CITY OF BRADFORD METROPOLITAN DISTRICT COUNCIL JOINT STRATEGIC NEEDS ASSESSMENT

Climate Change: Heat and Health Harms Health Needs Assessment

July 2025

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Executive summary

Introduction

This chapter on 'Temperature Change and Health Harms' is the first in a planned series of needs assessments on climate change and health. It will focus on the health impacts of increased heat and hot weather. It will consider how this will impact the health of people in Bradford, and will also explore actionable strategies to mitigate these impacts and design cooler, safer environments. Other topics such as flooding, increases in vector-borne illness, and impacts on air quality will be covered within other chapters.

Who is at risk and why?

Everyone is at risk of harm from increasing temperatures and extreme heat events. Some groups are able to protect themselves better than others, and some groups will face multiple increased risks.

Properties that are prone to overheating such as top-floor flats, poorly ventilated homes, urban residences, south-facing properties, those with dormers, large windows, conservatories, smaller properties, overcrowded or temporary accommodations, and bungalows or ground-floor bedrooms—pose extra risks, especially for individuals with limited financial means to secure cooling measures. Vulnerable people include older adults, very young children, pregnant women, those with chronic health conditions or on medications affecting heat regulation, individuals already ill or dehydrated, people facing mental health or substance issues, and those with learning disabilities or living alone, along with outdoor workers and manual labourers are also at higher levels of risk. Some people will be exposed to multiple risk factors.

Unmet need and gaps

Whilst the council is doing a lot of work on sustainability, this exercise has identified a number of gaps and unmet need in relation to health and increasing temperatures.

There needs to be much greater integration of climate change work within public health. In terms of communications this should concentrate on areas where there are lower levels of public knowledge, this might include advice on avoiding dehydration, understanding uv levels and which groups are most at risk. In relation to medications, many have not been studied for temperature interactions (Mehrhof and Bunn, 2024), therefore the public are likely to have limited knowledge.

Vulnerable groups—including older adults, children, and those in deprived and urban areas—face heightened risks from rising temperatures. The built environment, particularly in urban heat islands, exacerbates these risks.

Recommendations for consideration

It is important to note that many of the actions below have multiple co-benefits, particularly the upstream and midstream ones.

	Recommendation
	Upstream Prevention
1	Plant more trees – Create a city forest
2	Reduce oil, coal and natural gas usage and car dominance
3	Reduce energy demands and move to renewables
4	Reduce demands on the transport system e.g. increasing online options where appropriate
5	Actions to improve air quality
6	Reduce consumption and focus on the circular economy
7	Work with planning on guidance to prevent overheating
8	Cooling active travel routes
9	Improve urban greening and reduce ground coverage with plastic grass across the district – and incorporate within planning policy.
	Midstream Prevention
10	Planting shade trees in areas at risk of the urban heat island effect
11	Trees around transport hubs including bus stops
12	Continue to identify opportunities for funding and investment in energy efficiency measures within Bradford housing stock.
13	Water fountains – in public spaces and public buildings
14	Work to ban sunbeds nationally
15	Green roofs (preferable due to biodiversity benefits) and painting roofs white
	Downstream Prevention
16	Health campaign - Dehydration
17	Health campaign – Suncream and the UV index
18	Working with GPs to ensure advice is given to patients taking medications that puts them at increased levels of risk
19	Work with schools to ensure they are following existing guidance and best practice for children e.g. reducing physical activity demands at peak sun, ensuring they have time dedicated to reapplying suncream and improving natural shading.
20	Work on a hot weather advice resource
21	Identify public cool spaces for people to shelter from heat and increase awareness of them

	Research
22	Investigate public awareness of health and increasing temperatures

END

Full JSNA report

Notable changes from previous JSNA

This is the first temperature change and health related harms chapter.

What do we know?

What are the causes of extreme temperatures?

Climate change is principally a result of the following factors as identified by the United Nations:

Table 1: A summary of the causes of climate change from the United Nations (2025).

Causes of Climate Change	Further Information
Generating power	Generating electricity and heat by burning fossil fuels causes a large proportion of global emissions. Most electricity is still generated by burning coal, oil, or gas, which produces carbon dioxide and nitrous oxide. Globally, just over quarter of electricity comes from wind, solar and other renewable sources which, as opposed to fossil fuels, emit little to no greenhouse gases or pollutants into the air.
Manufacturing goods	Manufacturing and industry produce emissions, mostly from burning fossil fuels to produce energy for making things like cement, iron, steel, electronics, plastics, clothes, and other goods. Mining and other industrial processes also release gases, as does the construction industry. Machines used in the manufacturing process often run on coal, oil, or gas; and some materials, like plastics, are made from chemicals sourced from fossil fuels. The manufacturing industry is one of the largest contributors to greenhouse gas emissions worldwide.
Cutting down forests	Cutting down forests to create farms or pastures, or for other reasons, causes emissions, since trees, when they are cut, release the carbon they have been storing. Forests absorb carbon dioxide, destroying them also limits nature's ability to keep emissions out of the atmosphere. Deforestation, together with agriculture and other land use changes, is responsible for roughly a quarter of global greenhouse gas emissions.
Using transportation	Most cars, trucks, ships, and planes run on fossil fuels. That makes transportation a major contributor of greenhouse gases, especially carbon-dioxide emissions. Transport accounts for nearly one quarter of global energy-related carbon-dioxide emissions.
Producing food	Producing food causes emissions of carbon dioxide, methane, and other greenhouse gases, including through deforestation and clearing of land for agriculture and grazing, digestion by cows and sheep, the production and use of fertilizers and manure for growing crops, and the use of energy to run farm equipment or fishing boats, usually with fossil fuels. Greenhouse gas emissions also come from packaging and distributing food.
Powering buildings	Residential and commercial buildings draw on coal, oil, and natural gas for heating and cooling. Growing energy demand for heating and cooling, with rising air-conditioner ownership, as well as increased electricity consumption for lighting, appliances, and

	connected devices, has contributed to a rise in energy-related carbon-dioxide emissions from buildings in recent years.
Consuming too much	Consumption of clothes, electronics, plastics and other products. The wealthiest bear the greatest responsibility: the richest 1 per cent of the global population combined account for more greenhouse gas emissions than the poorest 50 per cent.

UK Temperature Changes

Before and Now

Average global land temperatures have already increased by over 1°C since the Industrial Revolution. This baseline increase in temperature is already resulting in extreme heat events, such as heatwaves and record-breaking high temperatures, becoming more frequent, long-lasting, and intense (Met Office, 2025b). Long term trends and studies point towards **a long-term warming trend of the UK's climate and a reduction in cold events** (Met Office, 2025a).

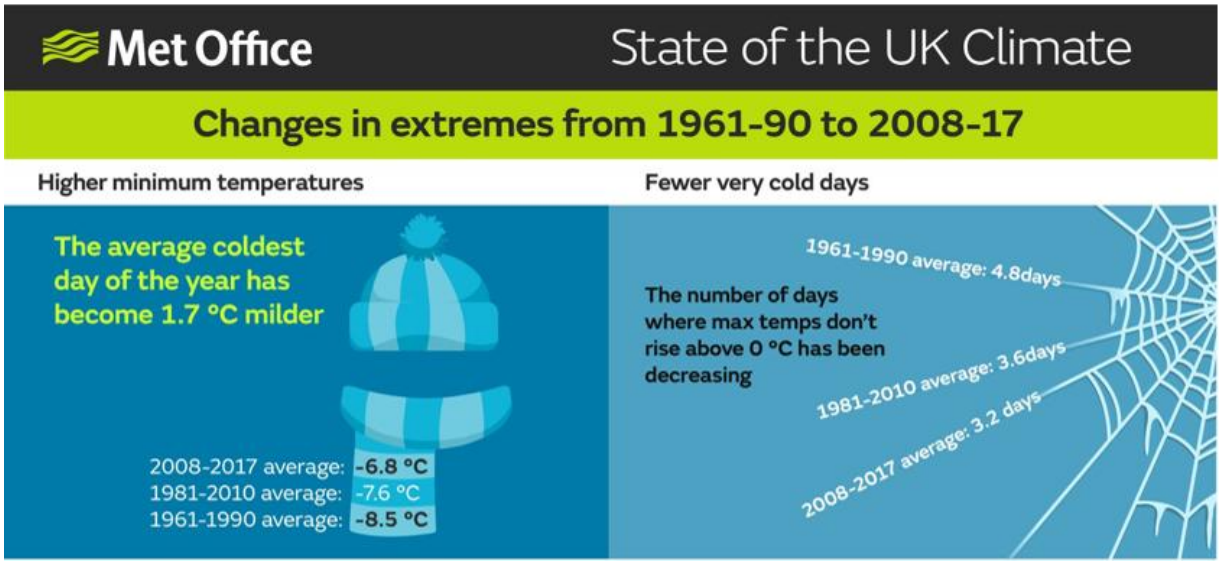


Figure 1:Cold days have become milder and there are fewer very cold days (Met Office, 2025a)

Escalating temperature changes

- Projecting how climate will change is very complex
- The current UK climate is **warmer, wetter and sunnier** than was typical during the 20th century, with **average annual temperatures over the whole of the UK increasing and sea levels rising.**
- In the future, there will be a greater chance of **warmer, wetter winters** and **hotter, drier summers** with **sea levels continuing to rise.**

- However, there will still be cold snaps and cool summers or winters as weather varies year to year and around the UK.
- By the end of the 21st century, all areas of the UK are projected to be warmer, particularly in the summer.
- **Hot days are predicted to become more frequent.**
- Climate change has already caused an extension in the length of Earth's fire seasons by an average of 18.7% between 1979 and 2013. Met Office modelling predicts twice the number of summer days with dangerous weather conditions for fire development under 2°C of warming, and a five-fold increase under 4°C of warming.
- Under climate change, the UK is likely to experience milder, wetter winters that promote vegetation buildup, and hotter, drier springs and summers that increase the risk of vegetation catching fire.

All the above information is from Tasker and Wentworth (2024) and UKHSA (2023a).

Global Temperature Rising

The climate stripes were developed by Professor Ed Hawkins at the University of Reading. Each stripe represents the average temperature for a year. The colours transition from cool blues (cooler years) to warm reds (hotter years) to represent the increases in temperature seen throughout the past 150 years or more (University of Reading, 2025). The stripes at figure 2 are specifically for Bradford from 1850 to 2024. In Bradford, like the rest of the UK, the stripes show a clear trend of increasing temperatures.

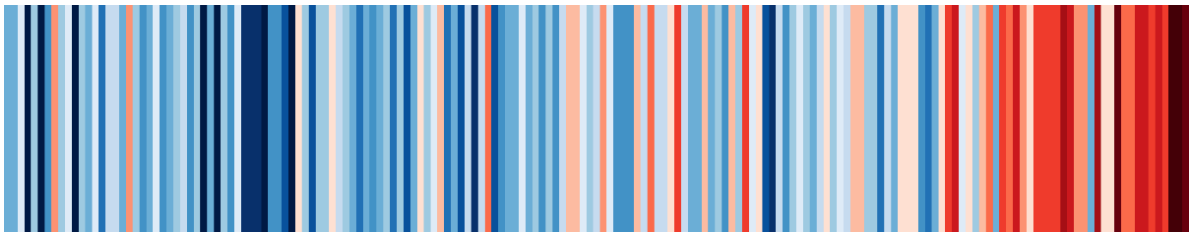


Figure 2: The climate stripes for Bradford by Professor Ed Hawkins (Show Your Stripes, 2024).

