Sampson M. (2022) Climate change and cardiovascular disease. *British Journal of Cardiac Nursing*. 2022 Aug 30:1-2.

The world is warming up; in the past decade, mean global temperatures have increased by 1 degree C compared to the pre-industrial era (Madge, 2022). While this may not sound much, warming of the environment is associated with greater fluctuation in temperatures, and an increase in extreme weather events. Once thought of as rarely occurring, freak incidents, torrential rain, flooding and heatwaves are now regular features of weather across the world. If the globe continues to warm at its current rate, the intensity, duration and geographical extent of these events is expected to increase.

If anyone in the UK had any lingering doubts about the impact of global warming on our own weather, these should have been dispelled this summer. On 15 July 2022, the Meteorological Office (2022) issued the first ever red warning for extreme heat. Temperatures in the high 30s were predicted for the 18th and 19th of July, with warnings of a substantial risk to life and a high likelihood of disruption to transport and energy supplies. People were warned to stay at home and keep out of the sun.

In fact, temperatures were even higher than predicted; a new UK record of 40.3 degrees C was recorded in central England on the 19th of July. Airports shut down, railway services were suspended, and roads closed as their surfaces rose and buckled. The London Fire Brigade declared a major incident as multiple fires erupted across London and Essex, destroying 41 homes (Rudgard et al, 2022). Meanwhile, 13 people died in lakes, rivers and canals as they sought open water to cool off, seven of whom were teenage boys (Vinter and Halliday, 2022). Comparisons were made with the legendary heat wave of 1976, when months of high temperatures and drought led to government enforced water rationing. However, the peak temperature in 1976 was 4.4 degrees lower than in 2022 and occurred on a background of average July temperatures of 18.7 degrees (Reality Check team, 2022).

As dramatic as they were, the events of England's hottest day (so far) do not capture the true impact of global warming on the health of the population. The unreported victims of extreme weather are those with long term health conditions, in particular cardiorespiratory disease. The effects of cold weather have long been appreciated, with cold snaps linked to an increased incidence of heart attack, stroke and respiratory illness (Stewart et al, 2017). The impact of temperature on mortality was recently analysed by the Global Burden of Disease (GBD) research collaborative. Their data suggest that almost 2 million deaths worldwide could be attributed to environmental temperature between 1990 and 2019 (GBD 2019 Risk Factor Collaborators, 2020). Most of these deaths were associated with cold

weather, however there is evidence that the impact of extreme heat is becoming more important and is likely to eclipse the effects of cold weather in the future.

Exposure to heat increases sweating, raises heart and respiratory rates, and causes vasodilatation. Demand for circulation is increased, alongside a rise in systemic inflammation and alterations in coagulation. In individuals with coronary heart disease, these changes increase the risk of angina and may trigger the rupture of atherosclerotic plaque, leading to myocardial infarction. In people with chronic heart failure, an impaired heart may be unable to meet the increased demand for circulation, leading to decompensation. Ischaemia, inflammation and changes in autonomic tone are also triggers for cardiac arrhythmias, which commonly complicate the course of all types of cardiovascular disease. UK studies have demonstrated an increase in all-cause mortality when temperatures rise above normal seasonal values, with cardiovascular disease the most common cause of death (Arbuthnott & Hajat, 2017). In the UK, the elderly and those living in London, the Southeast, and the East of England appear to be at highest risk.

So, what can be done about extreme heat events? Health care professionals need to be aware of the impact of heat on patients, especially those with physical or cognitive problems who may need assistance in keeping cool and staying hydrated. Standard advice from the British Heart Foundation (2021) includes: -

- Closing windows and curtains to keep out the heat during the day and opening them at night to allow cooler air in
- Wearing loose clothing
- Switching off unnecessary lights and electrical appliances as they generate heat
- Spending more time in the coolest parts of the house (usually the downstairs)
- Staying out of the sun, especially during the hottest part of the day (11am to 3pm)
- Wearing sunscreen and a hat when going outside, and carrying water
- Drinking plenty of fluids but avoiding excessive caffeine or alcohol. Patients who are fluid restricted (for example, due to heart failure) should seek advice from their GP or clinical nurse specialist
- Avoiding strenuous exercise

Everyone can play a part by taking steps to lower their carbon footprint. Greenhouse gases released by the burning of fossil fuels for electricity, heat and transportation are major contributors to global warming. Household emissions can be reduced by simple measures such as turning down the heating and switching off lights, as well as by upgrading home insulation and heating systems. Using public transport, cycling or walking to work, instead of

using a car, can also make a difference. Even small changes at the individual level can contribute to major reductions in harmful gas emission.

Global warming is clearly not “someone else’s problem”. People with cardiovascular disease are disproportionately affected and it is impacting all of our lives.

References

Arbuthnott, K.G., Hajat, S (2017) The health effects of hotter summers and heat waves in the population of the United Kingdom: a review of the evidence. *Environ Health,* 16, 119, https://doi.org/10.1186/s12940-017-0322-5

British Heart Foundation (2021) *Hot weather and your heart.* https://www.bhf.org.uk/informationsupport/support/practical-support/weather-and-your-heart (accessed 12 August 2022)

Madge G. (2022) *2021 continues warm global temperature series*. https://www.metoffice.gov.uk/about-us/press-office/news/weather-and-climate/2022/2021-hadcrut5-wmo-temperature-statement (accessed 15 August 2022)

GBD 2019 Risk Factor Collaborators (2020) Global burden of 87 risk factors in 204 countries and territories, 1990–2019: a systematic analysis for the Global Burden of Disease Study, *Lancet*, 396,1223–1249.

Meteorological Office (2022) *UK prepares for historic hot spell*. https://www.metoffice.gov.uk/about-us/press-office/news/weather-and-climate/2022/red-extreme-heat-warning (accessed 15 August 2022)

Reality Check team (2022) *UK heatwave: how do temperatures compare with 1976*. https://www.bbc.com/news/62212604 (accessed 14 September 2022)

Rudgard O, Roberts L, Clarence-Smith O et al.(2022) *London's firefighters have ‘busiest day since Second World War’ as temperatures break 40C for first time*. https://www.telegraph.co.uk/news/2022/07/19/london-fire-wennington-dartford-upminster-green-uk-heatwave-summer/ (accessed 15 August 2022)

Stewart S, Keates AK, Redfern Aet al.(2017) Seasonal variations in cardiovascular disease. *Nat Rev Cardiol*.14(11):654–664. https://doi.org/10.1038/nrcardio.2017.76

Vinter R, Halliday J. (2022) *Frivolity can turn to fatality’: UK heatwave brings rise in teenage drownings*. https://www.theguardian.com/uk-news/2022/jul/19/distinct-risk-pattern-uk-heatwave-toll-drowned-teenage-boys (accessed 15 August 2022)