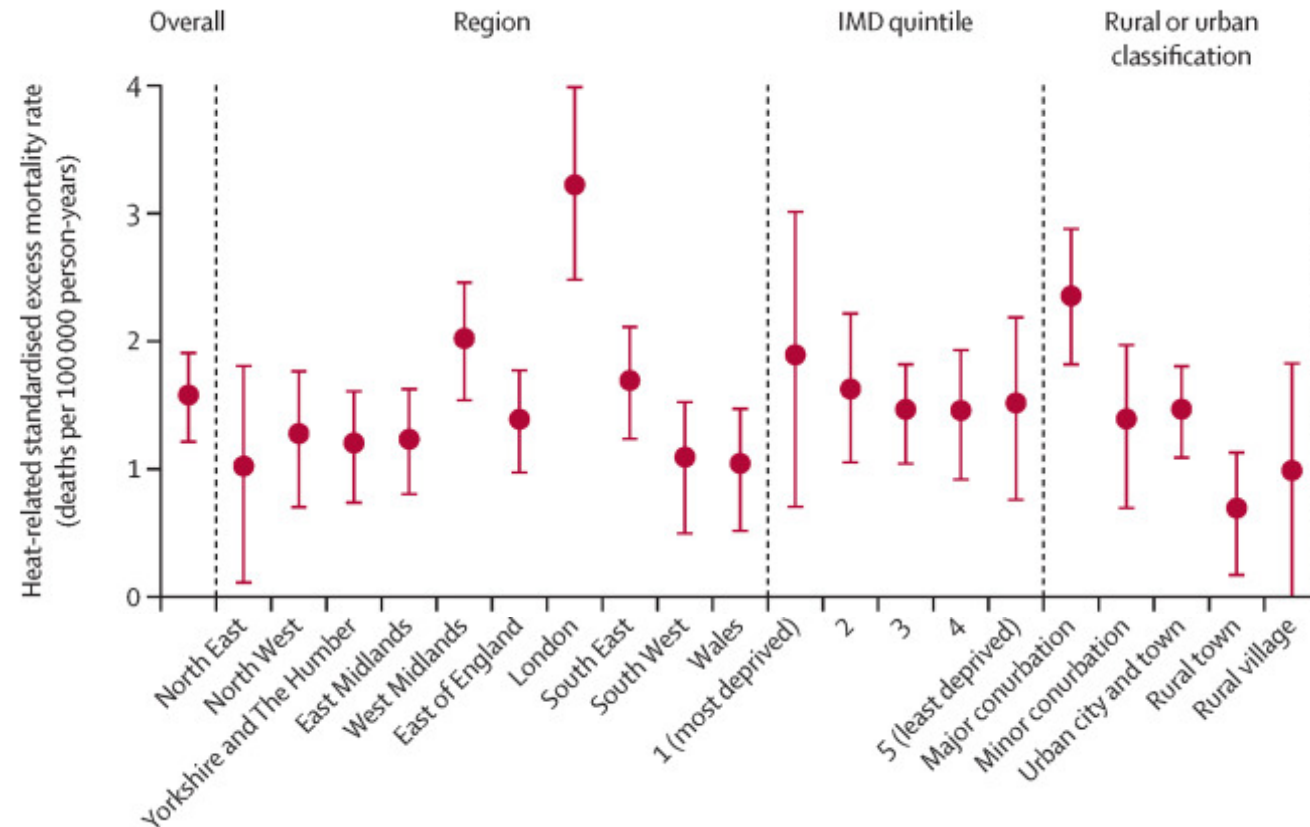
Heat-related deaths



Comparison of heat-related excess deaths, 2000 to 2019

- Wales has a similar rate of heat-related excess deaths compared to other regions in England except for London.
- 31 deaths per year in Wales on average 2000 to 2019.
- Those living in major conurbations have the highest heat-related excess mortality rates whilst those in rural areas are lowest.
- The excess death mortality rates are similar across all deprivation quintiles.