Heat periods

Heat periods are defined by the UK Health Security Agency as at least one day with an amber Heat-Health alert in at least one region and/or the mean Central England Temperature being at least 20 °C. The Office for National Statistics (ONS) and UKHSA use heat periods to report heat mortality statistics on excess heat-deaths (Mehrhof and Bunn, 2024).

Heatwaves

There are variations in how heatwaves are defined. The UK Met Office states a heatwave threshold is met when a location records a period of at least three consecutive days with daily maximum temperatures meeting or exceeding the heatwave temperature threshold. The threshold varies across the UK. For Bradford this is currently: **25 degrees or higher.** Met Office (2025c). The World Meteorological Association uses *'*A period of marked unusual hot weather (maximum, minimum and daily average temperature) over a region persisting at least three consecutive days during the warm period of the year based on local (station-based) climatological conditions, with thermal conditions recorded above given thresholds'.

It is important to note that health impacts including increased mortality levels start to increase from above average temperatures and do not need to be a heatwave.

The heat island effect

Higher temperatures are more likely in towns and cities due to the 'heat island effect', or the 'urban heat island'. Temperature differences can range from a few degrees in smaller cities and to over 10 °C in large metropolises (Elmarakby and Elkadi, 2024). Urban areas store more heat than rural areas and are warmer due to increased heat including transport systems and energy output (Elmarakby and Elkadi, 2024; Susca and Pomponi, 2018). Streets and roofs which are clad in dark materials like asphalt and bitumen retain more heat than lighter materials and natural surfaces like soil (Susca and Pomponi, 2018). Traffic and use of air conditioning systems in towns and cities contributes to increased nighttime temperatures (Emmanuel, 2015). The urban heat island heightens the chances of the negative health impacts listed elsewhere in this chapter.

An urban heat atlas has been developed by academics working on the 'cool towns project'. This identified 'heat vulnerable places' such as transport hubs, school playgrounds, festival grounds, market squares and care homes (Spanjar et al, 2022). People using active travel were also identified as higher risk (Spanjar et al, 2022). For those using buses, heat stress was more than 3 °C higher under unshaded, enclosed shelters than unshaded areas outside of shelters Lanza et al, 2025).

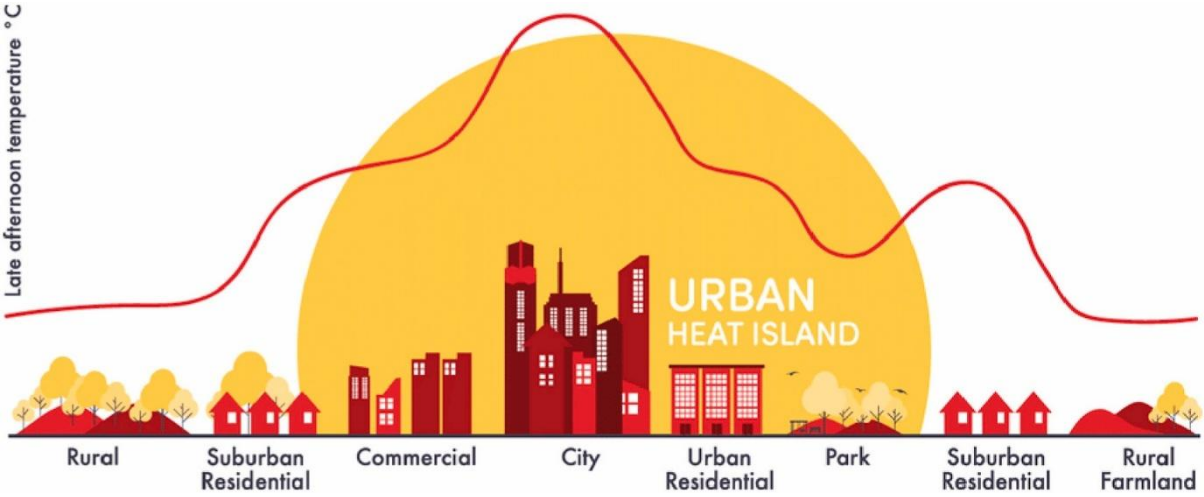
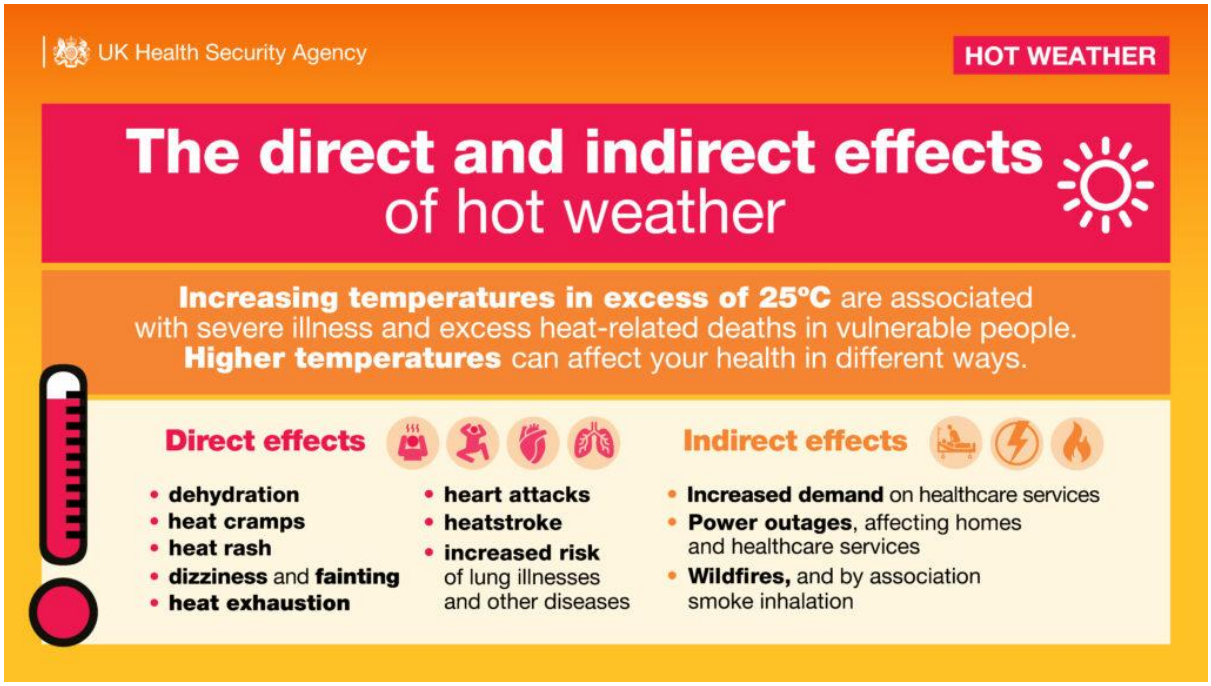


Figure 3: The Urban Heat Island by (Elmarakby and Elkadi, 2024)

Who is at risk and why?

Heat Health Risks

Temperatures do not need to be excessive, and do not need to exceed 40°C or even 30°C before the impacts of heat are felt (Howarth et al, 2024). The majority of heat-related deaths under 1.5°C of warming are not due to extreme heat events. They are a result of moderate temperature increases at between 1–5°C above regional thresholds (Jenkins et al., 2022). When temperatures reach 25°C, the number of heat-related deaths increases by around 30% in England (ONS, 2023).



When the body gets hotter the blood vessels open leading to lower blood pressure and this makes the heart work harder to push blood around the body. This can start to cause milder symptoms such as heat rash or swollen feet due to leaky blood vessels. Sweating causes loss of fluids and salt from the body, and this changes the balance of them in the body. When this occurs in tandem with lower blood pressure it can lead to heat exhaustion (BBC, 2024).

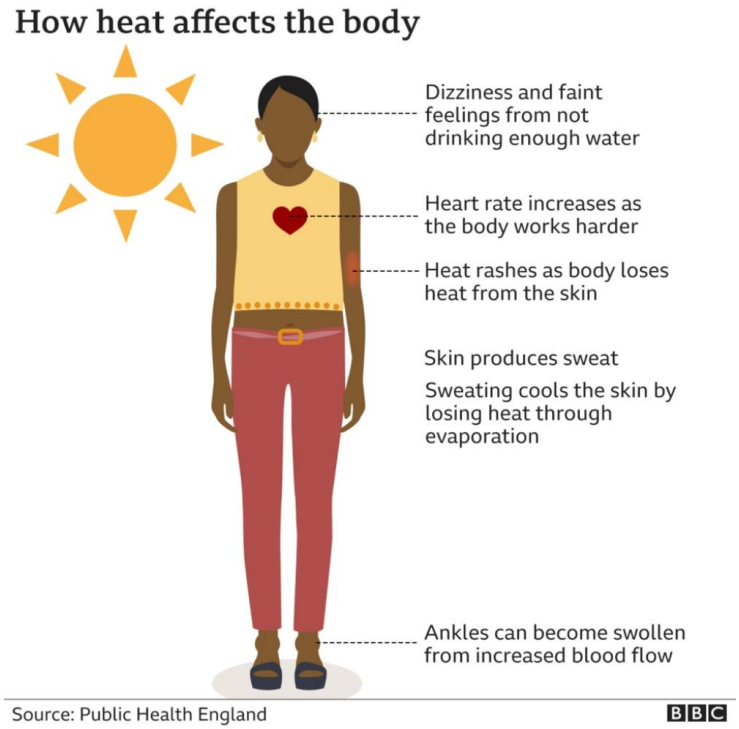


Figure 4: How heat affects the body from Public Health England cited by the BBC (2024)

Other adverse effects of heat include:

- **Heat Rash** is small, raised spots which can itch and accompanied by mild swelling. Babies and children are more prone to heat rash (NHS, 2024).
- **Heat Stroke** is a medical emergency with a core temperature of >40°C. It can occur due to heat exposure or as a result of strenuous physical exercise (BMJ, 2025).
- **Heat Exhaustion** is a mild to moderate illness which present as an elevated temperature, mild neurological symptoms (e.g., intense thirst, weakness, anxiety, dizziness, syncope), and an intact mental status. Heat exhaustion needs to be managed to prevent progression to heat stroke (BMJ, 2025).
- **Sunburn** is skin damage caused by ultraviolet rays. It can cause the skin to become red, sore, tender and sometimes itchy. Sunburn is often mild however it is essential it is avoided as it can increase the likelihood of skin cancer in later life (NHS Inform, 2024).

Heat can have ill effects on health in relation to:

- **Respiratory illness and mortality**: Exposure to heat can worsen respiratory disease symptoms, especially when dehydration is a factor. This is likely due to poorer air quality during heatwaves and the added physiological stress of maintaining body temperature (Mehrhof and Bunn, 2024).

- **Heart attacks and cardiovascular issues**: admissions increase for heart attacks and other cardiovascular problems, as the heat puts additional strain on the heart.

- A review which looked at impact of increased temperatures and heat waves on health in the UK found respiratory deaths were more sensitive to heat than deaths from cardiovascular disease, although the burden from cardiovascular deaths is greater in absolute terms (Arbuthnott and Hajat, 2017).

- **Dehydration and kidney issues**: the risk of dehydration rises during heat waves, which can lead to kidney problems and other complications. Dehydration due to sweating can lead to acute kidney injury and failure (Hajat et al, 2024). Chronic kidney disease can strain the heart, increasing the chance of cardiovascular events during heat (Mehrhof and Bunn, 2024).

