East Sussex

Addressing the Health Effects and Impacts of Climate Change

Addressing Environment, Climate and Health
A Systemwide Health Impact Assessment for East Sussex (ECH-HIA)

Taking a Whole Systems Approach for Integrating and Advancing Population and Planetary Health in All of Our Approaches

Main Technical Report

Part 3A: Considerations, Opportunities and Action Steps to Address the Health Effects of a Changing Climate



East Sussex
County Council

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1. Explanation, Rationale and Principles for Formulation and Implementation of the Consideration and Opportunities for the Whole of the East Sussex System

The following considerations, opportunities and action steps have been co-developed by partners from across the East Sussex system, representing the wide range of organisations, services and sectors described in the Introduction (Part 1). Collectively, they reflect a shared ambition to strengthen climate resilience, improve population and planetary health, reduce inequalities and support sustainable development across the county.

The consideration, opportunities and action steps have been developed through an extensive programme of collaboration, evidence gathering and system-wide engagement, including:

- Individual climate and health conversations with organisations and sector representatives.
- A comprehensive review of policies, strategies and plans relating to environment, a changing climate and health across the East Sussex system.
- Three multi-agency systemwide workshops with most sectors and services.
- Wider stakeholder engagement and consultation activities.
- Multiple validation and refinement stages, during which considerations, opportunities and action steps were developed, challenged, reviewed, validated and revalidated by partners from across the East Sussex system.

This collaborative process has ensured that the considerations, opportunities and action steps reflect collective expertise, shared ownership and a common commitment to implementation. Rather than developing them solely within individual sectors, partners worked beyond their own organisational responsibilities to identify opportunities for collaboration, remove barriers, challenge assumptions and act as critical friends. This systems-based approach enabled participants to identify shared priorities, maximise co-benefits and developed considerations, opportunities and action steps that deliver value across multiple organisations and sectors.

The process of undertaking an **Environment, Climate and Health – A Systemwide Health Impact Assessment for East Sussex (ECH-HIA)** has encouraged partners to think beyond individual organisational priorities and consider how the wider East

Sussex system can work more effectively as a whole. It has helped identify gaps, barriers, tensions, dependencies and further opportunities that may not have been recognised through a single lens and single-organisation planning. This approach has worked to strengthen understanding of the interconnected relationships between a changing climate, health, inequalities, the environment and sustainable development.

Although the East Sussex County Council Public Health Team – Healthy Places Team facilitated and coordinated the development of this HIA and these opportunities, responsibility for their implementation rests collectively with all partner organisations. Delivery will be taken forward through **Phase 2 (2026–2030)**, with organisations adopting relevant action steps through their own governance arrangements and collectively through the **East Sussex Whole System Climate and Health Partnership**.

The considerations, opportunities and action steps have been intentionally developed to be ambitious whilst remaining grounded in practical implementation. They are designed not only to address current climate and health challenges, but also to articulate what should be made possible through long-term collaboration, innovation and systems leadership.

In developing these considerations, opportunities and action steps, partners sought to:

- Promote a positive, hopeful and solutions-focused narrative around climate and health.
- Balance ambition with realism, recognising financial, organisational and political constraints.
- Reflect emerging national, regional and local policy developments.
- Identify opportunities to influence policy and advocate for wider system change.
- Demonstrate the "art of the possible" by encouraging innovation and collaborative problem-solving.
- Align organisations around shared priorities, reducing duplication and maximising collective impact.
- Provide a confident and collective voice for partners committed to protecting health, reducing inequalities and strengthening resilience in response to a changing climate.

The considerations, opportunities and action steps presented within this report are intended to provide a strategic framework for action rather than a prescriptive implementation plan. During **Phase 2 (2026–2030)** they will be translated into organisation-specific delivery plans, including SMART objectives (Specific, Measurable, Achievable, Realistic and Time-bound) objectives, enabling partners to implement

actions in ways that reflect their individual responsibilities while contributing to the shared vision for a healthier, fairer, more resilient and climate-ready East Sussex.