Standardised mortality rates attributable to heat, England and Wales, 2000-2019



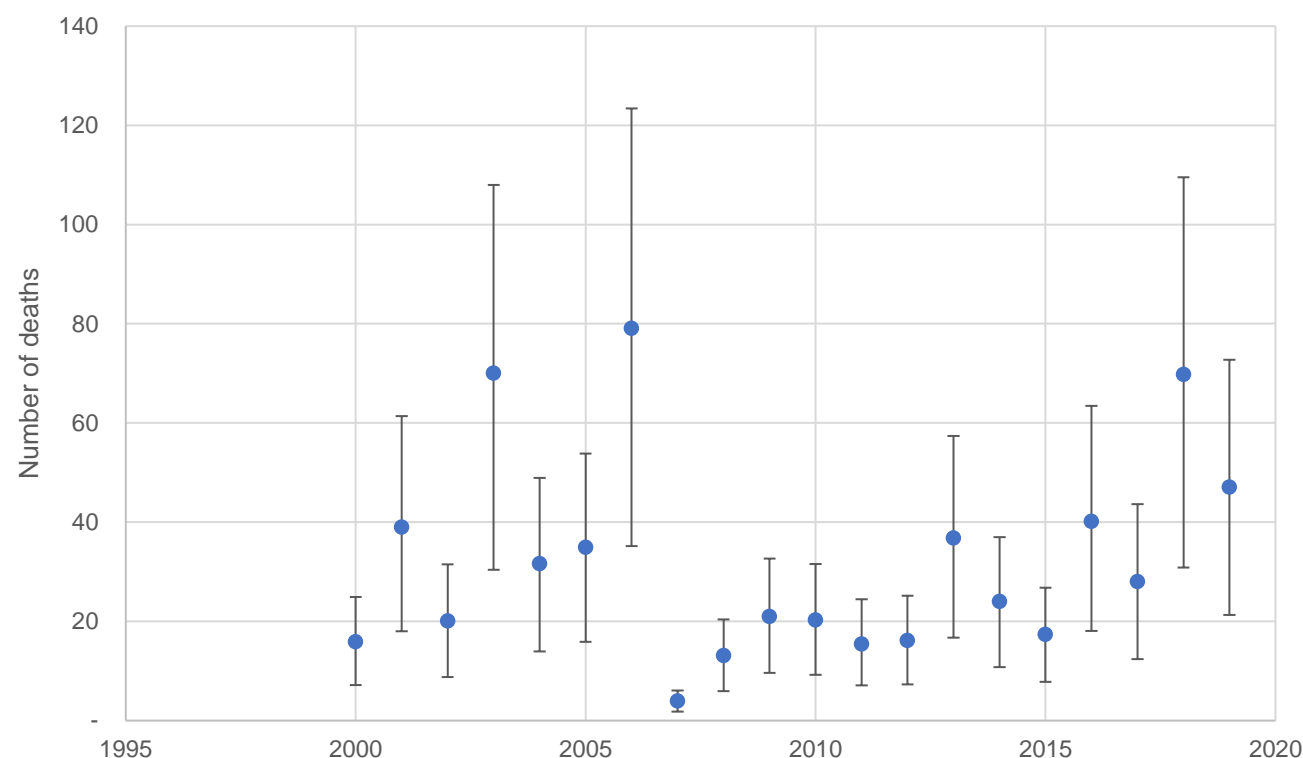
Heat-related excess deaths over time, 2000-2019



Using Lancet and ONS England data and applying a ratio, there were an estimated 643 heat-related excess deaths over the 2000-2019 period which equated to 0.1% of all Wales deaths registered between 2000 and 2019.

- The number of estimated annual heat-related excess deaths range from around 4 deaths (in 2007) to 79 (in 2006).
- The number of deaths associated with the hottest days in Wales tends to show **an increase** though care must be taken in interpreting this due to the large confidence intervals.