- **Pre-existing conditions**: can worsen during heatwaves. For example, people with diabetes, epilepsy, lipedema, multiple sclerosis, dementia, Alzheimer's disease, and Parkinson's disease may experience exacerbated symptoms due to impaired thermoregulation, increased risk of cardiovascular events, and other heat-related complications. (Buso et al, 2019; Mehrhof and Bunn, 2024). More information on this topic is included in Table 2.

- **Accidents and injuries**: occur at higher rates as people are more prone to accidents, injuries and falls due to increased dehydration, fatigue and exacerbation of existing conditions. A systematic review found In England, each 5℃ increase in maximum daily temperature was linked to a 1.8% increase in trauma admissions (Otte im Kampe, Kovats and Hajat, 2016). A study of unintentional drownings between 2012 and 2019 showed an increase in drowning risk for males by over 7% per 1℃ temperature increase (Hills et al, 2024; Mehrhof and Bunn, 2024).

Additional health risks during heatwaves include:

- **Mental Health**: extreme heat and heatwaves can negatively impact psychological wellbeing and functioning, including for people who **do not have** a mental health condition (Mehrhof and Bunn, 2024; Thompson et al, 2023). Some mental health illness can worsen and there is an increased suicide risk (Thompson et al, 2018).

- **Warm nights:** when there is a brief period of hot weather, warm nights persist after daytime temperatures have returned closer to the norm, particularly in cities, leading to more hot nights than days overall (Burt, 2022). Sleep is poorer during heatwaves (Altena et al, 2022) which can heighten the chance of accidents and reduces cognitive performance (Mehrhof and Bunn, 2024). Academics from Loughborough's *Sleep in the City project* estimated that during the heatwaves of 2018 (on a national level) 4.6million English bedrooms (19% of the stock) and 3.6million living rooms (15%) overheated (Lomas et al, 2021). Overheating was **more prevalent in bedrooms at night** than in living rooms during the day, and it was more prevalent in flats (Lomas et al, 2021).

- **Air quality worsens**: this is because the air is more stagnant, which means pollutants and particulate matter are not dispersed, increased ozone formation (particularly problematic in urban areas with high levels of vehicle emissions and industrial activities) and increased risk of wildfire (World Meteorological Organization, 2023).

Higher risk groups during hot weather

Everyone can be affected by hot weather. Those at higher levels of risk during hot weather and why is included below in table 2.

Table 2: High risk groups during hot weather as identified by UKHSA (2024a), and explanations for why this is.

Group at increased risk identified by UKHSA (2024a)	Why?
Older people aged over 65 years	Older adults are more likely to struggle in hot weather due to reduced thermoregulation, reduced ability to produce sweat and increased demands on the cardiovascular system (National Institute on Aging, 2022). Increased prevalence of conditions and medications also exacerbate heat risks for older adults (further detailed below as additional risk factors). A large study including residents from 750 properties found households with members aged over 75 significantly under-reported the prevalence of overheating compared with monitored results (Lomas et al, 2021).
Babies and young children under the age of 5 years	Babies and young children are at greater risk as they have a higher metabolism which generates more heat, they sweat less, and they may not recognise when they are dehydrated or able to communicate it (United Nations Children's Fund, 2023).

Group at increased risk identified by UKHSA (2024a)	Why?
Pregnant women and fetuses	The energy demands of a growing fetus are likely to increase a woman's core body temperature (Dalugoda et al, 2019). Women with nausea and vomiting in pregnancy are already dehydrated and hot weather exacerbates the dehydration that someone may have been suffering from for weeks and months before hot weather. (Ref). They are often unable to follow health advice to drink more water as water makes them vomit. A systematic review including 70 studies found exposure to high temperature is associated with an increase in adverse pregnancy outcomes, especially preterm birth and stillbirth, and among women in lower socioeconomic groups (Chersich et al, 2020).
People with underlying health conditions, particularly heart problems, breathing problems, dementia, diabetes, kidney disease, Parkinson's disease or mobility problems.	People with underlying health conditions struggle in the heat because their bodies have a harder time regulating temperature and responding to stress caused by extreme heat. **Heart problems** – Heat puts extra strain on the heart, increasing the risk of heart attacks and strokes (Mehrhof and Bunn, 2024). **Breathing problems** – Hot weather can worsen respiratory conditions like asthma and COPD, particularly when dehydrated and especially when air pollution levels rise (Mehrhof and Bunn, 2024). **Dementia** – People with dementia may not recognise the signs of heat-related illness or remember to stay hydrated (BBC, 2024). **Diabetes** – Heat can affect blood sugar levels. For those that take insulin it can be absorbed more quickly from the injection site increasing the likelihood of hypos (Diabetes UK, 2025). **Kidney disease** – People who have chronic kidney disease, are receiving dialysis treatment, or are a transplant recipient, may need to take extra care to maintain fluid balance. Fluid levels are very important for people on kidney dialysis because they have a tendency to accumulate more fluid as the kidneys cannot make as much urine as they should. There is no standard advice for dialysis patients, and they need to consult health professionals for individualised advice. People who have had a kidney transplant are at much greater risk of developing skin cancer so need to be careful in the sun (Kidney Care UK, 2025). **Parkinson's disease** – Thermoregulation can be impaired with Parkinson's disease and people can also suffer with sweating abnormalities (Mehrhof and Bunn, 2024). Some medications for Parkinson's can interfere with the body's ability to regulate temperature Coon and Low, 2018). **Mobility problems** – People with limited mobility may struggle to move to cooler areas or access water easily (United States Environmental Protection Agency, 2025a).
People on certain medications – some of these are widely used and include antihistamines,	Medications can impact on thermoregulation (Hospers et al, 2024). A case study written by a researcher who uses antipsychotic medication in the BMJ (2023) reported they noticed they were a lot less able to tolerate heat including increased sweat, clammy skin, feeling a lot more tired, irritable

Group at increased risk identified by UKHSA (2024a)	Why?
antidepressants, anticholinergics[1], antiepileptics[2], antipsychotics and blood pressure medication, including diuretics and beta blockers (Mehrhof and Bunn, 2024).	and difficulties thinking. At the time they had no idea it was related to their medication. Learning that they need to be more careful has been beneficial to their health.
People who are already ill and dehydrated (for example from diarrhoea and vomiting)	As they are likely to already be dehydrated and may also have electrolyte imbalance.
People with serious mental health problems	People with mental health conditions may be less likely to be aware of heat-related health risks and less able to adapt behaviourally (Mehrhof and Bunn, 2024). Sleep disruption can make depression, bipolar disorder and schizophrenia worse (Rony and Alamgir, 2023). High temperatures can also raise cortisol levels, leading to heightened stress, irritability, and anxiety. Medications can also contribute to difficulties regulating body temperature.
People with alcohol or drug dependence	Consumption of alcohol dehydrates the body by depressing the central nervous system, increasing urination and sweating. Drugs can affect thermoregulation, making it more challenging for the body to deal with higher temperatures (Page et al, 2018; Chang et al, 2023).
People who are physically active and spend a lot of time outside such as runners, cyclists and walkers	The cool towns project identified people using active travel as vulnerable to heat stress (Spanjar et al, 2022).
People who work in jobs that require manual labour or extensive time outside	People in outdoor and manual jobs are at increased risk due to physical exertion generating body heat, potentially prolonged sun exposure, limited shade for cooling, perhaps needing to wear protective clothing and reduced concentration increasing the chance of accidents e.g. when working at heights or using machinery (Mehrhof and Bunn, 2024). Risks will vary between roles and measures taken to reduce heat harms. *The Healthy Places team also identified risks would vary significantly according to the role, for example some workplaces already have very high temperatures e.g. some factories and kitchens, the condition of the building and facilities in place e.g. someone doing a manual job in an*

[1] "Anticholinergic medications are used to treat conditions related to the bladder (such as incontinence), the digestive system (such as irritable bowel syndrome), the brain (such as Parkinson's disease) and the lungs (such as chronic obstructive pulmonary disease)." (Mehrhof and Bunn, 2024).
[2] Anti-seizure medication

Group at increased risk identified by UKHSA (2024a)	Why?
	airconditioned supermarket may be at lower risk than an office worker in a high rise building prone to overheating.
People experiencing homelessness, including rough sleepers and those who are unable to make adaptations to their living accommodation such as sofa surfers or those living in hostels	People experiencing homelessness are at increased risk as they are more likely to be exposed to heat, examples include living in hot informal accommodation, reduced access to drinking water and sitting or lying on hot surfaces (UKHSA, 2024b). They may be more vulnerable than the general population due to underlying health conditions and other factors such as increased physical exertion (e.g. walking to shelter or carrying heavy loads) (UKHSA, 2024b).
People who live alone and may be unable to care for themselves	They may not have people around who can assist should they become ill or in an emergency situation. Many people living alone are older or have chronic illnesses that make them more vulnerable to heat stress.
** Whilst not included on the UKHSA list above people with learning difficulties would also be at an increased level of risk**.	
People with learning disabilities	This is due to potential challenges in recognising health related symptoms, difficulties managing hydration, limited understanding of the dangers of prolonged exposure to heat and communication difficulties.

Housing conditions that put people at increased levels of risk

In addition, there is evidence to show that people living in the following housing types are most at risk of overheating:

Table 3: References include: Bouhi et al, (2022), Geraghty (2022), Mehrhof and Bunn (2024), Lomas and Porritt (2017), Lomat et al (2021) and Vellei et al (2016).

Top-Floor Flats	These are vulnerable due to their exposure to direct sunlight on the roof, which can significantly increase indoor temperatures. Overheating prevalence in the 2018 heatwaves was double for flats compared to all other property types.
Homes with Poor Ventilation	Properties lacking adequate ventilation systems are at higher risk as they cannot effectively dissipate heat.
Urban Areas	Homes in densely populated urban areas are more prone to overheating due to the urban heat island effect, where concrete and asphalt absorb and retain heat.
South-Facing Properties	Homes with large south-facing windows can experience higher indoor temperatures due to increased solar gain.

Properties with dormers	Dormers are often poorly insulated. Loft rooms are more prone to overheating than other rooms.
Large windows and conservatories	Large windows increase solar gain from the sun.
Smaller properties and flats	Are more at risk than larger properties due to surface area to volume ratio. Overheating within small dwellings was roughly four times higher than in dwellings over 100 m2.
Overcrowded properties and temporary accommodation	When more people are within a space, the temperature inside tends to rise because their bodies generate heat. If overcrowding occurs with other features of poor building design this can exacerbate overheating. In temporary accommodation people are less able to control the environment to make it cooler, for example they might not be able to turn off radiators or open windows properly.
****Bungalows** or ground floor bedrooms**	May be more at risk than a standard house if people are afraid to open windows for ventilation at nighttime due to bedroom being on the ground floor.

Lower income also put people at increased levels of risk. This is because they are more likely to live in poorly insulated homes and in more densely populated areas meaning they are more exposed to the heat island effect and will have less access to finance or ability to make adaptations to their homes (Mehrhof and Bunn, 2024). Air quality is also likely to be poorer in the places where poorer populations live, and this gets worse during a heatwave. In England, research has found that admissions to hospital during heatwaves were more pronounced among people who lived in more deprived areas (Rimzie et al, 2022).

