



Mortality Insights

The impact of climate change on mortality

Welcome to **Mortality Insights**. In this edition we explore the impacts that the consequences of climate change could have on mortality.

Climate change and mortality rates

Our average annual UK temperature is now around 1°C greater than pre-industrial times and [sea levels have risen by around 16cm since 1900](#). In 2018 the Intergovernmental Panel on Climate Change (IPCC) warned that [global warming is likely to reach 1.5°C above pre-industrial levels between 2030 and 2052](#) if it continues at the current rate.

In 2015, many nations, including the UK, signed up to the [Paris Agreement](#) with each country agreeing to a framework designed to keep global temperature rises by 2100 below 2°C above pre-industrial levels. As part of this the UK has legislated to become [Net Zero with respect to greenhouse gas emissions by 2050](#). Achieving Net Zero will require significant economic and societal changes.

In this edition, we consider how mortality may be impacted by climate change, both directly due to rising temperature and indirectly due to a range of other factors. We also consider our pathway to a low carbon world, which, alongside our success in minimising global temperature rises, could influence mortality in various ways.

Direct temperature mortality impacts

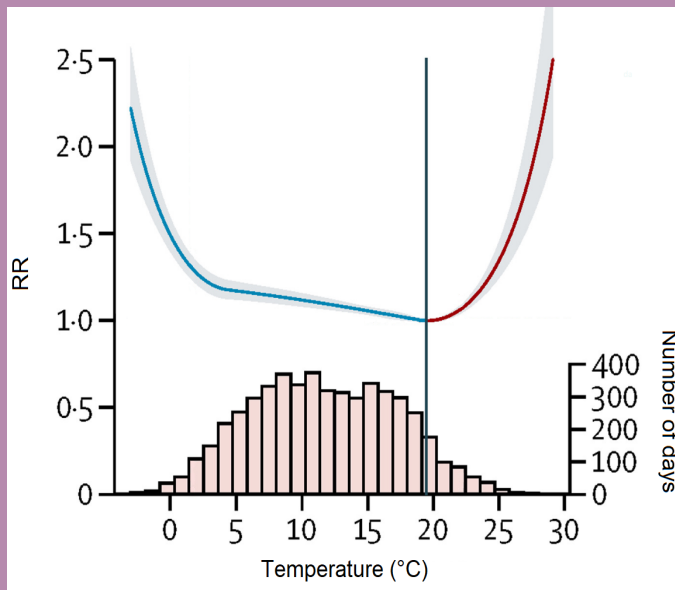
Research has shown that daily temperature can have a direct impact on mortality rates experienced – see figure 1 below. As global warming increases average temperatures, we might expect the number of days with temperature above the 'optimum' temperature to increase, and the number of days with temperature lower than the 'optimum' temperature to reduce. This trend may be expected to increase the number of 'excess heat' deaths, while also reducing the number of 'excess cold' deaths. In the UK we currently have significantly more 'excess cold' deaths relative to 'excess heat' ones, so this trend may be expected to lead to lower mortality rates in the short to medium term.

However, some recent experience suggests that aggregate mortality in England and Wales may not be overly sensitive to the average temperatures experienced. For example, in 2018 the UK had one of the hottest summers on record. Despite spikes in the daily number of deaths coinciding with heatwaves, the total number of deaths across the summer period was similar to that of previous years. It is possible that deaths caused by the heatwave were predominantly those in vulnerable groups (for example those with pre-existing respiratory or cerebrovascular conditions) that may have occurred over the summer period in any case.





Figure 1: Daily temperatures and relative risk (RR) of mortality in London between 1993 and 2006



Source: Gasparrini, A, et al. 2015. Mortality Risk Attributable to High and Low Ambient Temperature: A Multi-country Observational Study. *The Lancet*. 2015; 386 (9991): 369-375

The bars in the bottom half of the graph show the distribution of average daily temperatures in London experienced during the period from 1993 to 2006.

The curve in the top half of the graph shows how the relative risk of mortality varied by temperature. This illustrates that in London over this period:

- the 'optimum' daily temperature (at which the relative risk of mortality was lowest) is around 19°C
- for each degree below the 'optimum' temperature, the relative risk of mortality increased, giving rise to more 'excess cold' deaths
- for each degree above the 'optimum' temperature, the relative risk of mortality increased, giving rise to more 'excess heat' deaths

Indirect mortality impacts

As well as physical changes to our climate (such as rising temperatures and an increase in extreme weather events), mortality rates may also be affected by how society and our lifestyle changes as we transition to a low carbon future and adapt to our new environment. Some key factors, alongside the possible implications for UK mortality are shown below.

Air quality

Burning fossil fuels contributes to pollution and may increase mortality due to respiratory conditions. Switching to renewable energy sources may lead to improved air quality and lower mortality.

Diet

We are already seeing changes in diet, such as reduced red meat and dairy consumption, as part of the drive to reduce greenhouse gas emissions. This may reduce the risk of heart disease and type 2 diabetes. However, other factors may also lead to poorer diet, such as the reduced availability of imported fresh produce.

Other lifestyle changes

A decarbonisation programme that encourages people to ditch motorised forms of transport in favour of walking or cycling may improve health. However, there is a lot of uncertainty around how people will adapt to such changes.

