

2024

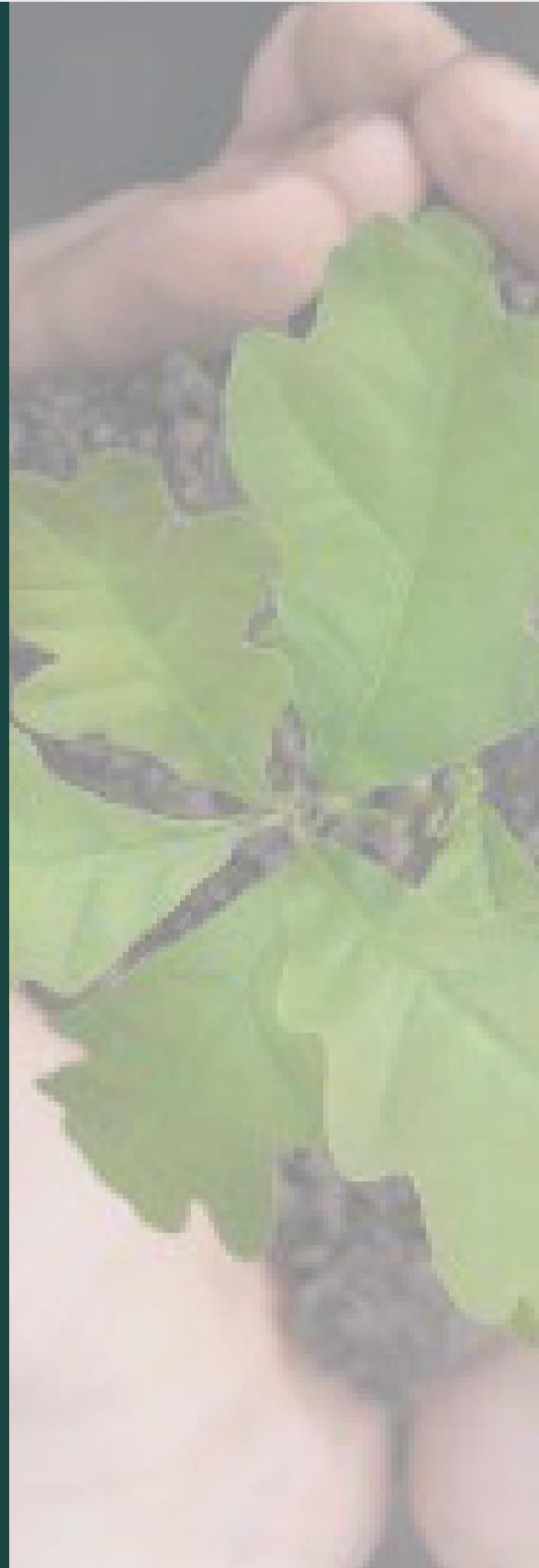


**Director of Public Health
Annual Report 2024:**

Climate Change

Table of Contents

Preface	3
Introduction	4
Wider Impacts	5
Emerging issues	7
Impact on health	12
What groups are most affected	15
Impact on services	20
Responding locally	22
Final Thoughts	32
Where to find out more	33
References	35



PREFACE



*Sarah Perman, Director of Public Health
Hertfordshire County Council*

Welcome to my first Annual Report as Director of Public Health for Hertfordshire. This year, the report is focussed on the challenge of climate change. It looks at the impact of the changing climate on health and on the determinants of health across a wide range of issues. The report highlights the implications of climate change for health inequalities and demand on local services. It also gives a summary of some of the great work being done to respond to these challenges in Hertfordshire.

Climate change is going to have an increasing influence on the health of our communities in years to come, so there's plenty more work to be done, with public health having a key role to play in bringing partners together to work on addressing this global challenge at the local level.

INTRODUCTION

In this 2024 Director of Public Health Annual Report on Climate Change, we demonstrate the intricate relationship between climate change and public health, where health emerges as the golden thread weaving through our sustainability and resiliency efforts. By exploring the links between climate, health, and housing, we identify substantial overlaps that highlight the urgent need for collaboration. Working together with other departments in Hertfordshire County Council and with our local resilience forums is a cornerstone of our efforts to protect local communities against the multifaceted impacts of climate change on health. Addressing health inequalities emerges as a common theme, highlighting the connection between our environment and the health and wellbeing of our residents.

CLIMATE CHANGE DEFINITION

Climate change refers to long-term shifts in global weather patterns and adverse weather including changes in temperature, precipitation, and extreme weather events, primarily driven by human activities such as burning fossil fuels and deforestation. Understanding the impacts of climate change at a local level is crucial because it directly affects communities, ecosystems and economies. Local impacts can include increased frequency of extreme weather events like floods and heatwaves, disruptions to essential services such as water supply and healthcare, threats to agriculture and food security, and heightened risks to vulnerable populations.

ADVERSE WEATHER

Extreme weather events have severe impacts on society and pose an increasing threat as our climate changes. We are currently seeing an increase in the frequency of warm temperature extremes and heavy rainfall events, and a decrease in cold extremes. Furthermore, the frequency and magnitude of flooding is projected to increase in the UK.¹ Alongside this, mean temperatures and daily maximum temperatures are projected to increase.² Warmer temperatures can impact on the geographical distribution of infectious diseases posing a need to predict and protect against potential future health impacts of vector-borne diseases.³ Additionally, the health risks of climate change will not be distributed equally across the UK or across groups, meaning that health inequalities may be further exacerbated. There is a need to adapt to the changing climate whilst also limiting further climate warming.⁴

The risk of adverse health effects from the cold increase as temperature falls, however they can begin to occur at temperatures considered relatively mild (4-8°C). In the UK, mortality and ill health is significantly higher in the winter months compared to other seasons. Cold weather can directly affect health through infectious circulating diseases like influenza; respiratory and heart conditions; falls and injury; and hypothermia. It also indirectly affects health through disruption to healthcare services, cold homes and fuel poverty (linked with poor mental health and social isolation), carbon monoxide poisoning (due to inappropriate use of heating appliances), and lower education/employment attainment (e.g. through inability to study in a cold home).⁵

The Met Office defines a heatwave as “an extended period of hot weather relative to the expected conditions of the area at that time of year, which may be accompanied by high humidity.” The main cause of illness and death during a heatwave are respiratory and cardiovascular diseases, with other specific heat-related illnesses including heat cramps, heat rash, heat syncope (fainting or dizziness), heat exhaustion and heatstroke. Extreme heat can also exacerbate health risks from increased transmission of food, vector and waterborne diseases.⁶

Direct health effects linked to flooding include drowning, physical trauma, and skin and gut infections through contaminated water. Longer-term health effects include mental health impacts, carbon monoxide poisoning, respiratory poisoning from cold and damp, and rodent-borne disease.⁵

EMERGING ISSUES

Vector-borne diseases

Caused by infections with parasites, viruses and bacteria which are transmitted by blood-feeding arthropods (vectors) such as mosquitos, ticks and fleas. With weather and climate changes, the makeup of the vectors change and so do the diseases they transmit. Vector development occurs in warmer weather, and this results in them surviving longer and an increase in the number of bites they give to humans. Climate change is undoubtedly the main factor that promotes the growth of vectors; however, trade and travel can also increase the risk of non-native vectors and pathogens. New evidence shows the direct and indirect effect of climate change that brings the possible risk of non-native vectors and pathogens to the UK.⁷



EMERGING ISSUES

Vector-borne diseases



Mosquito-borne disease

Warming temperatures may result in the introduction and establishment of invasive mosquito species in the UK, with the *Aedes albopictus* species being a particular concern as they can spread several infections including dengue, chikungunya and Zika virus.