Research from the University of Manchester and Friends of the Earth (2022) concluded those **at the intersection of social vulnerability and facing environmental stressors are at the highest level of risk.**

Health risk changes as a result of a generally hotter baseline temperature

Sunburn

Ultraviolet radiation (UVR) can be influenced by ozone concentration, cloud cover, and air pollution, all of which may be altered by climate change. Monitoring indicates that the UV Index, a tool for communicating sunburn risk, has remained nearly constant since the 1920s, with some recent peaks. The impact of climate change on sunlight exposure in the UK is challenging to predict with high certainty due to the influence of sun behaviour (UKHSA, 2023e).

Skin cancer

Whilst the recovery of the ozone layer may help to reduce skin cancers, to return to 1980 values (before the presence of the ozone hole) it is expected it will take until around 2066 over the Antarctic, 2045 over the Arctic and 2040 for the rest of the world **if** current policies remain (UN Environment Programme, 2023).

- Nationally there is slightly higher incidence among males than females.
- Incidence rates are highest for those aged 85-89 years
- Incidence rates for melanoma skin cancer are lower in the Asian and Black ethnic groups, compared with the White ethnic group, in England (2013-2017).
- Skin cancer melanomas has increased by 125% since the 1990s
- In females, the most common specific location for melanoma skin cancers in the UK is the lower limb, in males the most common specific location for melanoma skin cancers in the UK is the trunk (2016-2018).
- Melanoma skin cancer incidence rates are projected to rise by 9% in the UK between 2023-2025 and 2038-2040.
- Melanoma skin cancers are preventable, almost 9 in 10 cases can be prevented from using SPF, avoiding the sun and avoiding sun beds
- This information is from Cancer Research UK (2025)

Whilst people with black or brown skin are less likely to get skin cancer than people with lighter skin, they can still develop skin cancer. Skin cancers on black and brown skin are also more likely to be misdiagnosed at the primary care level (Lyman, Mills and Shipman, 2016).

Food Poisoning

Rising temperatures due to climate change are expected to increase the incidence of non-typhoidal Salmonella infections, which are a major cause of foodborne illness worldwide. The complexity of climate change effects on Salmonella transmission makes predicting future patterns challenging. The occurrence of salmonellosis has been linked to ambient air temperature, with higher temperatures promoting the survival and spread of Salmonella. However, the impact of other climatic variables like precipitation and humidity is less clear and varies by region, though it has been seen in the UK. Overall, it is reasonable to expect

that rising temperatures will lead to an increase in salmonellosis in the UK (UK Health Security Agency, 2023c).

Mental Health

In the UK, hospitalisations for psychiatric conditions have been found to be 9.7% higher in heatwave periods, compared to non-heatwave periods (Thompson et al, 2023). Environmental Audit Committee reported the risk of suicide is twice as high when the temperature reaches 32°C compared to 22°C (Imperial College London, 2024). A UK based systematic review and meta-analysis found that for each 1°C rise in mean temperature above 18°C, there was a 3.8% increase in suicide rates and a 5.0% increase in violent suicides (Thompson et al, 2023).

Climate or eco anxiety is *"heightened emotional, mental or physical distress in response to dangerous changes in the climate"* (Unicef, 2025a). It is a rational response to environmental degradation and is not normally considered a mental health disorder (Unicef, 2025a). It can, however, become problematic when the anxiety begins to interfere with everyday functioning. This might include persistent worry, difficulty sleeping or feelings of depression (Schwartz et al, 2022). Around three in four adults (74%) reported feeling (very or somewhat) worried about climate change (ONS, 2022b).

Increased risk of wildfires

Wildfires commonly occur in the UK, currently they tend to be small and short lived. Wildfire frequency has started to increase in London (UKHSA, 2023e). In the UK, weather conducive to wildfires is projected to occur more frequently due to climate change (Tasker and Wentworth, 2024). There is a risk that major wildfires could affect urban communities and infrastructure in the UK (Tasker and Wentworth, 2024). Warmer and wetter winters may fuel wildfires, and hotter, drier summers could extend the fire season (UKHSA, 2023e). A 2°C increase in global temperatures could double the number of days with very high fire danger in the UK and extend the wildfire season into late summer and autumn (UKHSA, 2023e).

Wildfire smoke exposure can have health consequences, ranging from eye and respiratory tract irritation to more serious conditions such as reduced lung function, bronchitis, asthma exacerbation, heart failure, and even premature death (United States Environmental Protection Agency, 2025b). Studies have linked exposure to PM2.5 and harmful chemicals in

wildfire smoke to an increased risk of cancer across all types (Grant and Runkle, 2022). Additionally, wildfire smoke is associated with inflammatory and oxidative stress, DNA damage, epigenetic modifications, and stress-related disorders in both adults and children (Rizzo and Rizzo, 2025). Increased emissions from wildfires have also been shown to lead to higher hospital and clinic visits among affected populations (United States Environmental Protection Agency, 2025b).

There is limited, but growing research on the health effects of wildfires in the UK. A study on the impact of wildfires on Saddleworth Moor in 2018 found 4.5 million people were exposed to $PM_{2.5}$ concentrations above WHO guidelines. (Graham et al, 2020; UKHSA, 2023e). *"Although people may not have been able to smell smoke, particulate matter was very high in areas far away from the fires, such as Southport and Wigan."* Researchers reported in the BBC (2020).

Other risks to society which impact health

Impact on Work

Extreme heat reduces work capability. A study by Loughborough University found productivity can drop by 76% when temperatures hit 40°C (Smallcombe et al, 2022). Outdoor workers face additional risks from increased UV exposure and skin cancers. An association between outdoor work and skin cancers at current levels already exists (Cherrie et al, 2021). If people have to cancel work due to heatwaves, then there may be economic penalties, this is likely to be particularly detrimental for people in low paid work and the self-employed. However research suggests it is more likely that people will continue to work more intensely than they should for the heat in order to meet their financial obligations (Ioannou et al, 2022).

Increasing violence

Rising temperatures increases the risk of violence. This includes murder, sex offences, assault and civil unrest or collective violence (Levy et al, 2017; Mahendran et al, 2021). There is a substantial body of evidence which suggests a correlation between higher temperatures and increased aggression, this is often referred to as the ‘heat hypothesis’ (Anderson, 2001). A systematic review including 83 individual studies found higher temperatures were significantly associated with increased crime and violence. Specifically, a

10°C (18°F) increase in short-term mean temperature exposure was linked to a 9% increase in the risk of violent crime (Choi et al, 2024). The evidence supports a positive association between elevated temperatures and violent crimes, such as assault and homicide (Choi et al, 2024). It is important to note that the relationship between climate change and violence is complex. Many factors contribute to violence, and climate change is one of them (Miles-Novelo and Anderson, 2019).

Food Security

A concern for the UK within the context of increasing temperatures. Climate change, nature loss and water insecurity all pose risks to global food availability (DEFRA, 2024). The UK is highly dependent on food imports, mostly for fruit, vegetables and seafood. Many of the countries we import from will also face impacts on crop yields, and so will the UK.
It is highly likely that food costs will continue to increase, having the most impact on less wealthy families. Currently just under 50% of the UK's food is imported including 80% of fruit, 50% of vegetables, and 20% of beef and poultry, while the UK is almost completely self-sufficient for wheat, barley, lamb, and potatoes (Jones et al, 2023). Food insecurity will have lifelong impacts on children if they are not provided with adequate nutrition to develop and grow (Gallegos et al, 2021). UK food experts believe there will be civil unrest if there are food shortages for communities. The 58 experts included in the research believe shortages of wheat, bread, pasta and cereal are the types of food most likely to lead to unrest (Jones et al, 2023).

Reduced capability for physical activity

Undertaking outdoor physical activity will become more difficult as temperatures increase and air quality worsens. Exercising in hot and humid conditions is more difficult, and this may reduce motivation, and people may also avoid exercise to reduce the likelihood of sunburn or heat illness (Thompson et al, 2024).

Size of the issue locally

Climate change is a global issue that will impact everyone in the world and therefore everyone in the district in some way. Below includes some data on how it will impact people

in the Bradford district specifically where data exists, some information is only available at a West Yorkshire or at regional level.

Heat Island Effect

Residents living in the most densely populated areas of Bradford District will be more exposed to higher temperatures, temperature differences can range from a few degrees in smaller cities and to over 10 °C in large metropolises (Elmarakby and Elkadi, 2024).

Some of our densest areas within Bradford, Keighley and Shipley are included in table 5. There are an estimated 384,050 people within these areas, using an approximate population figure for the whole district (552,644, mid-year 2022 estimate), 69.5% of our population is at increased risk based on living in densely populated areas alone.

Table 4: Data taken from the locality and ward profiles (City of Bradford Metropolitan Borough Council, 2025a, 2025b). The figures are much higher in the Bradford localities as they are multiple wards.

Bradford East locality	Covers the electoral wards of Bolton and Undercliffe, Bowling and Barkerend, Bradford Moor and Eccleshill, Idle and Thackley and Little Horton.	121,800 people
Bradford West locality	Includes the city centre and includes the electoral wards of Thornton and Allerton, City, Clayton and Fairweather Green, Toller, Heaton and Manningham.	121,400 people
Bradford South locality	Covers the electoral wards of Great Horton, Queensbury, Royds, Tong, Wibsey and Wyke.	106,400 people
Keighley Central ward	One of six wards in the Keighley area which covers the town centre and stretches north to Utley.	18,740 people
Shipley ward	Shipley ward includes Shipley town centre and Saltaire, as well as the residential areas of Nab Wood and Moorhead.	15,710 people
Combined		384,050 people

Heatwave Exposure – Bradford Data

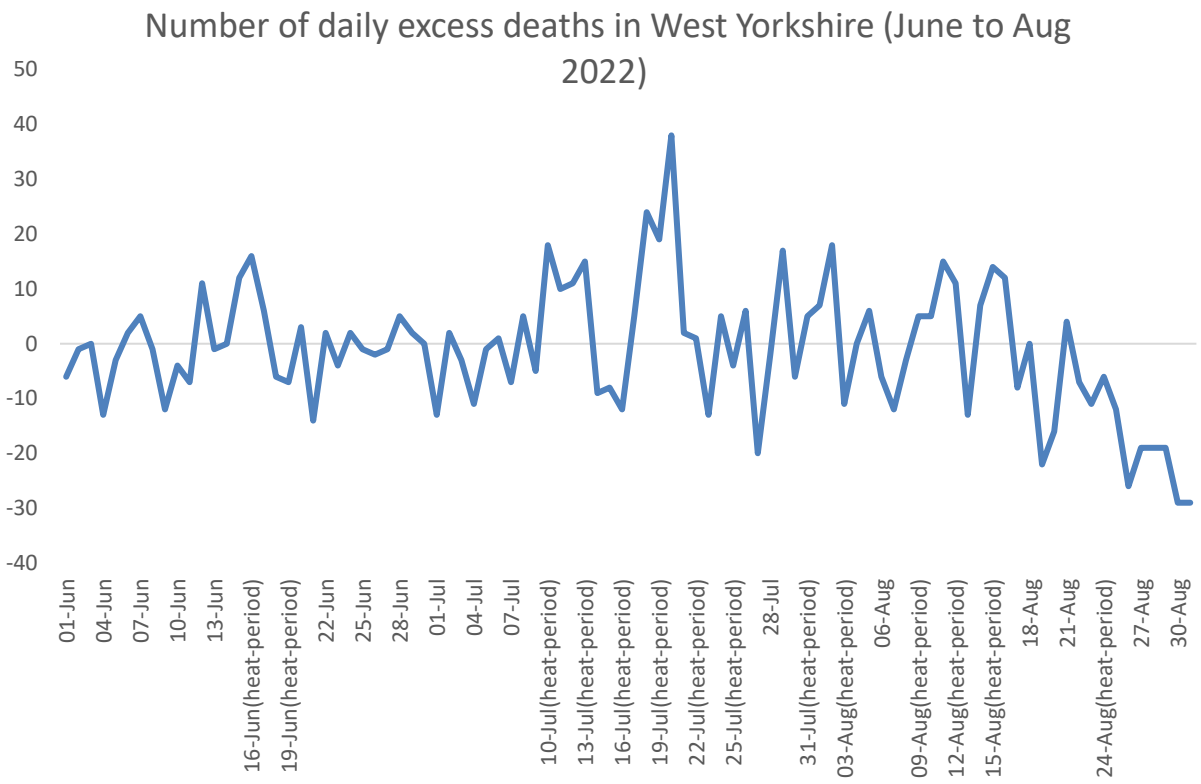
Friends of the Earth have produced an interactive map that identifies neighbourhoods which have enhanced risks of health impacts due to a combination of physical characteristics (eg little green space, lots of flats), enhanced physical risk (eg elderly population, poor health) and low ability to respond (eg low income). These are the neighbourhoods that need prioritising for adaptation measures (Friends of the Earth, 2025).