2. Introduction

The following chapters apply the collaborative framework described above to each of the **principal environmental and climate-related hazards** identified through the Environment, Climate and Health – A Systemwide Health Impact Assessment for East Sussex (ECH-HIA). These are:

- Aeroallergens
- Indoor and Outdoor Air Quality
- Chemicals
- Drought
- Flooding and Coastal Impacts
- Food Systems, Food Supply and Food Security
- Infectious Diseases
- Climate-Driven Migration
- Sun and Ultraviolet Rays
- Temperatures and Extreme Temperatures
- Transitioning and Adapting Infrastructure
- Vector-Borne Diseases
- Wildfires
- Wind and Extreme Winds

Together, they provide the evidence base for understanding how a changing climate is affecting population health today, how these risks are expected to evolve over coming decades, and where coordinated action across the East Sussex system can have the greatest impact.

This section and its sub-section follow a consistent structure to support both strategic decision-making and practical implementation. It begins with a **High-Level Strategic Opportunity**, supported by a clear rationale explaining why the issue is important for health, wellbeing and climate resilience. This is followed by a set of **Considerations, Opportunities and Action Steps**, which identify practical actions that organisations across the system can adopt individually and collectively. Each chapter then presents the wider **Context and Health Impacts**, summarising the latest scientific evidence on how a changing climate influences the environmental hazard and the resulting implications for population health. To support implementation, chapters also review relevant **International and National Responses**, describe the **Current East Sussex**

Response and highlight opportunities to build on existing strengths, address identified gaps and strengthen partnership working.

Although each environmental hazard is presented separately, they should not be considered in isolation. Climate hazards are highly interconnected, with many sharing common drivers, vulnerable populations, health outcomes and opportunities for intervention. For example, rising temperatures can worsen air quality, increase aeroallergen exposure, intensify drought and wildfire risk, and place additional pressure on water resources, while flooding can affect water quality, infrastructure, housing, mental wellbeing and chemical exposure. Recognising these interdependencies is fundamental to a systems-based approach, enabling partners to identify actions that deliver multiple health, environmental, social and economic co-benefits across the county.

Taken together, the chapters that follow provide both the strategic context and practical framework for strengthening climate resilience across East Sussex. They are intended to support informed decision-making, encourage collaboration across organisational boundaries and provide a shared evidence base for the development of coordinated local action throughout Phase 2 (2026–2030).

3. Overview and Wider Context

The period 2011 to 2020 was the warmest decade on record, with the global average temperature surpassing the preindustrial levels by 1.1 ◦C in 2019. January 2025 was the warmest January on record and the second-warmest year globally on record exceeding the 1.51 ◦C warming threshold above pre-industrial levels[1]. In June 2025, human-caused climate change intensified the recent European heatwave and increased the number of heat deaths by about 1,500 in 12 European cities according to the Grantham Institute (Imperial College London and the London School of Hygiene & Tropical Medicine) and its first rapid study to estimate the number of deaths linked to climate change for a heatwave.

People aged 65 and over made up 88% of the deaths, highlighting how those with underlying health conditions are most at risk of premature death in heatwaves. Focusing on ten days of heat from June 23 to July 2, the researchers estimated the death toll using peer-reviewed methods and found climate change nearly tripled the number of heat-related deaths, with fossil fuel use having increased heatwave temperatures up to 4°C across the cities. They warn that heatwave temperatures will keep rising and future death tolls are likely to be higher, until the world largely stops burning oil, gas and coal and reaches net zero emissions.

They year 2026 is now recorded as the hottest summer in the UK to date. According to the MET Office, the UK's highest June temperature on record of 37.7C (99.9F) was set on Friday 26 June 2026 at Lingwood, Norfolk smashing the previous high of 35.6C (96F) set in 1957 and equalled in the infamous 1976 heatwave. A rare red extreme heat warning was issued for parts of England and Wales.

Environmental challenges and a changing climate can result in the following:

Ice melting and sea level rising. Climate experts estimate that the sea level will remarkably rise in the next century, causing many coastal regions to be flooded. The average rate of sea level rise was 1.3 mm per year between 1901 and 1971, and increased to 1.9 and 3.7 mm per year in the periods between 1971 and 2006 and between 2006 and 2018, respectively[2];

Heat waves and droughts will become more common.

Severe storms, hurricanes, and typhoons will gain strength and become more frequent, as a warmer climate increases the quantity of absorbed water in the atmosphere and increases the likelihood of violent downpours rather than steady storms.

Decreased food security, as many crops grow best at quite specific temperatures, and their productivity considerably changes when such temperatures change.

Ecosystems change, as increasing heat will shift some species into other regions. Moreover, a changing climate will lead to the extinction of hundreds of species.