Furthermore, despite there not yet being any cases of West Nile Virus (WNV) infections in the UK, climate change will increase the risk of WNV outbreaks, particularly in South East England where the vector species is already established.⁷



Tick-borne disease

Research shows that climate change has contributed to an expanded range of ticks, increasing the risk of tick-borne diseases in areas where ticks were previously unable to survive. There is potential for warming to increase the UK distribution of several tick species, including *Ixodes ricinus*, which can transmit Lyme disease (Lyme borreliosis) and tick-borne encephalitis (TBE). Reported cases of Lyme Disease have been increasing in the UK and climate change may further exacerbate this.⁷ Despite the countrywide increase, in Hertfordshire, the laboratory confirmed incidence rate of acute Lyme disease has significantly decreased since 2021, accounting for only 5 cases.⁸

EMERGING ISSUES

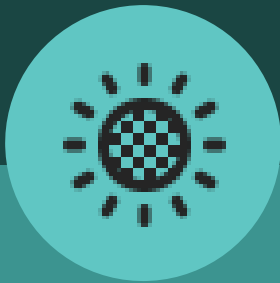
Increasing risk of pandemics

Recent decades have seen an emergence of pathogens crossing from animals into human populations. The risk to public health comes about when such pathogens have or develop the capacity for human-to-human transmission. The increased risk has been driven by population growth into unoccupied regions along with behaviours such as the consumption of wild meat. The emergence and re-emergence of endemic pathogens begin at a local level and continue to grow globally due to international travel, human migration and the international trade of animals and plants. Climate change may also play a role by providing environmental changes that are conducive to the spread of species which transmit such pathogens and adaptive mutations in the pathogens themselves. As the climate changes rapidly, the range of locations that are suitable for the growth of pathogens increases and so does the risk of pandemics.⁹



EMERGING ISSUES

Droughts & wildfires



Drought

Existing evidence focuses on drought and health in developing countries; however, there is growing evidence that projects an increase in frequency and severity of droughts in developed countries. Drought can be defined through various perspectives; for example, agricultural drought is when there is insufficient support for plant water demands. In hydrological drought, there is a deficiency of surface and subsurface water supplies compared to the normal conditions. The health implications for drought in the UK include mental distress from water insecurity for farming communities, air-borne and dust-related diseases and an increase in vector-borne disease. The projections for UK climate anticipate the tendency of increasingly wet winters and drier summers and overall warmer temperatures in all seasons.¹⁰

In 2022, an official drought was declared in several areas of England including in Hertfordshire and North London.¹¹ Residents and businesses were urged to use water wisely. If droughts increase in the future as temperatures rise, there could be pressures on water supplies locally.



Wildfires

Wildfire can be defined as uncontrolled vegetation fire which requires decision, or action, regarding suppression.¹² Following the Swinley Forest fire that threatened infrastructure in South East England, wildfire risk was added to the UK's National Risk Register in 2013.¹³ In the UK, the majority of wildfires have been started by human action. However, environmental risk factors are also crucial, as wildfires are more common during hot weather. Insurance data from 2022 found that Hertfordshire was in the top five fire-prone counties in England with extreme weather and garden fires contributing to the increased risk.¹⁴

The Hertfordshire Fire and Rescue Service (HFRS) can identify the number of wildfires attended by considering a set of criteria. For wildfires, the initial incident type is classed as a small or large fire in the open; the incident must have over four appliances in attendance; and the type of property damaged must fall within the set list of 9 which includes locations such as grassland, woodland, standing crop or other outdoor locations. Between 2022 and 2023, there were 17 wildfires attended by HFRS with the majority occurring in July and August 2022. The district with the most wildfires was Broxbourne (n = 6).

EMERGING ISSUES

Thunderstorm asthma & mass migration of people

Thunderstorm asthma: Characterised by the emergence of acute asthma presentations following a thunderstorm due to meteorological factors that result in more pollen in the atmosphere.¹⁶ In the UK, there is a significant susceptible population of otherwise healthy individuals who may be affected by thunderstorm asthma, and past events suggest that thunderstorm asthma events can overwhelm local medical services and result in fatalities. Climate change is likely to increase the likelihood of such events through a range of mechanisms, including a potential increase in frequency and intensity of storms, and changes in the growth patterns of allergen-producing plants, with increasing carbon dioxide concentrations also linked to an increased spore count of allergenic fungi and increased atmospheric pollen.^{17 18}



Mass migration of people: Climate change is likely to trigger more internal and international migration and displacement, both directly and indirectly, as people are forced to move due to extreme weather events or more gradual threats to livelihoods, food production or the availability of freshwater resources, for example.¹⁹ In 2019-2020, the number of people who internationally migrated into Hertfordshire was 7,574 compared to 5,244 who migrated out internationally leading to a net gain of 2,330 people.²⁰ Climate change could potentially increase the number of people migrating into Hertfordshire.



IMPACT ON HEALTH

Pre-existing chronic medical conditions: Hot temperatures can cause respiratory issues to flare up, particularly if the individual becomes dehydrated, due to increased air pollutants, humidity and pollen levels.⁵ The physiological responses to regulate body temperature can heighten the risk of a cardiac event among people with pre-existing heart conditions.²¹ Cold air also puts strain on the respiratory system, exacerbating conditions like chronic obstructive pulmonary disease (COPD) and asthma and can worsen conditions like arthritis, lupus, anaemia and multiple sclerosis. Those with chronic medical conditions may also take medication that affects thermoregulation, the ability to sweat, or electrolyte imbalance, which increases vulnerability to extreme temperatures.⁵

Mental ill health: A 2023 systematic review and meta-analysis found that increased temperature and temperature variability was associated with increased cases of suicide and suicidal behaviour, hospital attendance for mental health, and worse outcomes for community mental health and wellbeing.²² Furthermore, living in a cold, damp home is associated with an increase in mental health problems, with evidence from the UK Household Longitudinal Study showing that transitioning to a cold home was associated with increased odds of experiencing severe mental distress.²³ Those with underlying mental health conditions have also been identified as being more vulnerable to the psychological impacts of flooding.²⁴

People who are ill or dehydrated: People who are already ill and dehydrated (for example, from diarrhoea and vomiting) are at increased risk during a heatwave. Dehydration impairs the body's ability to regulate its temperature through sweating, and can result in heat cramps, heat syncope, and heatstroke.⁵

IMPACT ON HEALTH

Disabilities: People with learning and/or physical disabilities have been identified as vulnerable to the effects of cold weather if the disability prevents them from being able to keep warm (e.g., being unable to move around) or puts them at greater risk of developing chest infections.²⁵ The 2022 National LeDeR report highlighted a concerning effect on excess deaths of people with a learning disability during heatwaves.²⁶ Research has also shown that individuals with paraplegia (paralysis affecting both legs) and tetraplegia (paralysis affecting both arms and both legs) are unable to adequately control body temperatures in hot environments while resting and during exercise.²⁷

Dementia and Alzheimer's Disease: One of the leading causes of excess winter deaths in England and Wales.²⁸ Some of the proposed reasons for increased vulnerability to cold temperatures among people with dementia include an inability to perceive temperature with a normal degree of sensitivity; inability to get warm in cold conditions due to disturbed physiological processes; and the inability to remedy cold conditions by making adaptive choices (i.e., heating and clothing).²⁹ People with dementia are also at risk of wandering and/or getting lost, which can be particularly dangerous in extreme weather conditions.³⁰

People at risk of falls: Cold weather can affect mobility and increase the likelihood of falls and injuries, particularly among frail and older people, due to worsening symptoms of arthritis in cold and damp houses, reduced strength and dexterity, and snowy and icy conditions increasing the risk of outdoor falls.⁵ This is important in Hertfordshire as falls are already a significant issue. According to Hospital Episode Statistics, in 2021/22, the rate of emergency hospital admissions due to falls in Hertfordshire for those aged 65+ (2,206 per 100,000) and 80+ (5,683 per 100,000) were statistically significantly higher than England (2,100 per 100,000 and 5,311 per 100,000 respectively).