High Heat & Enhanced Risk 37	High heat, not enhanced risk 13	Lower heat exposure 5
Allerton	Baildon North	Addingham & Ilkley Moor
Bankfoot	Bingley Town	Haworth & Oxenhope
Bakerend East	Cottingley, Harden & Wilsden	Ilkley & Ben Rhydding
Barkerend West & Little Germany	Crossflatts & Eldwick	Oakworth & Laycock
Bierley & Tong	Cullingworth & Denholme	Steeton & Silsden
Bolton Road & Kings Road	Haigh Fold	
Broomfields & East Bowling	Idle	
Brown Royd	Low Moor	
Buttershaw	Queensbury	
Central Bradford	Saltaire & Baildon West	
Chellow Heights	Thackley & Esholt	
Eccleshill	Thornton	
Fairweather Green	Wrose & Bolton Woods	
Frizinghall & Heaton Grove		
Girlington		
Great Horton & Brackenhill		
Heaton Highgate		
Holme Top		
Holme Wood		
Horton Bank		
Laisterdyke & Bowling		
Keighley Central & East		
Keighley Exley Head		
Keighley Oakworth Road & West Lane		
Keighley South		
Keighley Utley		
Manningham & Lister Park		
Ravenscliffe		
Scholemoor		
Shearbridge & University		
Shipley Town		
Thornbury		
Wibsey St Enoch's		
Windhill		
Wyke		

This data could be used to prioritise areas for actions such as increased tree planting, cooling active travel routes, improving urban greening, prioritising for water fountains and any other cooling initiatives.

Number of daily excess deaths in West Yorkshire during heat periods

Between June and August 2022, the highest numbers of daily deaths recorded were seen on days during the heat period, 38 excess deaths on 20th July, 24 deaths on 18th July, 19 deaths on 19th July. The highest number of daily excess deaths in West Yorkshire recorded in the month of June 2022 was on the first day of the heatwave (16 June). By the second heatwave between 10th -25th July, a total of 102 excess deaths were recorded. Also, in the month of August, the highest number of excess deaths recorded in West Yorkshire was seen during the heat period (15 excess deaths on 11th Aug, 14 excess deaths on 15th Aug, 12 excess deaths 16th Aug).


Number of daily excess deaths in West Yorkshire (June to Aug 2022)
50
40
30
20
10
0
-10
-20
-30
-40
01-Jun
04-Jun
07-Jun
10-Jun
13-Jun
16-Jun(heat-period)
19-Jun(heat-period)
22-Jun
25-Jun
28-Jun
01-Jul
04-Jul
07-Jul
10-Jul(heat-period)
13-Jul(heat-period)
16-Jul(heat-period)
19-Jul(heat-period)
22-Jul(heat-period)
25-Jul(heat-period)
28-Jul
31-Jul(heat-period)
03-Aug(heat-period)
06-Aug
09-Aug(heat-period)
12-Aug(heat-period)
15-Aug(heat-period)
18-Aug
21-Aug
24-Aug(heat-period)
27-Aug
30-Aug

Number of daily excess deaths in West Yorkshire by gender

During the heat periods in 2022, cumulatively, the number of daily excess deaths recorded in West Yorkshire was higher in females (107) than in Males (42).

Heat Period	Males	Females
16 - 19 June	6	2
10 - 25 July	37	65
30 Jul – 5 Aug	8	14
8 -17 Aug	18	28
26 - 31 Aug	-27	-2
Total	**42**	**107**

Projected future mortality rates for Yorkshire and the Humber

Table 6 shows current and projected mortality rates for the 2030s, 20250s and 2070s related to heat as a direct result of increasing temperatures for the Yorkshire and Humber region. There is a mean rate, a lowest and highest for each time period.

Table 5: Annual average estimates of temperature related mortality rate in relation to heat in UK regions per 100,000 population of all ages – Yorkshire and the Humber region. Adapted from HECC (2023).

	Now	2030s	2050s	2070s
Mean	**1.41**	**3.25**	**7.33**	**13.65**
Lowest	0.72	1.55	3.72	6.68
Highest	2.58	5.54	11.93	17.80

Estimated numbers of people at increased risk due to housing type

The data is not available for us currently to specifically identify how many houses are at risk in the Bradford district due to their characteristics. However national research[3] led by the University of East London found that the prevalence of indoor overheating reported in UK

[3] The research was a national survey with a sample of 1,600.

dwellings has increased from 20 % (2011) to 82% (2022) (Khosravi et al, 2025). They reported difficulty in keeping at least one room cool during the summer, with bedrooms being the most difficult to keep cool. Over half of the participants experienced sleep disruption and a quarter cited frequent headaches and fatigue (Khosravi et al, 2025).

There are 11,450 households within the district which are in overcrowded accommodation (Office for National Statistics, 2021), and 39 people who are statutory homeless[4].

Estimated numbers of groups at increased risk during hot weather

In relation to the earlier data which identified higher risk groups in hot weather, there is below estimated numbers for each group of people where the data can be gathered. It is important to consider that some people may accumulate numerous risks. If looking just at life stage, where there are three disparate groups this estimates **127, 364** individuals to be at increased risk.

	Group at increased risk identified by UKHSA (2024a)	Possible Numbers
Life Stage	Older people aged over 65 years.	**86, 375** of people in Bradford District are 65 or over[5]
	Babies and young children under the age of 5 years.	**35, 849** children in Bradford District are between ages 0- 4years[6]
	Pregnant women.	Whilst live birth data is not the same as pregnant women this is the closest proxy that could be found. There were 6,684 live births in 2022. If pregnancies were equally spread across a year, then **5,140** women could be pregnant with a baby during hot weather periods.
Health Conditions	People with underlying health conditions, particularly heart problems, breathing problems, dementia, diabetes, kidney disease,	In 2024, the number of people aged 65 and older in Bradford District were registered for General Medical Services with an unresolved diagnosis of dementia was **4,524**[7].

[4] From: Tables on homelessness - GOV.UK
[5] As above
[6] ONS crown copyright reserved (from Nomis on 30 April 2025)
[7] OHID, based on NHS England data

	Group at increased risk identified by UKHSA (2024a)	Possible Numbers
	Parkinson's disease or mobility problems.	Coronary heart disease (CHD) 2023/24 = **19,689** Diabetes: QOF prevalence 2023/24 = **49,091** Asthma prevalence (6+ years) 2023/24 = **45,117**
	People on certain medications – some of these are widely used and include antihistamines, antidepressants, anticholinergics[8], antiepileptics[9], antipsychotics and blood pressure medication, including diuretics and beta blockers (Mehrhof and Bunn, 2024).	Hypertension: QOF prevalence (2023/24) = 91,977 No other data available currently.
	People who are already ill and dehydrated (for example from diarrhoea and vomiting).	Not possible to determine as will change throughout the year and many do not make contact with healthcare if a minor illness.
	People with serious mental health problems.	QOF prevalence (All ages) = 7,197
	People with alcohol or drug dependence.	**703** adults in treatment at specialist alcohol misuse services (2020/21) **2,955** adults in treatment at specialist drug misuse services
Increased risk by activity	People who are physically active and spend a lot of time outside such as runners, cyclists and walkers.	Percentage of physically active adults (19+ yrs) = 62.3% Percentage of physically active children and young people =43.4% (2023/24) This is not a perfect proxy as many people will decide not to exercise during hot weather. Children are generally at more risk than adults as they spend more time outdoors and are therefore more exposed to heat (Unicef, 2025b). They also have other factors such as less likely to realise they are dehydrated and

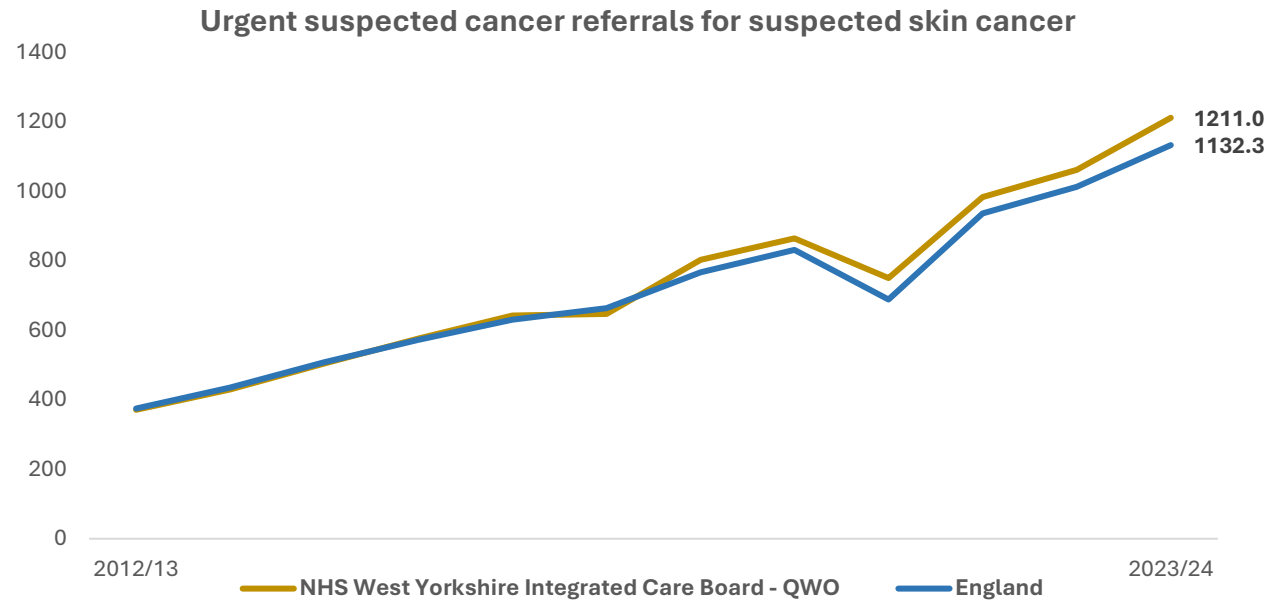
[8] "Anticholinergic medications are used to treat conditions related to the bladder (such as incontinence), the digestive system (such as irritable bowel syndrome), the brain (such as Parkinson's disease) and the lungs (such as chronic obstructive pulmonary disease)." (Mehrhof and Bunn, 2024).
[9] Anti-seizure medication

	Group at increased risk identified by UKHSA (2024a)	Possible Numbers
		their bodies being less efficient at cooling (Unicef, 2025b).
	People who work in jobs that require manual labour or extensive time outside.	Not possible to quantify
Increased risk by circumstance	People experiencing homelessness, including rough sleepers and those who are unable to make adaptations to their living accommodation such as sofa surfers or those living in hostels.	Households in temporary accommodation (2023/24) = **261.** Households owed a duty under the Homelessness Reduction Act = **2,568** **Actual people is likely to be much higher as this figure is for households rather than individuals*
	People who live alone and may be unable to care for themselves.	No data available at the moment.