Pests and diseases, as increasing temperatures promote the growth and spread of some agricultural pests and diseases.[3]

Acidification of the oceans, as a result of rising carbon dioxide levels that alter the chemical equilibrium of the oceans. In turn, the resulting acidic environment dissolves the calcitic skeletons of numerous marine organisms such as coral reefs.[4]

A changing climate has had negative impacts on **human health, livelihoods, and infrastructure** in residential regions.

Extreme climate events have caused damages to energy, transportation, water, and sanitation systems, and these negative effects had a greater impact on socially and economically marginalized groups[5].

Environmental challenges and a changing climate affect most health determinants directly or indirectly by influencing the weather conditions we experience on a day-

to-day basis. A changing climate can increase **risks to health** directly through greater severity and frequency of extreme weather events such as flooding, drought, heatwaves or wildfires. Heatwaves, for example, have already led to excess deaths in England and they can increase burden on health and care services, increase strain on water, energy and transportation infrastructure and can have implications such as crop loss and reduced air quality that can also impact health.

Many infectious diseases are highly climate sensitive, and with warmer temperatures we can expect an increased risk of new and emerging infectious diseases in the UK, including those transmitted through mosquito and tick bites. The impact of a changing climate on individuals will vary, with the worst effects on disadvantaged and vulnerable populations, which could widen health inequalities further.

Climate impacts outside of the UK can also affect our health. Weather extremes in the countries we import food from can disrupt food supply chains, the availability of foods highly sensitive to climate and potentially impact on food safety, while climate change impacts abroad may increase migration to the UK.

The challenge for policymakers and health and care professionals is understanding the extent to which climate change will affect different aspects of health as well as our health and care systems. All the global health indicators monitored by the Lancet Countdown are being undermined by a changing climate, increasing the fragility of the global systems that health depends on, and increasing the vulnerability of populations to coexisting geopolitical, energy, and cost-of-living crises[6].

Environmental challenges and a changing climate can result in political and social instability, leading to multi-region and cascading impacts across the globe, with implications for health security. Risks could also arise from low-probability, high-impact events such as climate tipping points (for example the collapse of the West Antarctic ice sheet and associated rapid sea-level rise).

According to the '[State of the UK Climate in 2024]', observations show the UK's climate continuing to change. Recent decades have been warmer, wetter and sunnier than the 20th Century. The UK's warming is at a rate consistent with the observed change in global near-surface air temperature over land. Since the 1980s the UK climate has been warming at a rate of approximately 0.25°C per decade. The last three years have all been in the UK's top five warmest on record.

- **Extremes are increasing:** Observations show that **extreme weather events** are to be expected each year as an integral part of the UK's climate. As has been typical in recent years, floods and storms brought the worst impacts in 2024. Over recent decades, temperature extremes have increased, becoming more frequent and more intense. For example, the hottest summer days have warmed around twice

as much as average summer days in some UK areas when comparing the latest decade to 1961-1990.

While long-term trends in **extreme winds** are less certain than those for temperature, recent years have been characterised by a succession of impactful named storms causing widespread disruption, infrastructure damage, coastal impacts and flooding across the UK. Emerging research also suggests that a changing climate is likely to increase the severity of compound storm events, where strong winds and intense rainfall occur together, increasing risks to communities, transport networks, homes and critical infrastructure.

Extreme winds have not been identified as a climate change impact in the UK Health Security Agency's 'Health Effects of Climate Change' report in 2023, but it was identified by the East Sussex Climate Change and Health Survey (2025) as the top climate impact effecting East Sussex residents.

Sunshine: The UK's climate has become sunnier since the 1980s, primarily driven by increases in winter and spring sunshine. The most recent decade 2015–2024 has been 3% sunnier than 1991–2020 and 8% sunnier than 1961–1990.

Phenology: Earlier springs are likely to be one of the most obvious responses of Nature to the changing climate. However, such responses can be complex, and short observational records can make detecting trends difficult.

Sea level rise is accelerating: Sea level rise around the UK is accelerating. UK sea levels have risen 19.5cm since 1901 with the last three years the three highest on record for annual mean sea level.

UK near coastal waters: have warmed steadily from the 1980s onwards at a rate slightly lower than the warming rate over UK land. The most recent decade (2015–2024) has been on average 0.3°C warmer than the 1991–2020 average and 0.9°C warmer than 1961–1990 for UK near-coast SST. Five of the 10 warmest years for UK near-coast SST have occurred in the most recent decade 2015–2024, with 2024 ranked sixth warmest.