IMPACT ON HEALTH

Alcohol/drug dependence: The use of alcohol and illegal narcotics is associated with increased mortality during heat extremes.²¹ A recent US study found that hospital visits from alcohol and substance-related disorders are elevated by rising temperatures.³¹ Certain drugs may compromise physiological heat loss responses or directly influence the thermoregulatory control centre of the brain.²¹

Air Quality / air pollution: Poor air quality is the largest environmental risk to public health in the UK, as long-term exposure to air pollution can cause chronic conditions such as cardiovascular and respiratory diseases as well as lung cancer, leading to reduced life expectancy.³² In addition, research found that increases in asthma prevalence and severity are linked to urbanisation and outdoor air pollution, with children living in low-income urban areas tending to have more asthma.³³ Research published in 2023 tied two air pollutants, ozone and PM2.5, to asthma-related changes.³⁴

The government has set a target of a maximum concentration of PM2.5 of 10ug/m³ across England by 2040 but the World Health Organization recommend an annual maximum target of 5ug/m³. In Hertfordshire in 2020, concentrations of PM2.5 were higher than England (8.0ug/m³ compared to 7.4ug/m³).^{35 36 37}

For more information, please also see the [Air Quality JSNA Briefing](#).

WHAT GROUPS ARE MOST AFFECTED?

There is a disproportionate impact on vulnerable populations, including the elderly, children, low-income communities, and those with pre-existing health conditions.



Older people

The mortality rates of older adults are closely associated with ambient temperatures.³⁸ Recent statistics from 2021-22 show that the winter mortality index is highest for those aged 75 years and over in both England and Wales.³⁹ In addition, a study of people aged 60+ concluded that exposure to cold temperatures increases blood pressure and risk of blood clotting in healthy adults and older people who are sedentary or wearing minimal clothing.⁴⁰ A national observational study found that during heatwaves from 2016-2020, significant excess mortality was observed for cardiovascular disease, respiratory disease, and Alzheimer's and dementia in persons aged 65+ years.⁴¹



Children under 5

Children are vulnerable to temperature extremes. Children could be particularly at risk for negative health outcomes from rapid heatwaves. There is evidence of higher risk of child mortality during heatwaves and emergency department visits by children also increase during heatwaves.⁴²⁻⁴⁴ Some studies have found that cold-related mortality increased in children on days where the temperature was lower than 6°C.⁴⁵



Pregnant women

Sustained exposure to high ambient temperatures causes acute heat stress in pregnant women and can adversely affect foetal development.⁴⁶ In humans a maternal core body temperature of 39 °C is associated with increased developmental risks to the foetus.⁴⁷ There is also increasing evidence that cold temperature may increase the risk of preterm birth and low birthweight.⁴⁸

WHAT GROUPS ARE MOST AFFECTED?



Living alone

Those who live alone, such as older adults, may be more prone to the effects of adverse or extreme weather conditions compared with other individuals. While this could be partially caused by the increased burden of disease or frailty leading to a change in thermoregulatory ability, there is also evidence to suggest that increased social isolation is a key risk factor in mortality associated with extreme heat or cold. This is due to the impact social isolation can have on resilience and mental health.^{49 50}



Food security

Climate change poses potential risks to food security and health in the UK, primarily through its impact on food production and supply. Research suggests that changes in temperature, rainfall patterns, reduced availability of ground and surface water, and changes in soil quality can disrupt agricultural production, leading to decreased crop and livestock production.⁵¹ In regions where agriculture is already vulnerable due to factors such as drought, existing challenges may be exacerbated by the effects of climate change, hence increasing, food shortages, prices, and food insecurity.⁵²



Deprived areas

Individuals experiencing deprivation are more likely to experience poor housing conditions which have the potential to be exacerbated in adverse weather conditions. Deprivation is also a risk factor for fuel poverty or living in houses with damp and mould.⁵ Housing tenure can be linked to socioeconomic position, meaning tenants may have less control over housing quality, energy efficiency or the resources to undertake necessary improvements.⁵ Deprived areas are also at greater risk of flooding and its adverse effects due to inequalities in flood defense integrity.⁵³

WHAT GROUPS ARE MOST AFFECTED?



Care homes

Due to the demographic profile of individuals living in care homes, vulnerability to adverse weather events should always be considered as residents may often come from at-risk groups. This includes the risks of indoor overheating alongside the risks of lower temperatures on vulnerable residents, as well as ensuring that staff also remain comfortable.¹

Evidence suggests that some older adults could be relatively insensitive to higher temperatures and so be at greater risk of over-heating without realising it. This, combined with limitations on their ability to manage their environment (e.g., opening windows, turning the central heating down), can increase the risk of mortality during extreme heatwaves.⁵⁴



Prisons

The government's Adverse Weather Health Plan includes the need to cater for prisons and ensure both prisoners and staff are protected in the event of adverse weather.¹ It is suggested that prisoners could be at risk of being impacted by adverse weather events due to their confinement. Anecdotal evidence suggests that prison design and regulation can leave prisoners struggling in the heat and cold. Old Victorian-era prisons may lack ventilation as windows are unable to be opened. Prison over-population can lead to overheating.^{55 56}



Schools

UKHSA has issued guidance for managing hot weather in schools noting that children are at an increased risk from hot weather due to their physiology and activity levels.⁵⁷ Relaxing school uniform dress codes, encouraging children to stay in the shade when outside, and opening classroom doors are some examples of measures suggested.⁵⁸

There is a lack of research into the impact of heatwaves and increased temperatures in schools and the extent to which schools follow these guidelines. Some evidence suggests that snow-related closures do not impact on achievement, whilst other evidence suggests that wildfires can impact the attainment of younger students.^{59 60}

WHAT GROUPS ARE MOST AFFECTED?



Fuel poor households

Fuel poverty occurs when a household does not have adequate funds to heat their home or meet basic energy requirements. This puts people at greater risk of living in cold, damp homes which may go on to cause adverse health consequences. Fuel poverty is mostly driven by three factors including household income, energy affordability and energy efficiency.⁶¹ According to a recent government report, 57% of adults in the winter of 2022/23 who had to cut back on their heating use felt that it negatively impacted their health and wellbeing due to the increased damp, dark and cold conditions made worse by winter temperatures.⁶²



Houses with damp & mould

There are certain groups that may be more likely to have mould and damp in their homes including those in living in fuel poverty, those with long-term illness or those from certain demographic backgrounds. Individuals living in certain houses may also be more at risk from the cold. For example, large parts of the housing stock in England are prewar and more challenging to insulate. Individuals at the greatest risk of adverse health effects from damp and mould include those with chronic illness, weakened immune systems, pregnant women, children, or the elderly. Damp and mould are often exacerbated by colder temperatures due to the desire to keep as much heat in the home as possible.^{63 64}



Migrants

Climate change is driving climate migration, and more people will be coming to Hertfordshire with particularly high health needs and adding additional demand to vaccination programmes as many migrants may not be inoculated.^{65 66}

WHAT GROUPS ARE MOST AFFECTED?