Economic consequences

The economic implications of the transition to a low carbon economy will depend on many factors. There will also be costs associated with physical effects of the changing climate, such as increased flooding. In the past, periods of economic downturn have generally been associated with increased mortality, whereas periods of economic growth have led to reduced mortality rates.

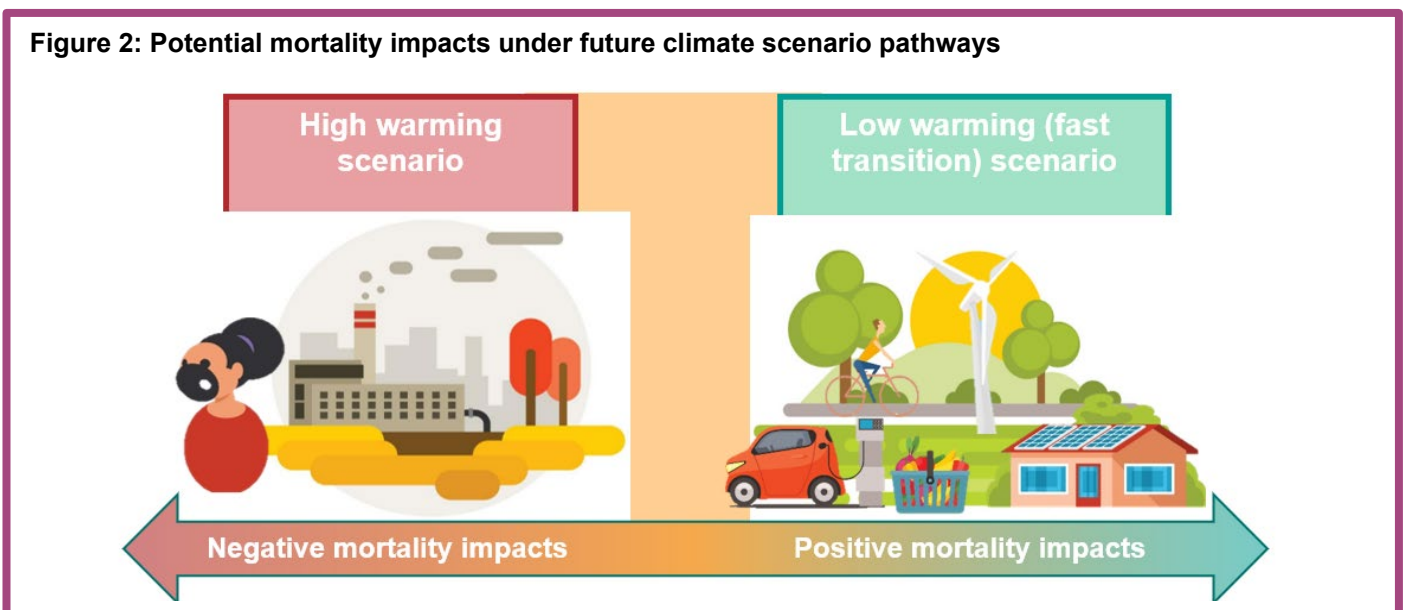


In addition to uncertainty around the mortality impacts themselves, there is also uncertainty as to the time horizons over which any mortality impacts may be felt. A reduction in greenhouse gas emissions may have an almost immediate impact on air quality but some physical changes and economic implications may not be felt for several decades.

Future pathways

The impact on mortality will be crucially dependent on what future transition path we take. A fast and deep transition to a low carbon world is likely to be accompanied by a variety of mainly positive consequences that improve mortality overall. Conversely under high warming scenarios there could be some extreme impacts on our whole system and negative physical impacts (such as natural disasters, famine and pestilence). These may lead to bleaker consequences for society and in turn mortality.

Figure 2: Potential mortality impacts under future climate scenario pathways



In a [recent letter to the Prime Minister](#), the Committee on Climate Change has recommended that the government pursues a 'green recovery' when rebuilding after the COVID-19 crisis. This will help the UK navigate more quickly to a low carbon world. The coming years will be crucial to shape our future, and UK government policy, alongside our successes in influencing global policy, will be key to this.

Final thoughts

We can expect a high level of uncertainty as to how climate change may affect mortality for some time to come. Future mortality rates may also be impacted by many other uncertain factors, such as advances in health care, and the potential for outbreaks of infectious diseases such as the recent COVID-19 pandemic. This creates a challenge for pension schemes, insurers and investors when valuing their expected future costs.

Further research and identifying emerging trends are important in helping to reduce this uncertainty. GAD will keep abreast of latest research, and work with government bodies such as the Office for National Statistics, to monitor latest developments. We can provide specialist advice, including the use of mortality scenarios, to assist in assessing any risks and associated costs our clients may be exposed to.

Any material or information in this document is based on sources believed to be reliable, however we cannot warrant accuracy, completeness or otherwise, or accept responsibility for any error, omission or other inaccuracy, or for any consequences arising from any reliance upon such information. The facts and data contained are not intended to be a substitute for commercial judgement or professional or legal advice, and you should not act in reliance upon any of the facts and data contained, without first obtaining professional advice relevant to your circumstances. Expressions of opinion do not necessarily represent the views of other government departments and may be subject to change without notice.