Reduction in frost days: Air and ground frosts have reduced by around a quarter since the 1980s.

Snow: The number and severity of snow events in the UK have declined since the 1960s.

Winters are getting wetter: October 2023 to March 2024 was the wettest winter half-year on record. In a series from 1767, six of the ten wettest winter half-years (October to March) for England and Wales have been in the 21st Century so far.

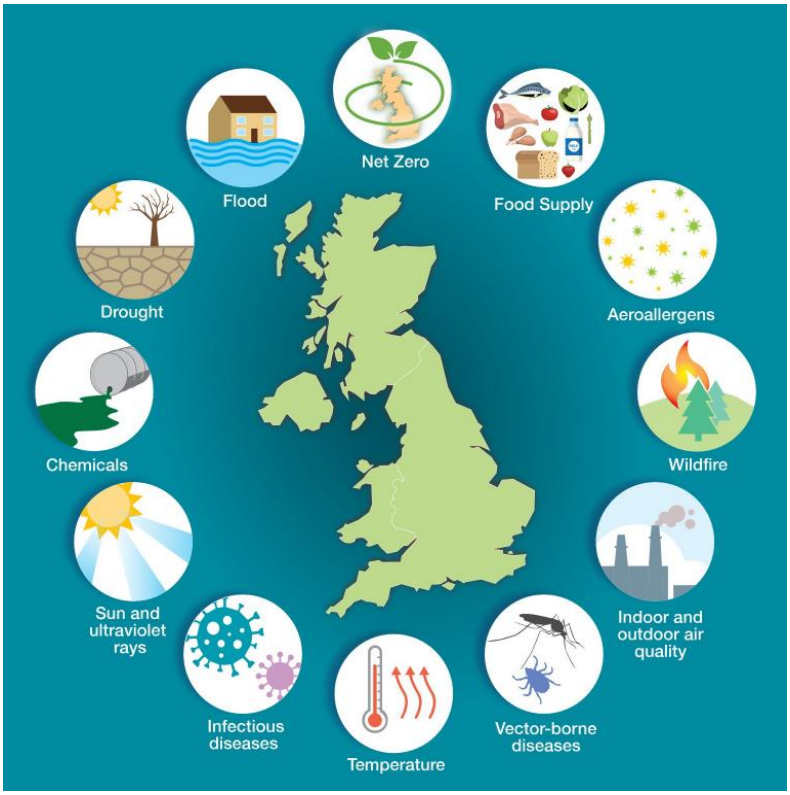
Rainfall: The UK's climate has become steadily wetter since the 1980s, due to an increase in winter 'half-year' rainfall. The most recent decade 2015–2024 has been 2% wetter than 1991–2020 and 10% wetter than 1961–1990.