Homelessness

People experiencing homelessness are already at greater risk of poor health outcomes, not least in adverse weather conditions including extreme heat, cold and flooding. Being homeless can result in mortality from sleeping outside in freezing temperatures, or other cold weather complications from sitting or lying on cold contact surfaces such as concrete or tarmac.²⁵



Areas at risk of flooding

Local geography, including the location of and proximity to bodies of water, and the physical arrangement of homes in relation to other buildings, streets, parks, and agricultural land, can all be factors contributing to the risk of flooding. For example, homes built on flood plains or basement flats may be more at risk than others.⁵

IMPACT ON SERVICES & SERVICE DEMAND

Climate change poses several significant challenges to local services and service demand in Hertfordshire. As temperatures rise and extreme weather events become more frequent and severe, the demand for emergency services such as fire and rescue, healthcare, and disaster response are likely to increase.²¹ For instance, heatwaves can lead to a surge in heat-related illnesses such as heatstroke and dehydration, placing additional strain on healthcare facilities which are generally not designed to cope with extreme heat.^{67 68}

Extreme weather events disproportionately affect vulnerable people – for example, older adults, lower income groups, and people living with disabilities – which may increase the demand on social services to support these groups.⁶⁹

Intense rainfall events can cause flooding, damaging infrastructure and homes, and requiring emergency response from local authorities. These disruptions can strain the resources of local services in the short-term, through infrastructure damage, transportation issues and overwhelmed medical facilities, in addition to increasing the longer-term demand for services due to the associated physical and mental health consequences of flooding.⁷⁰

Extreme weather events can damage transportation infrastructure, disrupting the delivery of goods and services and making it harder for residents to access essential facilities such as hospitals, schools, and supermarkets.⁷¹

IMPACT ON SERVICES & SERVICE DEMAND

Hertfordshire may face increasing pressure to adapt infrastructure, enhance emergency preparedness, and invest in resilience measures to mitigate the impacts of climate change on local services and meet the evolving needs of our communities. We are already seeing the impact in Hertfordshire.

Utilising the Flood Risk Management viewer, some areas in Hertfordshire have been identified to have higher flood risk based on the flood incident records. Stevenage is potentially the most vulnerable town in Hertfordshire to flooding. Other urban areas at higher risk include St Albans, Watford, Welwyn Garden City, and Hemel Hempstead. Potters Bar, Hoddesdon and Bishop Stortford were also seen to be at risk of flooding.⁷² The Hertfordshire Fire and Rescue Service are being called out to an increasing number of flooding incidents affecting Hertfordshire residents.

Additionally, due to climate change, Hertfordshire has had a series of extreme weather alerts over the past year that have highlighted a number of circumstances, such as heavy rainfall and cold health concerns. In September 2023, a three day Amber heat alert was issued for East of England and in January 2024, there was an Amber Cold Health alert received for East of England which was extended to a week. In May 2024, the MET office issued a yellow warning for heavy rainfall with thunderstorm in Hertfordshire which could result in localised flooding and travel disruptions.

RESPONDING TO CLIMATE CHANGE LOCALLY

Hertfordshire County Council declared a climate emergency in July 2019. Various strategies seek to reduce and mitigate the effects of climate change. Some examples of strategies, services and case studies are listed below.

[The Corporate Plan \(2022-25\)](#): The Corporate Plan has four key priorities, one of which is for Hertfordshire to have a cleaner, greener environment. Under this goal is a commitment to demonstrate environmental leadership to make all HCC operations carbon neutral by 2030. Alongside this are commitments to work collaboratively to ensure accessible and biodiverse green spaces and support residents to minimise waste.

[Sustainable Hertfordshire Strategy \(2022\)](#): There is a need to embed sustainability across all operations and services throughout the county to help reduce the effects of climate change leading to a cleaner, greener, healthier county for all. The Sustainable Hertfordshire Strategy 2022 (March 2023 revision) has 9 key ambitions for Hertfordshire including cleaner air for all by 2030 and becoming a net zero greenhouse gas county before 2050.

[Tree and Woodland Strategy \(2022-2030\)](#): This strategy aims to support the establishment of at least 1.8 million new trees across Hertfordshire by 2030.

[Local Transport Plan](#): This includes proposals of Sustainable Travel Towns that include comprehensive packages of improvements for walking, cycling and passenger transport.

[Energy Strategy](#): This includes ambitions to identify how to reduce energy consumption through service delivery redesign and policy development alongside reducing carbon emissions and developing electric vehicle charging infrastructure.

[Air Quality Strategy](#): This includes ambitions to achieve an improvement in Hertfordshire's air quality, achieve clear leadership on air quality and establish a coherent workstream on air quality.

RESPONDING TO CLIMATE CHANGE LOCALLY

- **The Herts Obesity Prevention Partnership Action Plan (2023-25):** This action plan centres around addressing obesity and promoting healthy weight with a focus on prevention. As part of this action plan, there are plans to promote the Hertfordshire Responsible Food Award which is awarded to those that meet criteria related to healthier eating and sustainability practices including looking at factors such as food waste, recycling and energy use. This project is currently being piloted in Broxbourne with a view to expand wider.
- **Food Insecurity Action Plan:** As climate change poses a threat to food sources, food security needs to be considered. The Hertfordshire Food Insecurity Action Plan was developed with cross-sector agreement by engaging both the Hertfordshire Food Insecurity Steering Group and the Hertfordshire Food Insecurity Alliance. This action plan set priorities for tackling the causes of food insecurity and embedded actions within three themes: prevention, crisis and immediate provision, and changing the landscape. Since its initial launch, the Hertfordshire Food Insecurity Action Plan has been embedded into the Herts Obesity Prevention Partnership Action Plan due to its relevance with the second objective - 'To develop localised solutions to address food insecurity, acknowledging that the causes of obesity and food insecurity can be similar.'
- **Local Flood Risk Management Strategy:** This strategy seeks to lay out the approach to flood risk management in Hertfordshire. The key principles and aims underlying the strategy are:
 - 1) taking a risk-based approach to local flood risk management
 - 2) working in partnership to manage flood risk in the county
 - 3) improving our understanding of flood risk to better inform decision making
 - 4) supporting those at risk of flooding to manage that risk
 - 5) working to reduce the likelihood of flooding where possible, and
 - 6) ensuring the flood risk arising from new development is managed

RESPONDING TO CLIMATE CHANGE LOCALLY

- **Grants for community groups and organisations:** Community groups, organisations and charities who work to reduce or improve food and energy poverty locally, can apply for grants from this partnership with **Hertfordshire Community Foundation.**
- **Let's Clear the Air:** A campaign that highlights some of the actions that can be taken to reduce and protect ourselves from air pollution. The campaign took place between July 2022 and July 2023 and reached over 400,000 people. There was also a 77% increase in the amount of people who signed up to the **air quality alert system.**
- **Housing support:** Temporary housing provided by charities such as Dacorum Emergency Night Shelter (DENs); Catalyst or Group for The Rootless in Watford (GROW).
- **Collaborative working:** Hertfordshire Public Health is working closely with district and borough councils to address the health impacts of poor housing, particularly the effects of damp and mould.
- **Here for you this winter:** Winter health, wellbeing and cost of living campaign run by the Public Health team at Hertfordshire County Council. This campaign includes:
 - **Warm Spaces Directory:** a network of warm spaces people can use. **Information Hub** and **Comms toolkit:** contains a range of marketing materials and content to help promote the campaign across Hertfordshire such as a cost of living flashcard, which has been used across libraries, family centres and frontline social workers etc.
 - **Here For You Winter Health Guide:** Has been sent to households and distributed through over 40 different partners across the county as well as a translated summary in 6 different languages.