Estimated heat-related excess deaths, Wales, 2000-2019



Sources:

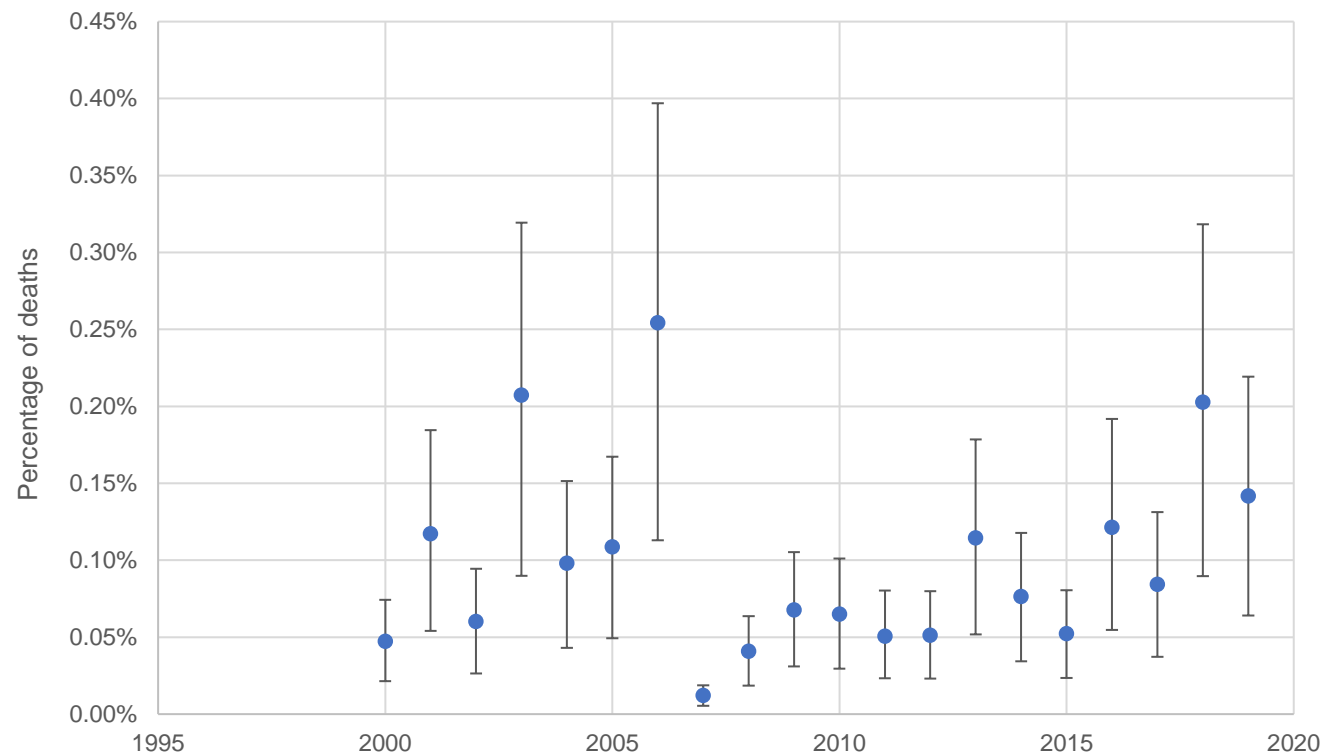
1. [Small-area assessment of temperature-related mortality risks in England and Wales: a case time series analysis - The Lancet Planetary Health](#)
2. [Climate-related mortality, England and Wales - Office for National Statistics \(ons.gov.uk\)](#)

Percentage of heat-related excess deaths in Wales over time



- In general, the percentage of deaths in heat-related excess deaths (as a proportion of all cause deaths in Wales) has increased between 2000 and 2019
- Note that these percentages rely on the total deaths (all-cause) figures: these may fluctuate each year due to numerous factors.

Estimated percentage of heat-related excess deaths, Wales, 2000-2019



Sources:

1. [Small-area assessment of temperature-related mortality risks in England and Wales: a case time series analysis - The Lancet Planetary Health](#)
2. [Deaths registered monthly in England and Wales - Office for National Statistics \(ons.gov.uk\)](#)
3. [Climate-related mortality, England and Wales - Office for National Statistics \(ons.gov.uk\)](#)