Direction of travel on skin cancers

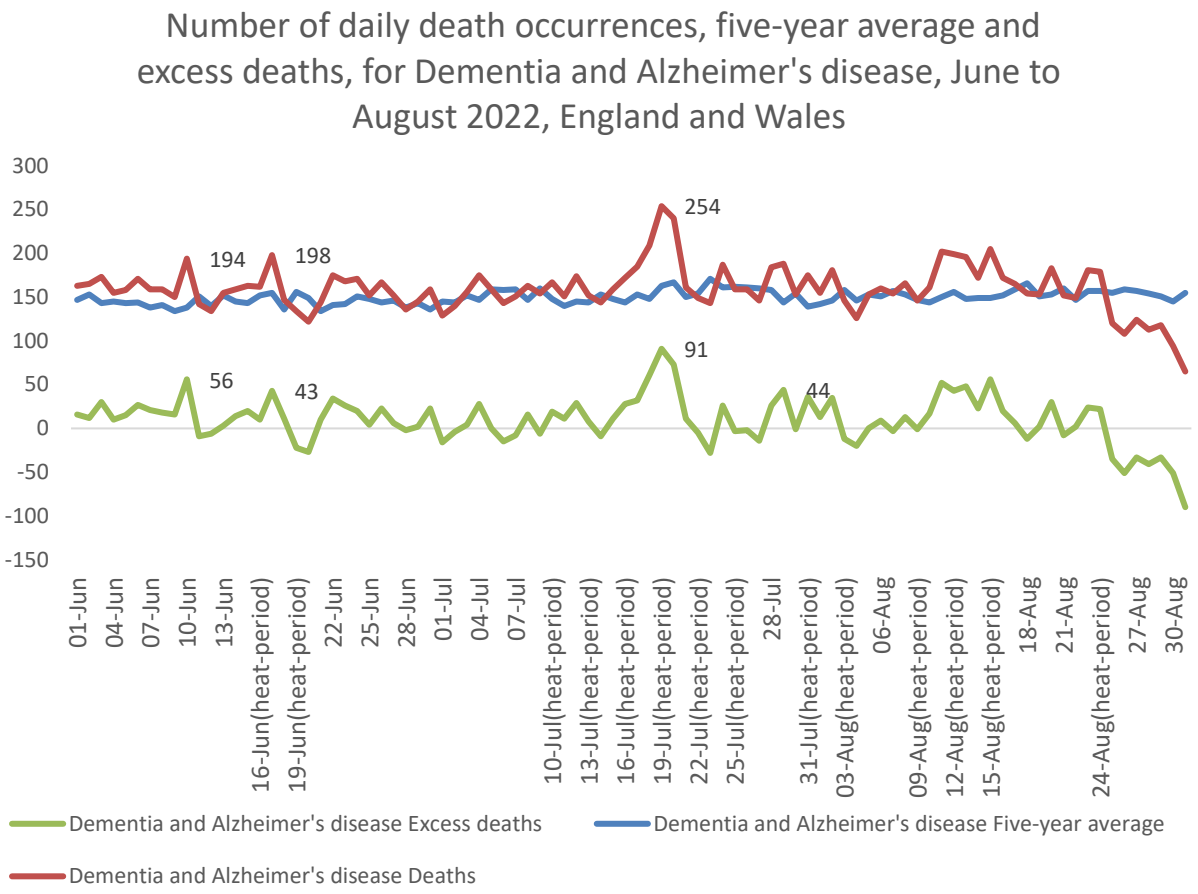
Whilst there are no publicly available data on skin cancer rates in Bradford District, regional data available shows that the rate of suspected cancer referrals for skin cancer in the NHS West Yorkshire ICB footprint has increased in recent years to 1211 per 100,000 population which is significantly higher than England's average of 1132 per 100,000 population.

Urgent suspected cancer referrals for suspected skin cancer



Dementia

In 2024, the number of people aged 65 and older in Bradford District were registered for General Medical Services with an unresolved diagnosis of dementia was 4,524. The rate of people aged 65 and older in Bradford District with a recorded diagnosis of dementia reduced in 2024 to 73.6 per 100 person estimated to have dementia which is statistically similar to England's rate of 64.8 per 100. Whilst there is no local data to show effect of the heat on Dementia, latest data for England and Wales (June-Aug 2022) showed the highest number of deaths due to dementia and Alzheimer's (254) was recorded on 19th July during the heat period.



Violent Crime

Local data is available only on a West Yorkshire basis. Violent crimes against the person, public order offences (which include riot, violent disorder, affray, threatening behaviour, disorderly behaviour, hate incidents) both increase significantly in the warmer months, and recorded sexual offences also increased.

Table 6: Data from West Yorkshire Police which covers Bradford, Calderdale, Kirklees, Leeds and Wakefield. Data from the Home Office (2025).

Violent Crime	April 2023 – September 2023	October 2023 – March 2024	Difference
Violence against the person	64,837	56,169	+ 8,668 in warmer months
Public order offences	18,849	12,926	+ 5,923 in warmer months
Sexual offences	4,740	4,693	+47 in warmer months

Targets and performance

In 2023, UKHSA reviewed and assessed current indicators used to track the impact of climate change on public health in the UK (UKHSA, 2023f). The ones that relate to heat in some way have been included in the table below under 'data available that could be used, or the indicator is in current use', 'needs new processing of existing data' or 'no feasible data available'.

Data available that could be used, or the indicator is currently in use

Name of indicator	Description
H1. Exposure to solar ultraviolet	Acute high or chronic exposure to sunlight increases the risk for a range of health impacts. UKHSA monitors UV radiation from 10 ground-based sites and displays near real-time UV index to the public. Forecasts of UV index is based on satellite data. One of the nine UK PHE solar network monitors is positioned at Leeds.
H4. Annual heat illness	Hot weather has a range of effects on morbidity, even though mortality outcomes generally show stronger impact. UKHSA collects information related to illness (morbidity outcomes) on a real-time basis through syndromic surveillance systems, although it may not be good indicator of overall population impact.
H5. Use of outdoor space for physical activity	Research shows a connection between time spent in greenspace and health improvements; use of outdoor space may change with increasing temperatures and changes in rainfall patterns due to climate change. The Natural England: People and Nature survey includes several questions linked to on this.
HS1. Hospitals overheating incidents	UK summers are getting warmer with climate change, and a study found that up to 90% of hospital wards are vulnerable to overheating during periods of high temperatures due to the type and design of buildings. NHS England trusts are required to report instances of overheating as part of their estates return information collection, and new metrics are currently being developed to ascertain the extent of overheating impacts.

Needs new processing of existing data

Name of indicator	Description
H2. Proportion of housing stock with overheating risk	Indoor overheating is qualitatively defined as the state at which occupants experience thermal discomfort due to the indoor environment, and vulnerability to this varies by location and type of dwelling. This indicator could be derived through empirical or modelling methods but is currently not possible due to lack of regular and frequent monitoring of indoor temperatures.
3. Annual heat-related mortality	Health outcomes such as mortality increase above given temperature thresholds. UKHSA and partner agencies provide information on excess mortality that occurs during recognised heatwaves, which only captures a proportion of the heat-related mortality. This indicator is feasible but may be imprecise at local level due to small numbers.
H7. Spatial planning measures for	Green infrastructure (GI) offers sustainable low-cost cooling solutions, with a larger cooling effect from multiple layers compared to single layered trees. There is not an established indicator for cooling effects of GI components or characteristics, but an

urban cooling	indicator could be derived regarding the increase in cooling-friendly greenspace. The Natural England GI Framework identifies several principles for the consideration of urban cooling, but work is still required to define the most useful indicator.
H8. Local heatwave plan	The 'Adverse Weather and Health Plan (AWHP)' triggers actions in the National Health Service (NHS), public health, social care and other community and voluntary organisations to support people who have vulnerability to heat. Several key parts of the plan are implemented locally and therefore a local strategy for addressing heatwaves would have benefits to health. Details on local area implementation are not centrally collected, hence this indicator is currently not available but would be feasible to achieve.
H9. Extreme heat in the local risk register	Local resilience forums (LRFs) are multi-agency partnerships made up of representatives from local public services, and each has a risk register to recognise and plan for the most important risks. Heatwaves are often not included but including it with a risk level associated would be a useful indicator of local preparedness for extreme heat. All risk registers are publicly available, so it would be possible to monitor if heatwaves are included and the risk assigned.
W2. Population supplied by private wells	Private water supplies (PWS) are particularly at risk of contamination and vulnerable to dry and warm weather. Public Health England (PHE) undertook a survey of private wells in 2011 to 2013. There is currently no routine monitoring of the number or location of private wells, but replicating the data collection done by PHE could be done if information systems were put in place.
W3. Drinking water quality	Public water supplies are at risk of contamination from biological or chemical hazards caused by extreme weather events (flooding and drought). The quality of drinking water is regulated by the DWI and monitored by the individual water companies, or local authorities for PWS. Outbreaks in water supplies are reported, but the cause of the contamination and the role of weather is not routinely determined or reported

No feasible data available

Name of indicator	**Description**
H6. Health impacts of wildfires	Wildfire smoke includes both gases and particulate matter (PM) which can adversely impact on a range of health conditions. Significant increase in local PM due to wildfires can be monitored through the air quality monitoring system, and active wildfires through satellites. There is currently no monitoring of the risk of wildfires occurring or the health impacts of wildfires.
W1. Population affected by supply disruption	Periods of reduced precipitation resulting from climate change will increase the likelihood of periods of water scarcity and droughts. Parts of the UK are already water stressed, and private water supplies are most vulnerable to climate hazards that affect water quality and quantity. Data on number of water usage bans is collected by the water companies, but it is currently not possible to monitor this with publicly available data.
SC1. Care home overheating incidents	UK summers are getting warmer with climate change, and many buildings can experience overheating. Care home residents are particularly vulnerable to heat-related mortality and morbidity. Data on overheating is currently not routinely monitored by care homes.

Current activity, service provision and assets

For the homeless community

The Bradford Homeless Outreach Partnership work with clients during hot temperatures. They hand out bottles of water, providing sunscreen and hats (when they have them). The team take into account Met Office warnings; however they do not wait for the temperature to get to a particular level before taking action. They cover the whole district.

Workplace Health

The council has risk assessments and procedures in place for outdoor workers such as street cleansing staff, parks staff and wardens, and this includes provision of free suncream to outdoor workers.

Housing Standards

Data included within the graph below shows where officers have visited due to another issue and found that the physical condition of the property is inadequate in terms of excess heat. This could include lack of shielding from solar gain, lack of ventilation or lack of controllable heating. It does not refer to observed excess heat. The housing standards team have carried out a search on their database and found they have received no complaints from tenants regarding excess heat in properties to date. Considering officers have found properties to be inadequate on visits, and research has found during the 2018 heatwaves overheating was present within an estimated 19% of English housing stock (Lomas et al, 2021), it is therefore possible that tenants are unaware the council can help with excess heat or the risks of overheating.