RESPONDING TO CLIMATE CHANGE LOCALLY

- **Net Zero Carbon Schools:** Two schools in Hertfordshire are net zero carbon in operation with another being the first school in England to be constructed as full net zero carbon. The design layout and choice of construction materials were carefully chosen to optimise efficiency. Solar panels are also used to help generate electricity needed to for running the schools.
- **Public Sector Decarbonisation Scheme:** In February 2021, 3 HCC funding applications were approved covering a range of projects across both the schools and non-schools' estate. Projects included Air Source Heat Pumps, Cavity Wall Insulation, Double Glazing and Solar Photovoltaic Panels. This programme is now complete and delivered a total of 92 projects over 64 school sites, as well as measures across various non-schools buildings including fire stations, libraries and service-specific buildings.
- **Heat Decarbonisation Plans:** Funded by the Salix Low Carbon Skills Fund (LCSF), a total of 319 Heat Decarbonisation Plans (HDPs) have now been developed for Hertfordshire Schools. These HDPs inform schools the types of interventions that could be considered for their school to decarbonise their buildings within the school's estate in line with sustainability ambitions and policies of HCC.
- **The Countryside Management Service** helps local authorities and residents to take care of and enjoy the environment e.g. through delivering Hertfordshire Healthy Walks and securing funds for project delivery. They also manage Broxbourne and Bencroft Woods, part of Hertfordshire's only National Nature Reserve.
- **Hertfordshire Energy Advice Tool (HEAT):** Gives virtual tour around the home and suggests quick and easy actions to help save money on bills.

CASE STUDY

Housing Quality and Asthma

Watford Borough Council offers [grants and loans](#) focused on vulnerable residents to assist them in making energy efficiency improvements. The assistance is often combined with Government funded schemes such as the [Energy Company Obligation](#) or the [Boiler Upgrade Scheme](#).

The council assistance offers short fall top up funding. It's often the difference between vulnerable residents being able to afford upgrades to improve their comfort, save money on their bills, save CO2 and improve the quality of their health through housing improvements.

The council recently completed external wall insulation to a property and for a resident whose child has asthma. The resident reported that the insulation has resulted in a more consistent temperature throughout their home. Their child's asthma symptoms have improved, as one of the triggers for attacks is change in temperature.

"So [previously] we were really careful as his asthma was sometimes triggered by the instant movement from moving from hot to cold. We used to say to him this section of the house is warmer, now it's a free for all and now it's absolutely brilliant; it's changed the quality of our life...if you have to make sure consistently the house is heated to a level and you have your income and have to try and offset that against how much heating you can put on and we don't actually worry about that anymore as when you put the heating on the house stays heated for 4 or 5 hours."

CASE STUDY

Better Housing, Better Health

Better Housing Better Health is a warm and wellbeing service with the aim to reduce fuel poverty across England. It has been in operation for around 13 years and has grown from a simple energy advice service to a holistic service designed to case manage residents through a variety of fuel poverty support interventions such as grant funding for energy efficiency measures (loft insulation, new heating systems, etc.) and support with energy bills as well as supporting residents with other issues they may be experiencing such as mould and damp, food poverty, ill-health and various social issues.

Better Housing Better Health does this by partnering with local support groups and council services to build a web of referral partners that they can refer residents into for any problem they may have. They currently operate across most of England and have been active in Watford Borough Council for the past 10 years. They work closely with Watford, Three Rivers, Dacorum and St Albans across Hertfordshire and although the service is active across the whole count, they are hoping to improve links with the rest of the Boroughs and Districts in Hertfordshire over the coming winter.

For more information, please see [Better Housing, Better Health](#).

CASE STUDY

Active Travel

Providing infrastructure to enable short journeys by means other than motor vehicles is at the heart of the Hertfordshire Local Transport Plan.

Active Travel such as cycling and walking is one way people can adapt their travel behaviour to reduce their carbon and air pollution footprint. Where constructed through Green Infrastructure, it also presents the opportunity for people to be in the natural environment and benefit from the resulting mental and physical health improvements.

Hertfordshire County Council Countryside & Rights of Way (CROW) has recently made improvements to Turf Lane, Graveley by providing a shared surface along a popular local traffic-free route. Turf Lane is a link in the off-road active travel link between Letchworth Garden City and Stevenage, part of National Cycle Network Route 12. This is one of several Green Infrastructure improvement projects that present the opportunity for people to make short journeys by active means away from motorised traffic. Elsewhere in Hertfordshire improvements to surface and signage are making several of the redundant railway lines (Alban Way, Cole Green Way and Nickey Line) more appropriate for everyday use.

This is one way in which Hertfordshire County Council's Countryside and Rights of Way team is contributing to creating a cleaner, greener and healthier Hertfordshire.

To find out more about CROW's work in Hertfordshire: [Countryside Management Service | Hertfordshire County Council](#).

CASE STUDY

Net Zero Schools

To help support sustainability, new schools have been built by Hertfordshire County Council to be net zero carbon in operation including the Valley School and Avanti Brook Primary School. Additionally, Buntingford First School is the first school within England to be constructed as full net zero carbon. Design layout and construction materials were chosen with sustainability and climate resilience in mind. For example, design elements were implemented to prevent overheating and promote natural ventilation. Low energy lighting is used, triple glazing has been incorporated and 20% of car parking spaces are electric-vehicle charging points. Solar panels are also used in the schools to help generate electricity.

The schools have also won several awards and accreditations. Buntingford First School won the Climate Action Award at the Constructing Excellence Awards 2024 (Herts, Beds and Bucks region). The Valley School also won the Building Project of the Year at the Constructing Excellence Awards 2024 (Herts, Beds and Bucks region); the Best Project Delivering Sustainable Outcomes at the Pagabo Awards 2024; and the Best Non-residential New Build at the Hertfordshire Building Control Awards 2024.

This work is in line with the [Sustainable Hertfordshire Strategy](#) and ambition to be a net zero greenhouse gas county before 2050.



CASE STUDY

Clean Air Night

Clean Air Night was a campaign to raise awareness about the impacts of burning wood at home. Wood burning stoves and open fires are becoming more common, but many people are unaware that this source of heating creates more CO₂ per kWh than burning gas; produces more air pollution inside and outside than other forms of heating; and is typically more expensive to run than traditional heating sources.

The Hertfordshire County Council Public Health campaign employed Global Action Plan, devisors of Clean Air Day, to promote information on these aspects. The campaign had its messages endorsed by experts in the air quality field and assets were made available for others to share. Upon completion of the campaign in January 2024 we found over 20% of English Local Authorities had disseminated our messages.

Campaign assets can be found at: [Clean Air Night | Global Action Plan \(actionforcleanair.org.uk\)](https://actionforcleanair.org.uk) where there are key facts and graphics for use.

CASE STUDY

Community Spaces and mental health support

Hertfordshire's Warm Spaces initiative and Warm Herts grants were launched in October 2022 in partnership with the county's ten district and borough councils as part of its Cost of Living response, to provide a range of warm spaces that are free and accessible to all Hertfordshire's residents. These Warm Spaces are hosted by libraries, community groups, family centres, and faith groups across Hertfordshire, opening their doors and welcoming residents into their space. A new transport scheme, developed in partnership with Community Help Hertfordshire, provides free transport for residents to get to a Warm Space. Warm Spaces provide safe, warm spaces for residents to use this winter, in which they can join in various activities and in some cases also have a hot meal.