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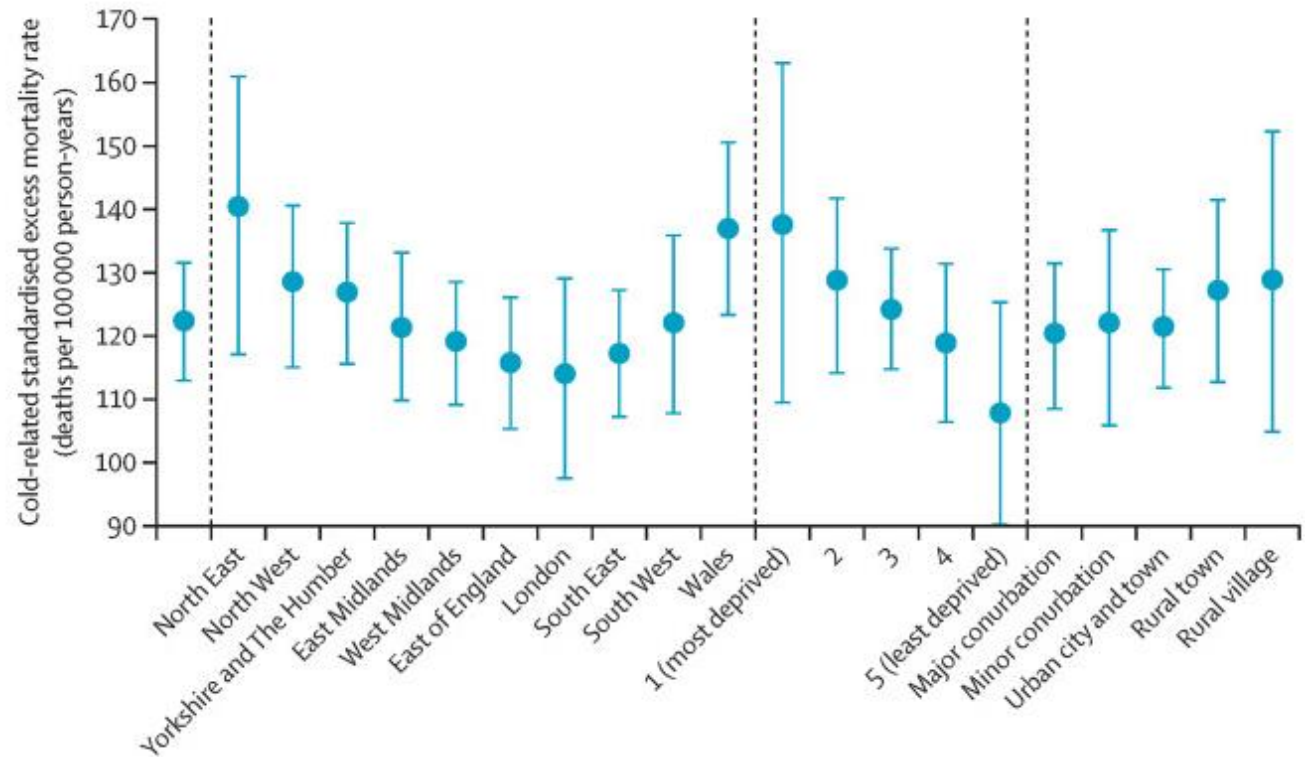
Cold-related deaths



Comparison of cold-related excess deaths, 2000 to 2019

- Wales has a higher number of cold-related excess deaths (per 100,000 person-years) compared to other regions in England except for North-East England.
- The impacts were more prevalent in deprived areas.
- However, the confidence intervals of the cold-related deaths in Wales overlap with all regions in England and the confidence intervals of all deprivation quintiles overlap so care should be taken when interpreting these.
- There has been an estimated 4,030 deaths per year in Wales between 2000 and 2019.