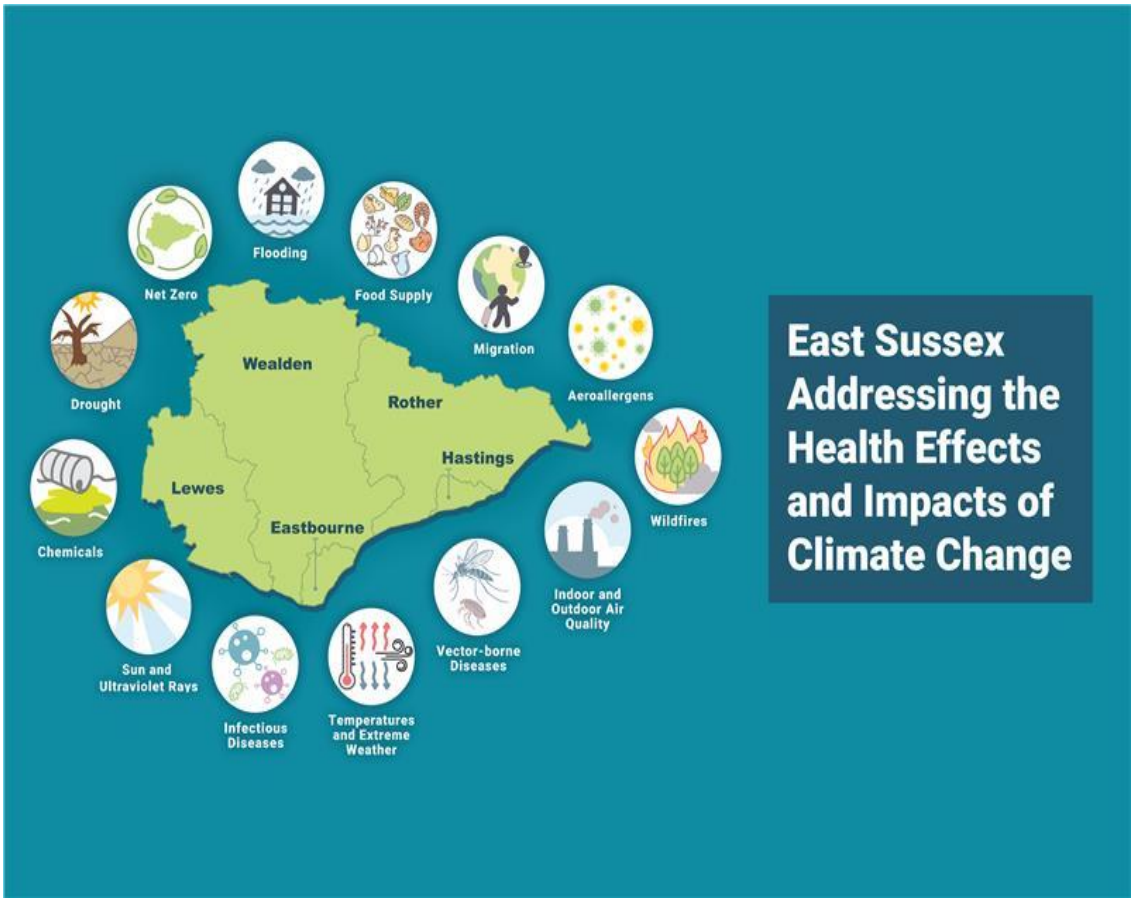
In the UK, the impact of a changing climate will be costly to society and the NHS. The total costs of heat-related mortalities from a changing climate and related socio-economic change in England have been estimated at approximately £6.8 billion per year in the 2020s, rising to £14.7 billion per year in the 2050s (using a medium-warming scenario and including treatment and resource costs, opportunity costs due to lost productivity and lost value of a life)[7].

Action is needed to prevent these health risks. Our ageing population will become more exposed to extreme heat which the UK is expected to face.[8] Frequently intense heatwaves could result in a rise in heat-related deaths.[9] By the 2070s, the UK could see over 21,000 additional heat-related deaths annually.[10] Extreme heat, drought, wildfires and flooding harms agriculture threatens our food security and may lead to supply shortages and price rises which affects those already facing health inequalities. People most at risk of these health impacts often live with disabilities and in areas of high deprivation.

Over half of UK homes are already vulnerable to overheating, while millions of buildings are vulnerable to flooding, threatening lives, livelihoods, and economic stability. There is no climate resilience without a climate-resilient built environment. Without decisive action, these risks will only escalate, increasing damage, disruption, and inequality across the county.

The UK Health Security Agency (UKHSA) published the 'Health Effects of Climate Change (HECC) in the UK: State of the Evidence 2023. The health effects covered in the report are communicated by the image at the top:


Net Zero
Flood
Food Supply
Drought
Aeroallergens
Chemicals
Wildfire
Sun and ultraviolet rays
Indoor and outdoor air quality
Infectious diseases
Vector-borne diseases
Temperature


Net Zero
Flooding
Food Supply
Migration
Aeroallergens
Drought
Wealden
Rother
Hastings
Lewes
Eastbourne
Chemicals
Wildfires
Indoor and Outdoor Air Quality
Vector-borne Diseases
Sun and Ultraviolet Rays
Infectious Diseases
Temperatures and Extreme Weather
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However, the list provided by the UKHSA is not exhaustive given that the HIA research and engagement in East Sussex has identified the additional health effects and impacts which include:

- Extreme Winds
- Displacement and Migration
- Coastal Impacts (which includes coastal erosion and coastal flooding for example)

Landslides can also be factored in (and as part of coastal erosion) especially as landslides have impacted the areas of **St Leaonard's** in East Sussex. See Landslide in St Leonards | East Sussex Fire & Rescue Service and Landslides at Beachy Head. Examples of **coastal erosion** include the steps at the **Birling Gap** beach which had to be re-sited after the winter storms of 2013/2014, when seven years of erosion was said to have taken place in just three months, with up to four metres of cliff being lost in one day.