Additionally, the mental health and suicide prevention team at Hertfordshire County Council worked closely with Hertsmere Borough to plan and fund mental health awareness and mental health first aid training to those working with the Warm Space initiative. This has been rolled out to all Warm Spaces venues in Hertfordshire. In addition, foodbank staff and volunteers across Hertfordshire have been offered this free mental health awareness and first aid training. This recognises the demand placed on foodbank staff to whom residents have spoken of increased anxiety and depression due to financial and other pressures. There is large demand for this training and currently a waiting list. Further work is taking place with partners to address this need and ensure support services are available to people in crisis.

Following the success of the Warm Spaces Initiative, we have transitioned to Community Spaces, where people can find a warm or cool space depending on the environmental needs.



FINAL THOUGHTS

We hope that you've found this report informative. We've tried to keep it concise by just briefly highlighting some of the key issues, but each of the topics highlighted could easily be the subject of a more detailed report in its own right. The changing climate presents us with complex problems that will affect all of us and which all of us have a role to play in tackling.



Our health and social care system is facing substantial pressures due to the difficult economic times we're in and the increase in demand for services linked to the ageing population. Climate change adds another area of substantial challenge into the picture. It's really important, therefore, that we work proactively together in partnership to ensure that we're ready for this growing threat to public health. Through working as a whole system, we can build joined-up approaches to respond to the impacts of climate change and help to protect the health of our communities for the future.

WHERE TO FIND OUT MORE

For evidence, intelligence & evaluation visit:
<http://www.hertshealthevidence.org.uk>

For JSNAs or literature reviews visit:
<http://www.hertfordshire.gov.uk/jsna>

Adverse Weather Lite Bite

Hertfordshire's Joint Strategic Needs Assessment (JSNA) looks at the specific health and social care needs of our local population and highlights areas of inequality. It helps public bodies decide what type of local services to commission.



The report has been produced using evidence and statistics presented in the Hertfordshire Adverse Weather Lite Bite. You can read the JSNA Lite Bite by going to hertfordshire.gov.uk/jsna or scanning the QR code above.

Climate Change: Health Effects in the UK

This report by UKHSA provides evidence, analysis and recommendations based on climate change projections for the UK. It can be accessed at [Climate change: health effects in the UK - GOV.UK \(www.gov.uk\)](https://www.gov.uk) or by scanning the QR code to the right.



WHERE TO FIND OUT MORE

[Sustainable Hertfordshire Strategy \(2022\)](#)

[Tree and Woodland Strategy \(2022-2030\)](#)

[Hertfordshire's Local Transport Plan](#)

[Hertfordshire's Energy Strategy](#)

[Hertfordshire's Air Quality Strategy](#)

[Local Flood Risk Management Strategy \(2019-2029\)](#)

[Sustainable Travel Towns](#)

[Let's Clear the Air](#)

[Countryside Management Service HCC](#)

[Healthy Places HCC](#)

[Hertfordshire Community Foundation](#)

[Warm Spaces Directory](#)

[Here for You Winter Guide](#)

[Hertfordshire Energy Advice Tool](#)

[Air Quality JSNA Briefing](#)



REFERENCES

1. UKHSA. *Health Effects of Climate Change (HECC) in the UK: 2023 Report: Chapter 3. Climate Change, Flooding, Coastal Change and Public Health* .; 2023.
2. Coley D, Liu C, Fosas D. The week that will be: Communicating the impact of climate change via extreme weeks. *Build Environ*. 2023;227:109809. doi:10.1016/J.BUILDENV.2022.109809
3. UKHSA. *Health Effects of Climate Change (HECC) in the UK: 2023 Report: Chapter 7. Effect of Climate Change on Infectious Diseases in the UK*.; 2023.
4. *Health Effects of Climate Change (HECC) in the UK: State of the Evidence 2023*.; 2023. Accessed February 1, 2024. <https://assets.publishing.service.gov.uk/media/659ff6a93308d200131fbe78/HECC-report-2023-overview.pdf>
5. UKHSA. *Adverse Weather and Health Plan: Supporting Evidence*.; 2024. https://assets.publishing.service.gov.uk/media/645b713dc6e897000ca0fc45/AW_HP_Evidence.pdf
6. Met Office. What is a heatwave? Accessed January 5, 2024. <https://www.metoffice.gov.uk/weather/learn-about/weather/types-of-weather/temperature/heatwave>
7. UKHSA. *Health Effects of Climate Change (HECC) in the UK: 2023 Report. Chapter 8. Direct and Indirect Effects of Climate Change on Vectors and Vector- Borne Diseases in the UK*.; 2023. Accessed May 1, 2024. <https://assets.publishing.service.gov.uk/media/65708af2809bc3001330819c/HECC-report-2023-chapter-8-vector-borne-diseases.pdf>
8. OHID. Health Protection - Data - OHID. Published 2023. Accessed May 22, 2024. https://fingertips.phe.org.uk/profile/health-protection/data#page/4/gid/1000002/pat/15/ati/502/are/E10000015/iid/93_863/age/1/sex/4/cat/-1/ctp/-1/yr/1/cid/4/tbm/1
9. Baker RE, Mahmud AS, Miller IF, et al. Infectious disease in an era of global change. *Nat Rev Microbiol*. 2022;20(4):193-205.
10. Bryan K, Ward S, Roberts L, et al. The health and well-being effects of drought: assessing multi-stakeholder perspectives through narratives from the UK. *Clim Change*. 2020;163:2073-2095.
11. BBC News. UK Heatwave: Official drought declared across large parts of England - BBC News. Published August 12, 2022. Accessed May 29, 2024. <https://www.bbc.co.uk/news/uk-62508521>
12. Graves D. *The Causes and Prevention of Wildfire on Heathlands and Peatlands in England*. Natural England; 2020.
13. Gazzard R, McMorro J, Aylen J. Wildfire policy and management in England: an evolving response from Fire and Rescue Services, forestry and cross- sector groups. *Philosophical Transactions of the Royal Society B: Biological Sciences*. 2016;371(1696):20150341.
14. Liberty Sheldon. Warning as Hertfordshire found to be one of the “most fire- prone areas in the UK.” Published July 21, 2022. Accessed May 7, 2024. <https://www.hertfordshiremercury.co.uk/news/hertfordshire-news/warning-hertfordshire-found-one-most-7363005>
15. Arnell NW, Freeman A, Gazzard R. The effect of climate change on indicators of fire danger in the UK. *Environmental Research Letters*. 2021;16(4):044027.