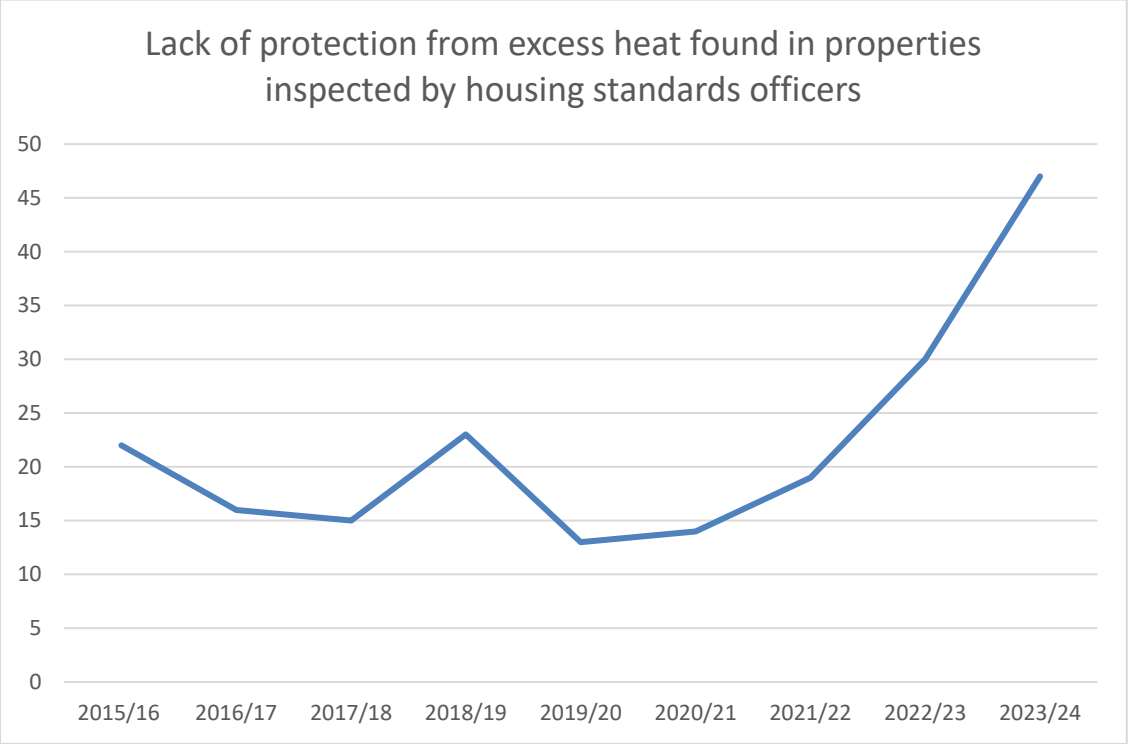


Figure 5: Number of properties where housing standards officers have found property standards to be inadequate in reference to excess heat

Building Regulations

There are building regulations which relate to overheating (HM Government, 2021). This relates only to **building works.** This includes limiting solar gain (e.g. using shading devices or glazing specifications), ventilation strategies (e.g. enabling cross-ventilation[10] or passive ventilation) and building design considerations (e.g. materials and insulation).

Cool Spaces in Libraries

Bradford has already listed warm and welcoming spaces on their website including libraries, community centres, church halls, sports clubs and other places open to anyone. A number of councils are now extending this to include 'cool spaces'. These typically offer shelter from the sun, a space to sit, free water and are free to access. As a starting point the libraries in Bradford were asked if their buildings warm up or remain cool during hot weather, the results of this are included within figure 7. Most libraries say they have not observed an increase in

[10] Cross-ventilation is where air or wind can enter a building through an opening such as a window, and exit through an opening at the other side of the building.

visitors during hot weather periods, though Bingley, Bolling Hall and Manningham have found visitor numbers do increase.

Table 7: Libraries which remain cool or increase in temperature during hot weather periods

Libraries which stay cool	Libraries which heat up
Addingham	Denholme
Bingley	Laisterdyke
Bolling Hall	Manningham (in the childrens area)
Burley-in-Wharfedale	Menston
Clayton	Shipley
Eccleshill	Thornbury
Heaton Hub	Wilsden
Idle	Wyke
Ilkley	
Keighley	
Manningham (in the adults area)	
Queensbury	
Silsden	
Thornton	
Wibsey	

Local Views

We are unaware of any local research or consultation in relation to heat related topics.

Possible topics for research where local views could be gathered include:

- Knowledge or beliefs around how health impacts the body
- Opinions on any campaigns in relation to this topic in terms of messaging
- To understand steps people are taking to mitigate and manage increasing temperatures.

It is important that we learn from other nations who are already experiencing higher temperatures. This also includes other research or projects within the UK, as research funding does not exist to cover all topics within all localities.

Evidence of what works

Efforts to improve the outdoor and indoor environments in which we live will help safeguard people from the harms of rising temperatures.

There are many co-benefits to actions which help to reduce climate change and improve health, these include for the economy, transport systems, the health care system, increased

energy security, job creation, the food system, green spaces, biodiversity, housing and reduced inequalities (Jennings, Fecht and De Matteis, 2020; Office for Health Improvement and Disparities, 2022). The diagram at figure 7 demonstrates many co-benefits for example using fewer fossil fuels improves air quality and lowers CO2 levels.

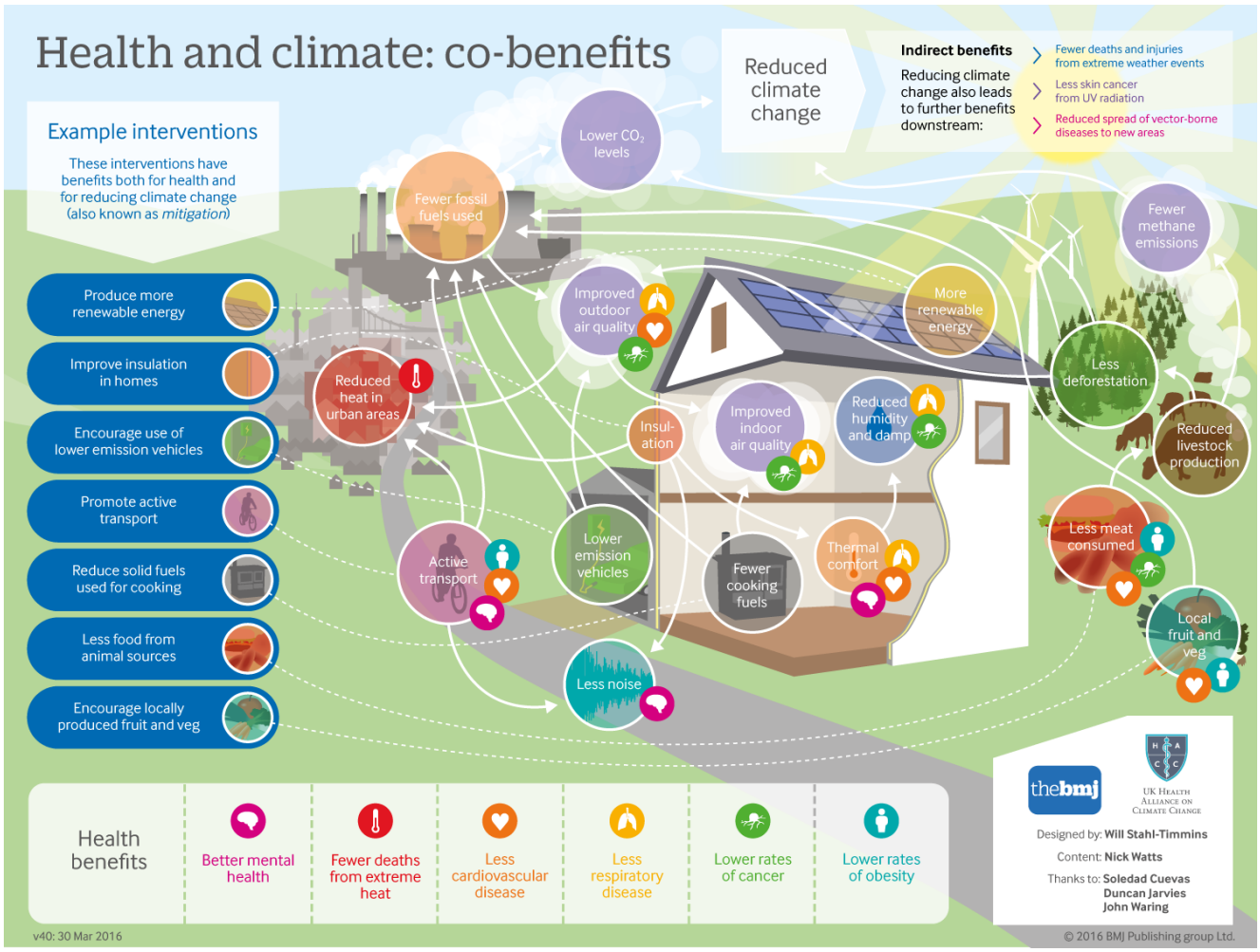


Figure 6: Health and climate co-benefits (BMJ, 2016)

Upstream, midstream and downstream as a framework

The upstream-downstream parable is a popular public health framework which aims to show that while downstream measures are essential, they are simply treating symptoms rather than preventing the problem. It is important to bear in mind potential activity and where this makes a difference when planning any public health interventions. Sometimes public health can be prone to focusing on the downstream activity, and it is important to ensure actions occur at all levels.