Standardised mortality rates attributable to cold, England and Wales, 2000-2019



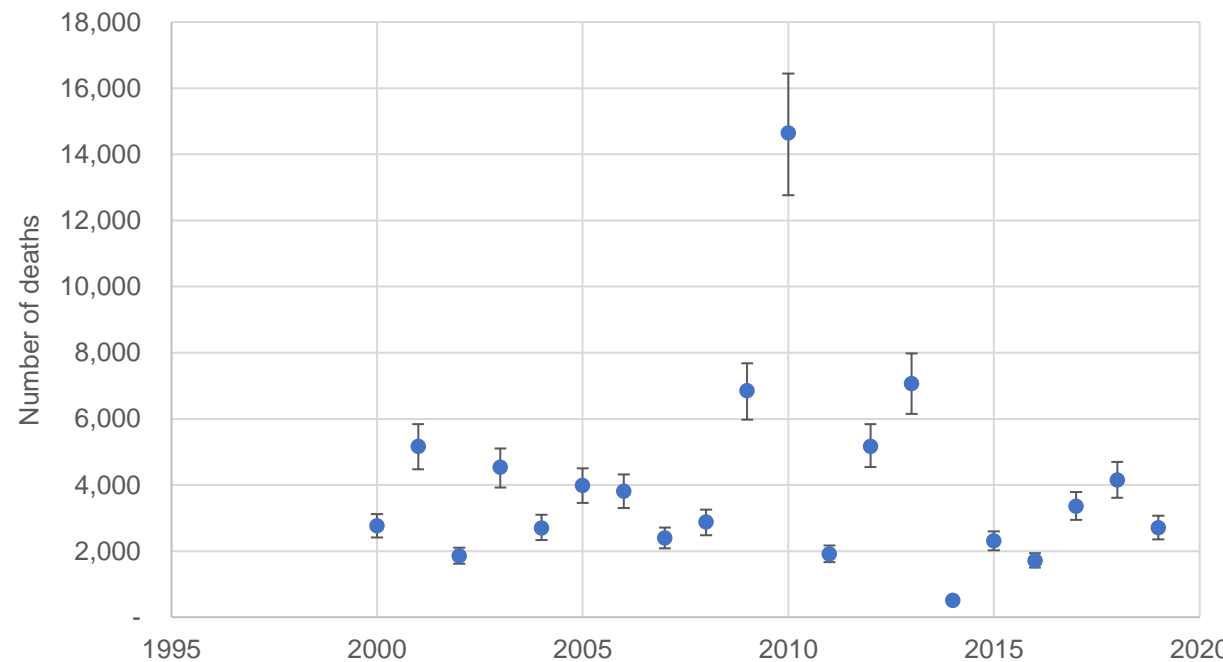
Cold-related excess deaths over time



Using Lancet and ONS England data and applying a ratio, there were an estimated 80,600 cold-related excess deaths over the 2000-2019 period which equated to 12.4% of all Wales deaths registered between 2000 and 2019.

- The number of estimated annual cold-related excess deaths range from around 519 deaths (in 2014) to 14,648 (in 2010).
- The number of cold-related excess deaths in Wales tends to show a slight decrease in general between 2000 and 2019 (though care must be taken in interpreting this due to the 2010 outlier).
- There was a particularly bad year in 2010, where there was a much higher than usual occurrence of deaths associated with the coldest days.

Cold-related excess deaths, Wales, 2000-2019



Sources:

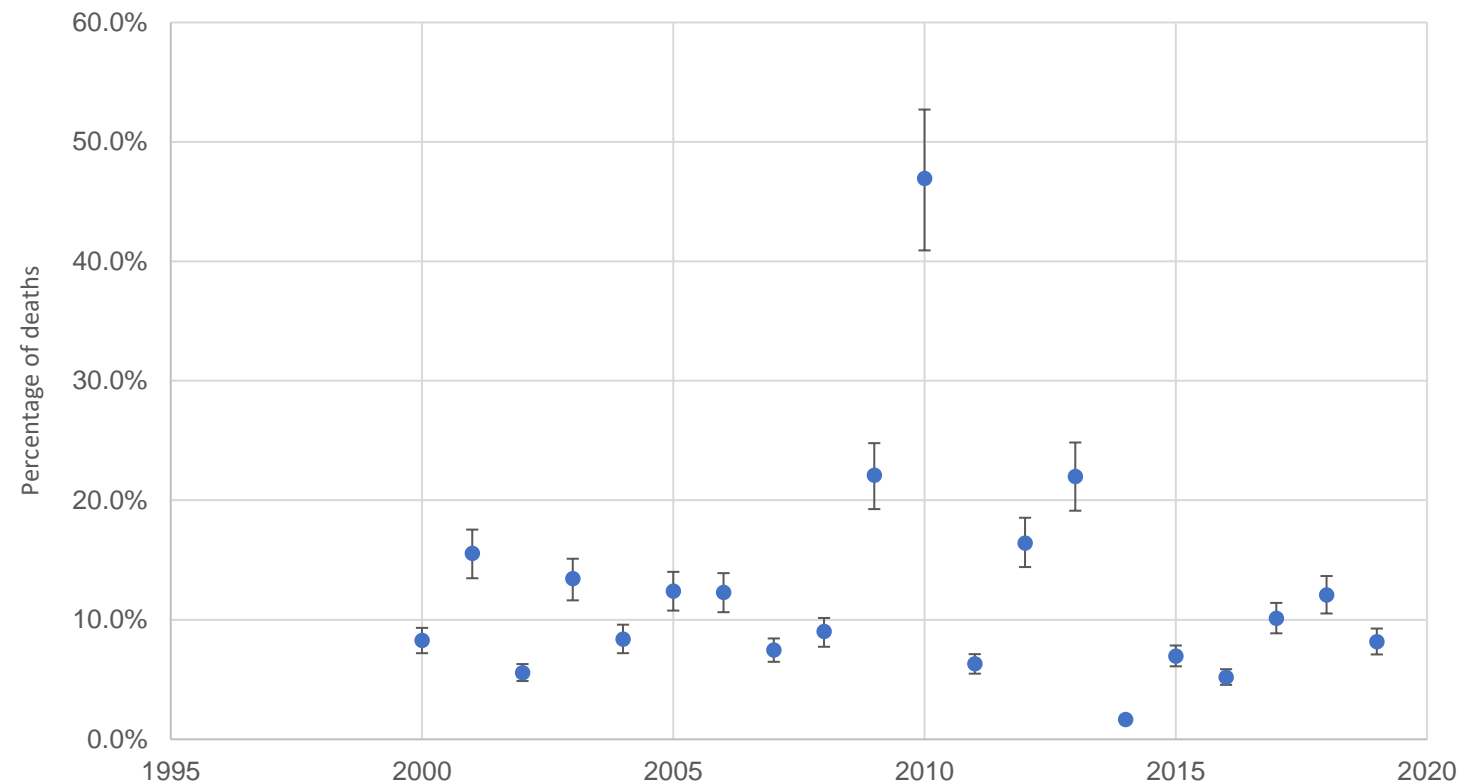
1. [Climate-related mortality, England and Wales - Office for National Statistics \(ons.gov.uk\)](https://ons.gov.uk)
2. [Small-area assessment of temperature-related mortality risks in England and Wales: a case time series analysis - The Lancet Planetary Health](#)

Cold-related excess deaths over time



- The percentage cold-related excess deaths have tended to decrease in Wales between 2000 and 2019.
- Note that these percentages rely on the total deaths (all-cause) figures: these may fluctuate each year due to numerous factors.

Estimated percentage of deaths which are cold-related excess deaths each year, Wales, 2000 to 2019



Sources:

1. [Climate-related mortality, England and Wales - Office for National Statistics \(ons.gov.uk\)](https://www.ons.gov.uk/peoplepopulationandcommunity/healthandsocialcare/deaths/articles/climate-related-mortality-england-and-wales/2019)
2. [Deaths registered monthly in England and Wales - Office for National Statistics \(ons.gov.uk\)](https://www.ons.gov.uk/peoplepopulationandcommunity/healthandsocialcare/deaths/articles/deaths-registered-monthly-in-england-and-wales/2019)
3. [Small-area assessment of temperature-related mortality risks in England and Wales: a case time series analysis - The Lancet Planetary Health](https://www.thelancet.com/journal/S2468-2667(20)30111-1)



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Effects of hot and cold temperature on mortality