REFERENCES

16. Price D, Hughes KM, Thien F, Suphioglu C. Epidemic Thunderstorm Asthma: Lessons Learned from the Storm Down-Under. *J Allergy Clin Immunol Pract.* 2021;9(4):1510-1515. doi:10.1016/J.JAIP.2020.10.022
17. Kevat A. Thunderstorm Asthma: Looking Back and Looking Forward. *J Asthma Allergy.* 2020;13:293. doi:10.2147/JAA.S265697
18. Thompson R, O'Connell E, Elliott A. *Thunderstorm Asthma and Public Health – Looking Back to Move Forward.*; 2022. Accessed May 1, 2024. <https://ukhsa.blog.gov.uk/2022/03/18/thunderstorm-asthma-and-public-health-looking-back-to-move-forward/>
19. Weston T. *Climate Change-Induced Migration: UK Collaboration with International Partners.*; 2023. Accessed May 1, 2024. <https://lordslibrary.parliament.uk/climate-change-induced-migration-uk-collaboration-with-international-partners/#:~:text=Climate%20change%20is%20likely%20to,the%20hardest%20hit%20regions%20uninhabitable.>
20. Office For National Statistics. Local Area Migration Indicators, Uk (Discontinued After 2020) - Office For National Statistics. Published September 2021. Accessed May 29, 2024. <https://www.ons.gov.uk/peoplepopulationandcommunity/populationandmigration/migrationwithintheuk/datasets/localareamigrationindicatorsunitedkingdom>
21. Ebi KL, Capon A, Berry P, Et Al. Hot Weather And Heat Extremes: Health Risks. *The Lancet.* 2021;398(10301):698-708. Doi:10.1016/S0140-6736(21)01208-3
22. Thompson R, Lawrance EL, Roberts LF, Et Al. Ambient Temperature And Mental Health: A Systematic Review And Meta-Analysis. *Lancet Planet Health.* 2023;7(7). Doi:10.1016/S2542-5196(23)00104-3
23. Clair A, Baker E. Cold Homes And Mental Health Harm: Evidence From The Uk Household Longitudinal Study. *Soc Sci Med.* 2022;314. Doi:10.1016/J.Socscimed.2022.115461
24. Ukhsa. Flooding And Health: An Overview . Gov Uk. Published December 19, 2023. Accessed January 5, 2024. <https://www.gov.uk/government/publications/flooding-and-health-advice-for-frontline-responders/flooding-and-health-an-overview>
25. Ukhsa. Supporting Vulnerable People Before And During Cold Weather: Healthcare Professionals. Gov Uk. Published September 11, 2023. Accessed January 5, 2024. <https://www.gov.uk/government/publications/cold-weather-and-health-supporting-vulnerable-people/supporting-vulnerable-people-before-and-during-cold-weather-healthcare-professionals>
26. White A, Sheehan R, Ding J, Roberts C, Magill N, Keagan-Bull R. *Leder Annual Report Learning From Lives And Deaths: People With A Learning Disability And Autistic People.*; 2023.
27. Forsyth P, Miller J, Pumpa K, Thompson Kg, Jay O. Independent Influence Of Spinal Cord Injury Level On Thermoregulation During Exercise. *Med Sci Sports Exerc.* 2019;51(8):1710-1719. Doi:10.1249/MSS.0000000000001978
28. Ons. Winter Mortality In England And Wales: 2021 To 2022 (Provisional) And 2020 To 2021 (Final). Census 2021.
29. Liddell C, Morris C, Gray B, Czerwinska A, Thomas B. Excess Winter Mortality Associated With Alzheimer's Disease And Related Dementias In The Uk: A Case For Energy Justice. *Energy Res Soc Sci.* 2016;11:256-262. Doi:10.1016/J.Erss.2015.11.007
30. National Council On Ageing. Understanding Wandering Risk With Older Adults . Published November 20, 2023. Accessed January 8, 2024. <https://www.ncoa.org/adviser/medical-alert-systems/dementia-wandering/>

REFERENCES

31. Parks Rm, Rowland St, Do V, Et Al. The Association Between Temperature And Alcohol- And Substance-Related Disorder Hospital Visits In New York State. *Communications Medicine* . 2023;3(1):1-9. Doi:10.1038/S43856-023-00346-1
32. Health Matters: Air Pollution - Gov.Uk. Accessed April 30, 2024. <https://www.gov.uk/government/publications/health-matters-air-pollution/health-matters-air-pollution>
33. National Institute Of Environmental Health Sciences: Air Pollution And Your Health. Accessed April 30, 2024. <https://www.niehs.nih.gov/health/topics/agents/air-pollution>
34. Altman Mc, Kattan M, O'connor Gt, Et Al. Associations Between Outdoor Air Pollutants And Non-Viral Asthma Exacerbations And Airway Inflammatory Responses In Children And Adolescents Living In Urban Areas In The Usa: A Retrospective Secondary Analysis. *Lancet Planet Health*. 2023;7(1):E33-E44. Doi:10.1016/S2542-5196(22)00302-3
35. Department For Environment Food And Rural Affairs. Air Quality Targets In The Environment Act-Defra, Uk. Accessed January 6, 2023. <https://uk-air.defra.gov.uk/library/air-quality-targets>
36. World Health Organization. Ambient (Outdoor) Air Pollution. Published 2022. Accessed January 6, 2023. [https://www.who.int/news-room/fact-sheets/detail/ambient-\(outdoor\)-air-quality-and-health](https://www.who.int/news-room/fact-sheets/detail/ambient-(outdoor)-air-quality-and-health)
37. Fingertips. Public Health Profiles - Air Pollution . Accessed February 2, 2023. <https://fingertips.phe.org.uk/search/air-pollution#Page/6/Gid/1/Pat/159/Par/K02000001/Ati/15/Are/E92000001/Iid/30101/Age/230/Sex/4/Cat/-1/Ctp/-1/Yrr/1/Cid/4/Tbm/1>
38. Huang Y, Yang J, Chen J, Shi H, Lu X. Association Between Ambient Temperature And Age-Specific Mortality From The Elderly: Epidemiological Evidence From The Chinese Prefecture With Most Serious Aging. *Environ Res*. 2022;211:113103. Doi:10.1016/j.envres.2022.113103
39. Ons. Winter Mortality In England And Wales: 2021 To 2022 (Provisional) And 2020 To 2021 (Final). Census 2021. Published January 19, 2023. Accessed January 5, 2024. <https://www.ons.gov.uk/peoplepopulationandcommunity/birthsdeathsandmarriages/deaths/bulletins/excesswintermortalityinenglandandwales/2021to2022provisionaland2020to2021final>
40. Cold-Induced Increases In Erythrocyte Count, Plasma Cholesterol And Plasma Fibrinogen Of Elderly People Without A Comparable Rise In Protein C Or Factor X | Clinical Science | Portland Press. Accessed January 5, 2024. <https://portlandpress.com/clinsci/article-abstract/86/1/43/76040/cold-induced-increases-in-erythrocyte-count-plasma?redirectedfrom=fulltext>
41. Thompson R, Landeg O, Kar-Purkayastha I, Hajat S, Kovats S, O'connell E. Heatwave Mortality In Summer 2020 In England: An Observational Study. *International Journal Of Environmental Research And Public Health* 2022, Vol 19, Page 6123. 2022;19(10):6123. Doi:10.3390/Ijerph19106123
42. Khalaj B, Lloyd G, Sheppard V, Dear K. The Health Impacts Of Heat Waves In Five Regions Of New South Wales, Australia: A Case-Only Analysis. *Int Arch Occup Environ Health*. 2010;83(7):833-842. Doi:10.1007/S00420-010-0534-2
43. Xu Z, Sheffield Pe, Su H, Wang X, Bi Y, Tong S. The Impact Of Heat Waves On Children's Health: A Systematic Review. *Int J Biometeorol*. 2014;58(2):239-247. Doi:10.1007/S00484-013-0655-X