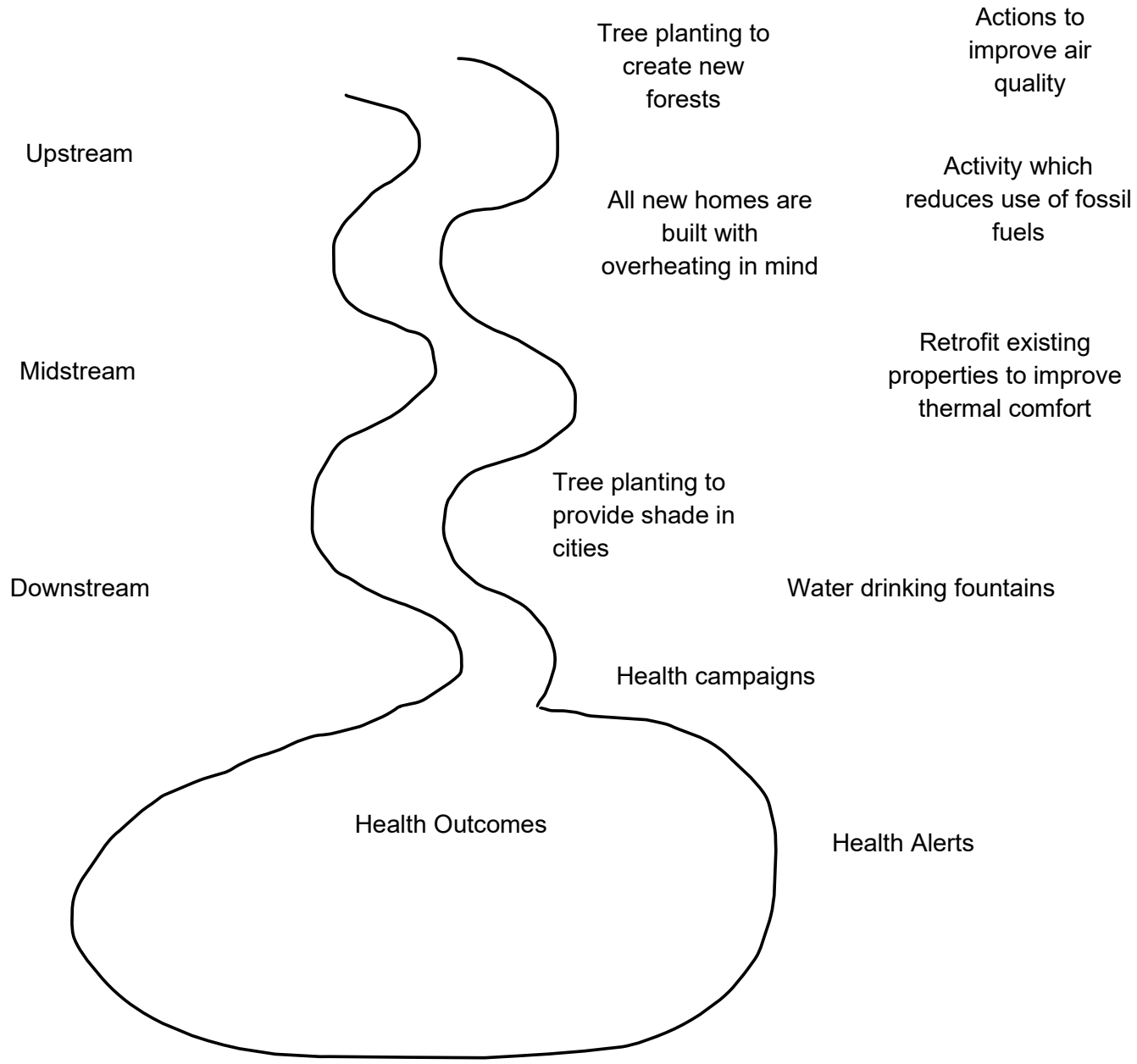


Figure 7: Upstream, midstream and downstream actions in relation to increasing temperatures

Reducing the heat island effect

A range of actions that could reduce the heat island effect are included in table 8.

Table 8: A summary of actions that can reduce urban heating. References include: Alberro (2019); Emmanual (2015); Lanza et al (2025); Susca and Pomponi (2018)

Action	Further Information
Increasing green spaces in towns and cities.	Increasing the coverage of natural ground can absorb rain which is then evaporated by the sun on a hot day which cools the air. *There are also co-benefits for reducing flooding.*
Increase tree planting in urban areas	Reduce temperature by blocking solar radiation. They also provide shade and improve air quality.
Roof painting	Many places across the world are painting roofs white or changing the material to a reflective polymer one.
Green roofs	Plants help to cool cities through the water that evaporates from their leaves and providing shading. Now a legal requirement for big new developments in Toronto and on many buildings in Switzerland. *Co benefits for biodiversity.*
Trees at bus stops to provide shading	Some enclosed shelters increase the chance of heat stress. Tree planting near bus stops to increase shading is recommended.
Cooling active travel routes	Supporting active travel requires ensuring the thermal comfort of pedestrians and cyclists. This could include creating 'cool corridors'

Passive Cooling Methods for Buildings

There is a need for greater employment of passive cooling methods that do not consume energy, and these should be used where possible (Howarth et al, 2024). There are co-benefits to some actions to reduce overheating, as some will also improve thermal comfort during the colder months.

Recommendations for cooling building include are included within table 8.

Table 9: Methods for cooling existing buildings

Windows	For homes with unshaded east, west and south facing windows, the amount of solar gain can be reduced by installing external shading devices like shutters (Department of Energy and Climate Change, 2015). Shutters are often used in southern European countries on the outside of windows. They help to absorb sunlight, which cools the room inside. In cooler countries windows often open outwards, so shutters or blinds would have to be added inside buildings, until home design changes (Brimicombe, 2022). Fixed external shading above windows will block solar gains from the higher altitude summer sun, whilst allowing gains from the lower altitude sun in the other seasons for natural daylight and winter heat. They are most suited to south facing windows (Department of Energy and Climate Change, 2015).
Loft insulation	Research by Lomat et al (2021) found that the prevalence of reported overheating in living rooms was significantly less in dwellings with 50 mm or more of loft insulation. Fabric energy efficiency measures aimed at reducing the wintertime energy demands of English dwellings, did not significantly increase the prevalence of overheating, but need to be monitored.
Rooves	Solar reflective coatings for flat roofs are effective for top floor flats (Department of Energy and Climate Change, 2015).

Air conditioning	Globally, air conditioning is exacerbating carbon emissions (Kleinman Center for Energy Policy, 2025). Air conditioning cannot be relied upon to provide relief to uncomfortable levels of heat. Air conditioning requires a significant amount of energy consumption, and if fuelled by fossil fuels will lead to higher levels of emissions (Howarth el al, 2024). Hot wasted air also exacerbates the 'heat island' effect, and actually increases cooling demands (Salamanca et al, 2014), undermining efforts to reduce the impacts of climate change. If homes and other environment do not have cooling measures put in place then it is likely that increased numbers of wealthier households will pay for a cooling system. This will increase demands on the national grid. It is therefore essential that sustainable cooling solutions, such as improved building insulation, green roofs, and urban greening, are implemented to mitigate the heat island effect and reduce reliance on energy-intensive air conditioning systems. There may be some circumstances where air conditioning is recommended. These may include: **Within healthcare settings** • To prevent surgery cancellation. In a survey of UK doctors during the 2022 heatwaves, one in five reported cancellations of surgeries due to extreme heat (Mehrhof & Bunn, 2024). Cancellations occurred due to staff and bed shortages, and overheating in surgical theatres (GreenSurg Collaborative, 2023). • To avoid IT failures. Extreme heat has caused IT failure within hospital trusts, which impacted healthcare (Mehrhof & Bunn, 2024). **Public transport passengers:** This group are at increased risk due to: • Spending longer time periods outdoors waiting for transport (Liu, 2024). • The urban heat island effect, as transport systems are concentrated on urban areas (Liu, 2024). • Public transport is often used by people more vulnerable to heat stress e.g. the elderly, children, and those with pre-existing health conditions (Ebi et al, 2021). **Within care homes:** As residents are all vulnerable people.

Measures are needed to **cool all spaces**, including the settings stated above, to avoid installation and use of air conditioning which exacerbates carbon emissions if fuelled by fossil fuels (Howarth el al, 2024). A national study found the prevalence of air conditioning units in homes had increased from 3% in 2011 to 20% during the 2020s (Khosravi et al, 2025).

Sun Protection

Evidence shows suncream and sunglasses work to protect people from skin cancer (Sander et al, 2020; Henderson et al, 2022). Other ways of protecting ourselves from the sun such as clothing and spending time in the shade should also be used (Henderson et al, 2022).

What is on the horizon?

Draft Climate Action Plan

Bradford Council has a draft climate action plan for 2025-2028 which aims to work towards net zero emissions. Actions have been captured under the broad headings of transforming travel and transport, increasing renewable energy, decarbonising industry, a sustainable and inclusive economy, warm and comfortable building, enabling community action, managing land and nature' and reducing consumption and waste (City of Bradford Metropolitan District Council, 2025).

Draft adverse weather plan

Bradford Council currently has a draft adverse weather plan. There are three levels of triggers which correlate with warnings from the Met Office.

The Met Office operates a Heat-Health Watch system in England from 1 June to 15 September each year. For the Yorkshire and Humber, the threshold temperatures for day and night are **29°C for daytime temperatures and 15°C for nighttime.**

	Heat Related Trigger	Met Office Heat-Health Watch	Impact
Level 1 - Be aware and prepared	Yellow Met Office weather warnings or Yellow Heat Health Alert.	**Alert and readiness.** 60% chance of temperatures being high enough on at least two consecutive days to have significant effect on health.	At this level it is expected that there will be an increase in demand on health and social care services should the forecasted weather occur.
Level 2 - Take action to reduce impacts and disruption	Amber Met Office weather warnings or Amber Heat Health Alert.	**Heatwave Action required**. Declared when Met Office confirms that threshold temperatures have been reached in any one region or more.	There is an expectation that the heatwave now occurring will impact on people's health and on health and social care services.
Level 3 - Take Action to reduce risk to life and disruption	Red Met Office weather warnings or Red Heat Health Alert.	**Emergency Response.** Declared when a heatwave is so severe and/or prolonged heatwave affecting sectors other than health	At this level, illness and death may occur among the fit and healthy, and not just in high-risk groups

The proposed role of the public health team is:

- Assess and respond to potential effects of heat wave on health of service users and the vulnerable.
- Fulfil roles detailed in the UK Health Security Agency Adverse Weather and Health Plan or NHS Adverse Weather and Health Plan.
- Circulate local weather health messages to vulnerable groups.

Unmet needs and service gaps

Urban Heat Island

The majority of our population is subject to the impacts of the urban heat island effect. There are many areas in which we can make changes to cool the urban environment.

Inadequate housing standards to avoid overheating

With current weather conditions, most homes do not pass nighttime comfort criteria (Bouhi et al., 2022). Data shows that 90% of existing dwellings in the UK require some form of intervention to address overheating risk in a 2°C or higher warming scenario (Bouhi et al., 2022; Howarth et al, 2024).

Public Drinking Water Fountains

There are very few public drinking water fountains in the district. There is one in Ilkley on the South Hawksworth Street Car Park that was funded by the town council.

Public Cool Indoor Spaces

The council currently advertises warm spaces that members of the public can gather for free. They are labelled welcoming spaces for the summer months on some of our webpages, but not all of them. Clear and direct signposting to cool places would likely aid awareness of such spaces in the community.

Knowledge gaps

Public knowledge on the many topics covered within this chapter may need to be explored. Ideally a literature search would be done looking at UK knowledge on related topics as a first step.

A parliamentary report on the public health impacts on heat reports research shows people are not sufficiently aware of the dangers of heat and protective actions that can be taken (Mehrhof and Bunn, 2024). In relation to medications, many have not been studied for temperature interactions (Mehrhof and Bunn, 2024), therefore the public are likely to have limited knowledge.

Recommendations for consideration

	Recommendation
	Upstream Prevention
1	Plant more trees – Create a city forest
2	Reduce oil, coal and natural gas usage and car dominance
3	Reduce energy demands and move to renewables
4	Reduce demands on the transport system e.g. increasing online options where appropriate
5	Actions to improve air quality
6	Reduce consumption and focus on the circular economy
7	Work with planning on guidance to prevent overheating
8	Cooling active travel routes
9	Improve urban greening and reduce ground coverage with plastic grass across the district – and incorporate within planning policy.
	Midstream Prevention
10	Planting shade trees in areas at risk of the urban heat island effect
11	Trees around transport hubs including bus stops
12	Continue to identify opportunities for funding and investment in energy efficiency measures within Bradford housing stock.
13	Water fountains – in public spaces and public buildings
14	Work to ban sunbeds nationally

15	Green roofs (preferable due to biodiversity benefits) and painting roofs white
	Downstream Prevention
16	Health campaign - Dehydration
17	Health campaign – Suncream and the UV index
18	Working with GPs to ensure advice is given to patients taking medications that puts them at increased levels of risk
19	Work with schools to ensure they are following existing guidance and best practice for children e.g. reducing physical activity demands at peak sun, ensuring they have time dedicated to reapplying suncream and improving natural shading.
20	Work on a hot weather advice resource
21	Identify public cool spaces for people to shelter from heat and increase awareness of them
	Research
22	Explore public awareness of health and increasing temperatures

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