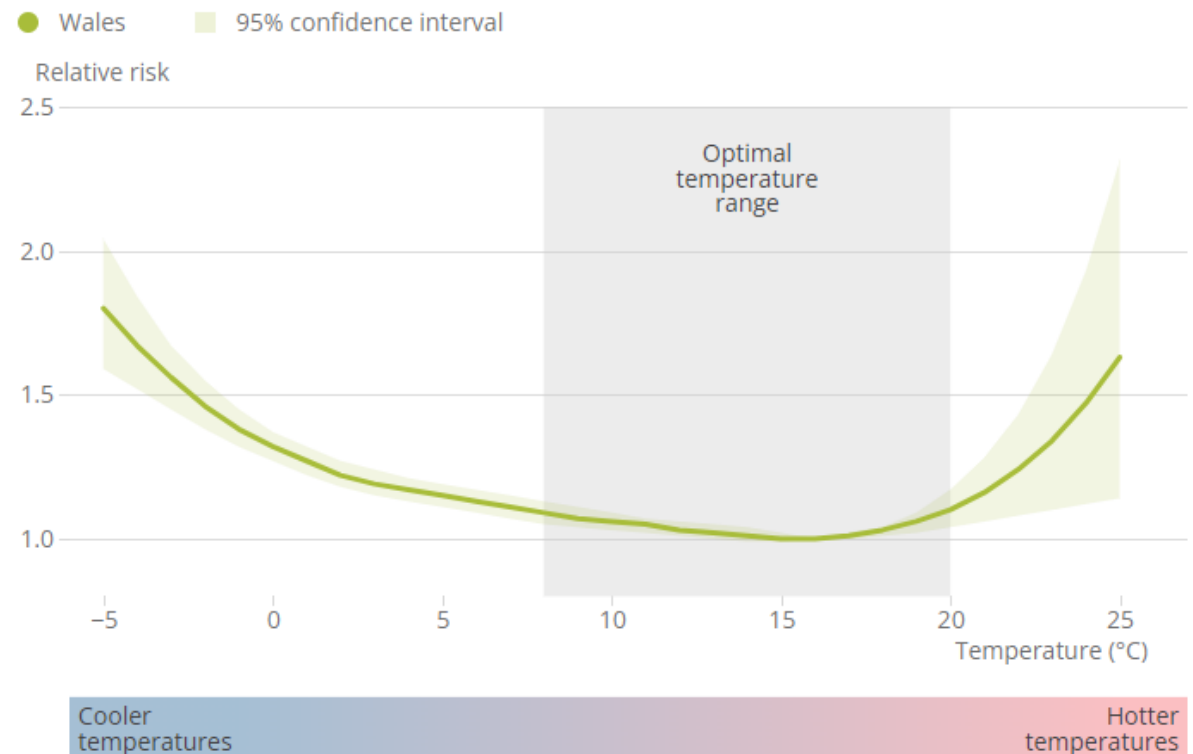


ONS mortality risk



- Both very low and very high average daily temperatures had higher mortality risk, with temperatures below negative 5 and above 25 degrees Celsius representing the greatest risk across Wales.
- In Wales, average daily temperatures between 8 and 20 degrees Celsius had the lowest mortality risk.

Temperature related relative mortality risk, Wales, 1988 to 2022



Sources:

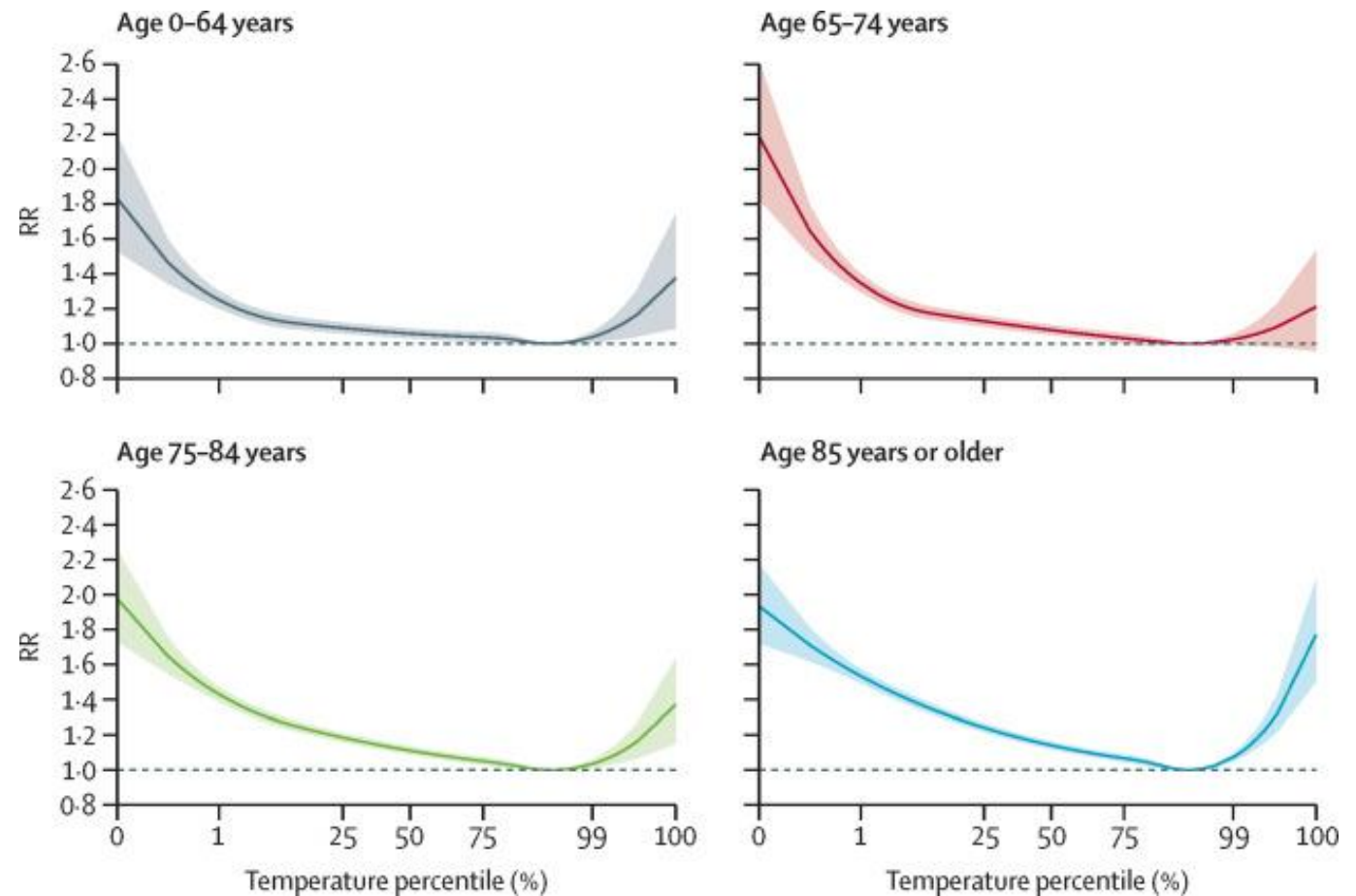
1. [Climate-related mortality, England and Wales - Office for National Statistics \(ons.gov.uk\)](https://ons.gov.uk)

Lancet Mortality Risk



- Mortality relative risk at the coldest temperature was higher than for the hottest temperatures for all age groups.
- Older people showed a higher susceptibility to non-optimal temperatures, with the 85 years or older age group having more than twice the mortality risk of people aged 0–64 years, for both heat and cold.
- The analysis revealed strong differentials in temperature-related impacts, with greater mortality associated with cold in northern and western UK regions, and heat-related risks greater in urban areas

Pooled estimates of the overall cumulative exposure–response relationships between temperature percentile and all-cause mortality by age group



Sources:

1. [Climate-related mortality, England and Wales - Office for National Statistics \(ons.gov.uk\)](https://ons.gov.uk)

Conclusion



- There are typically more deaths related to cold than related to heat each year in Wales. The Lancet study referenced provides annual mortality figures of 31 heat-related excess deaths per year and 4,030 cold-related excess deaths per year, 2000 to 2019 average.
- The number of heat-related excess deaths have increased and cold-related excess deaths have decreased in Wales in general over the years 2000 to 2019. There can be large differences from one year to the next which may be due to the temperatures in each particular year or other factors.
- Wales has a smaller percentage of deaths (as a proportion of all deaths) attributed to the hottest days compared with England between 2000 and 2019.
- Wales has a higher percentage of deaths (as a proportion of all deaths) attributed to the coldest days compared with England between 2000 and 2019. This could be due to a higher proportion of elderly people in the population in Wales who are more affected by colder temperatures.
- Those in urban areas designated 'major conurbation' have mortality rates due to heat higher than areas designated 'rural town'. Those in the least deprived quintile have mortality rates due to cold lower than the other quintiles.

Recommendations



- Collaborate with academia to determine the most important climate change effect on mortality, whether change of temperature, level of temperature (maximum, average), length of exposure, humidity with temperature.
- Carry out comparative analysis between Wales and regions of England with similar temperatures.

Thank you



- Any questions?

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