REFERENCES

44. Ghirardi L, Bisoffi G, Mirandola R, Ricci G, Baccini M. The Impact Of Heat On An Emergency Department In Italy: Attributable Visits Among Children, Adults, And The Elderly During The Warm Season. *Plos One*. 2015;10(10). Doi:10.1371/Journal.Pone.0141054
45. Díaz J, Linares C, García-Herrera R, López C, Trigo R. Impact Of Temperature And Air Pollution On The Mortality Of Children In Madrid. *J Occup Environ Med*. 2004;46(8):768-774. Doi:10.1097/01.Jom.0000135542.12974.49
46. Rylander C, Odland J Øyvind, Sandanger Tm. Climate Change And The Potential Effects On Maternal And Pregnancy Outcomes: An Assessment Of The Most Vulnerable – The Mother, Fetus, And Newborn Child. *Glob Health Action*. 2013;6(1). Doi:10.3402/Gha.V6i0.19538
47. Ravanelli N, Casasola W, English T, Edwards Km, Jay O. Heat Stress And Fetal Risk. Environmental Limits For Exercise And Passive Heat Stress During Pregnancy: A Systematic Review With Best Evidence Synthesis. *Br J Sports Med*. 2019;53(13):799-805. Doi:10.1136/Bjsports-2017-097914
48. Ha S, Liu D, Zhu Y, Kim Ss, Sherman S, Mendola P. Ambient Temperature And Early Delivery Of Singleton Pregnancies. *Environ Health Perspect*. 2017;125(3):453. Doi:10.1289/Ehp97.
49. Kaftey A, Henderson Sb, Lubik A, Kancir J, Kosatsky T, Schwandt M. Social Connection As A Public Health Adaptation To Extreme Heat Events. *Canadian Journal Of Public Health*. 2020;111(6):876-879. Doi:10.17269/S41997-020-00309-2
50. Arthurson K, Baum S. Making Space For Social Inclusion In Conceptualising Climate Change Vulnerability. *Local Environ*. 2015;20(1):1-17. Doi:10.1080/13549839.2013.818951
51. Uk Health Security Agency. *Health Effects Of Climate Change (Hecc) In The Uk: 2023 Report.*; 2023. Accessed May 2, 2024. <https://assets.publishing.service.gov.uk/media/659ff76ee96df5000df844c3/Hecc-Report-2023-Chapter-9-Food-Supply.Pdf>
52. Mirzabaev A, Bezner Kerr R, Hasegawa T, Et Al. Severe Climate Change Risks To Food Security And Nutrition. *Clim Risk Manag*. 2023;39:100473. Doi:10.1016/J.Crm.2022.100473
53. Environment Agency. Social Deprivation And The Likelihood Of Flooding. Gov Uk. Published May 3, 2022. Accessed May 15, 2024. <https://www.gov.uk/government/publications/social-deprivation-and-the-likelihood-of-flooding>
54. Gupta R, Howard A, Davies M, Et Al. Examining The Magnitude And Perception Of Summertime Overheating In London Care Homes. *Building Services Engineering Research And Technology*. 2021;42(6):653-675. Doi:10.1177/01436244211013645/Asset/Images/Large/10.1177_01436244211013645-Fig7.Jpeg
55. Penal Reform International. Prisons In Crises: Natural Hazards And Extreme Weather . Published 2021. Accessed May 15, 2024. <https://www.penalreform.org/global-prison-trends-2021/special-focus-2021-prisons-in-crises/natural-hazards-and-extreme-weather/>
56. Huffpost Uk News. Prison Tensions Risk Boiling Over As Heatwave Hits “Oven-Like” Jails. Published July 25, 2018. Accessed May 15, 2024. https://www.huffingtonpost.co.uk/entry/heatwave-jails_uk_5b5759fde4b0b15aba92d159
57. Ukhsa. Looking After Children And Those In Early Years Settings Before And During Hot Weather: Teachers And Other Educational Professionals. Published 2023. Accessed February 1, 2024.
58. Gov.Uk. Hot Weather And Heatwaves: Guidance For Schools And Other Education Settings. Published 2023. Accessed February 1, 2024. <https://educationhub.blog.gov.uk/2023/07/12/hot-weather-and-heatwaves-guidance-for-schools-and-other-education-settings/>

REFERENCES

59. Miller Rk, Hui I. Impact Of Short School Closures (1–5 Days) On Overall Academic Performance Of Schools In California. *Scientific Reports* 2022 12:1. 2022;12(1):1-13. Doi:10.1038/S41598-022-06050-9
60. Goodman J. *Flaking Out: Student Absences And Snow Days As Disruptions Of Instructional Time.*; 2014. Accessed February 1, 2024. https://www.nber.org/system/files/working_papers/W20221/W20221.pdf
61. Alice Lee, Ian Sinha, Tammy Boyce, Jessica Allen, Peter Goldblatt. *Fuel Poverty, Cold Homes And Health Inequalities In The Uk.*; 2022. Accessed January 15, 2024. <https://www.instituteoftheequity.org/resources-reports/fuel-poverty-cold-homes-and-health-inequalities-in-the-uk/read-the-report.pdf#:~:text=%E2%80%A2%20homes%20that%20are%20cold%20due%20to%20fuel,to%20a%20degree%20that%20they%20may%20cause%20death.>
62. Office For National Statistics. The Impact Of Winter Pressures On Different Population Groups In Great Britain . Gov Uk. Published March 30, 2023. Accessed May 15, 2024. <https://www.ons.gov.uk/peoplepopulationandcommunity/wellbeing/articles/the-impact-of-winter-pressures-on-different-population-groups-in-great-britain/15to26february2023>
63. Envirovent. Why Damp And Condensation Get Much Worse In Winter. Published September 16, 2022. Accessed May 15, 2024. <https://www.envirovent.com/blog/why-damp-and-condensation-get-much-worse-in-winter/>
64. Balogun B, Barton C, Rankl F, Bolton P, Harker R, Wilson W. *Health Inequalities: Cold Or Damp Homes.*; 2023. Accessed May 15, 2024. <https://commonslibrary.parliament.uk/research-briefings/cbp-9696/>
65. Ahmed A, Mohamed Ns, Siddig Ee, Algaily T, Sulaiman S, Ali Y. The Impacts Of Climate Change On Displaced Populations: A Call For Action. *The Journal Of Climate Change And Health.* 2021;3:100057. Doi:10.1016/J.Joclim.2021.100057
66. Mcmichael C. Climate Change-Related Migration And Infectious Disease. *Virulence.* 2015;6(6):548. Doi:10.1080/21505594.2015.1021539
67. Brooks K, Landeg O, Kovats S, Sewell M, Oconnell E. Heatwaves, Hospitals And Health System Resilience In England: A Qualitative Assessment Of Frontline Perspectives From The Hot Summer Of 2019. *Bmj Open.* 2023;13(3). Doi:10.1136/Bmjopen-2022-068298
68. Rizmie D, De Preux L, Miraldo M, Atun R. Impact Of Extreme Temperatures On Emergency Hospital Admissions By Age And Socio-Economic Deprivation In England. *Soc Sci Med.* 2022;308.
69. Rizmie D, De Preux L, Miraldo M, Atun R. Impact Of Extreme Temperatures On Emergency Hospital Admissions By Age And Socio-Economic Deprivation In England. *Soc Sci Med.* 2022;308:115193. Doi:10.1016/J.Socscimed.2022.115193
70. Curtis S, Fair A, Wistow J, Val D V., Oven K. Impact Of Extreme Weather Events And Climate Change For Health And Social Care Systems. *Environmental Health.* 2017;16(Suppl 1). Doi:10.1186/S12940-017-0324-3
71. Steen B, Chowdhury R, Fletcher A, Standing-Tattersall C. *Climate Change Adaptation And Transport Infrastructure A Rapid Evidence Assessment.*; 2022. Accessed May 3, 2024. <https://assets.publishing.service.gov.uk/media/6569b274cd4dda00d082fa3/Climate-Change-And-Transport-Infrastructure-Rapid-Evidence-Assessment.pdf>
72. Webmaps - Flood Risk Management Viewer. Accessed May 23, 2024. [https://webmaps.hertfordshire.gov.uk/waterman/index.htm?layers=\[6:0\]](https://webmaps.hertfordshire.gov.uk/waterman/index.htm?layers=[6:0])