4. Aeroallergens and Public Health - Considerations, Opportunities and Action Steps

High Level Strategic Opportunity:

Alert about Aeroallergens: Develop a coordinated approach to reduce respiratory health risks by creating an evidence-based planting list that balances public health, biodiversity, and climate benefits, alongside implementing a real-time aeroallergen alert system with targeted advice for vulnerable groups.

Rationale:

Aeroallergens are a key focus of this HIA because a changing climate is influencing the production, distribution and seasonality of allergens such as pollen and fungal spores, with important implications for public health. Rising temperatures, changing rainfall patterns and longer growing seasons can increase allergen levels and extend periods of exposure, potentially leading to higher rates of allergic rhinitis (hay fever), asthma exacerbations and other respiratory conditions. These impacts can affect quality of life, increase demand on health services and disproportionately impact vulnerable groups, including children, older people and those with existing respiratory

conditions. Understanding and responding to changing aeroallergen risks will help build community resilience, support preventative public health action and reduce the health impacts associated with a changing climate.

Considerations, Opportunities and Action Steps

Opportunity 1. Development of an Acceptable Planting List

Action Steps:

- Create a comprehensive, evidence-based list of plant species that are appropriate for landscape types and character as well as soil type. It must include considerations for suitable for public spaces, residential developments, and landscaping schemes.
- **Develop Allergen Awareness:** Include information on plant species known to release high levels of allergenic pollen or other airborne irritants (e.g., birch, certain grasses).
- **Make use of Health-Promoting Plants where possible:** Highlight low-allergen or hypoallergenic species that are less likely to aggravate respiratory conditions such as asthma and hay fever.
- **Increase Environmental Benefits:** Prioritise species that improve air quality, support biodiversity, and contribute to climate adaptation (e.g., carbon capture, shade provision).
- **Include and balance Pollinator Support:** Include bee-friendly and other pollinator-attracting plants that balance ecological needs with public health concerns.

Opportunity 2. Increase Aeroallergen Alert System for Vulnerable Groups

Action Steps:

- Protect individuals with respiratory conditions, such as asthma, COPD, or allergies, by providing timely and accessible information.
- **Sign-Up Alerts:** Enable residents to opt-in to an “air quality and allergen alert system” via SMS, email, or app.
- **Real-Time Monitoring:** Use local environmental data (e.g., pollen counts, pollution levels) to issue alerts during high-risk periods

- **Health Advice:** Pair alerts with actionable guidance—for example, staying indoors, using HEPA filters, or adjusting medication routines during high pollen days.
- **Integrated Communications:** Link the alert system to existing public health messaging and NHS respiratory support networks for consistency and reach.

Context and Impacts:

Aeroallergens are airborne biological particles that can trigger allergic reactions and respiratory symptoms in susceptible individuals. They include pollen from trees, grasses and weeds, fungal spores, and other naturally occurring biological particles found in the atmosphere. Exposure to aeroallergens is associated with a range of health conditions including allergic rhinitis (hay fever), asthma, conjunctivitis, eczema, chronic respiratory disease, and other allergic disorders.

A changing climate is increasingly recognised as a significant driver of changes in aeroallergen exposure. Rising temperatures, increasing atmospheric carbon dioxide (CO_2) concentrations, altered rainfall patterns, changing land use, and more frequent extreme weather events are affecting the production, distribution, concentration, and allergenic properties of pollen and fungal spores. As a result, many populations are experiencing longer and more intense exposure to aeroallergens than in previous decades.

Historically, pollen and allergy seasons followed relatively predictable seasonal patterns. However, a changing climate is altering these patterns, creating longer periods of exposure and increasing the likelihood of allergic disease among both existing sufferers and previously unaffected individuals. These changes are increasingly being recognised as an important climate-related public health issue.

Evidence shows that rising temperatures, increased atmospheric carbon dioxide (CO_2), changing rainfall patterns, and more frequent extreme weather events are contributing to:

- Earlier onset of pollen seasons.
- Longer pollen seasons.
- Increased pollen production.
- Increased allergenicity (the ability to trigger allergic reactions).
- Expansion of allergenic plant species into new geographic areas.
- Increased risk of asthma exacerbations and allergic disease.

These changes have implications for population health, healthcare demand, productivity, education, wellbeing, and health inequalities.

How a Changing Climate Influences Aeroallergens

A changing climate affects aeroallergens through several interconnected mechanisms:

- **Earlier Onset of Pollen Seasons:** Warmer temperatures during late winter and early spring can trigger earlier flowering of many trees and plants. As temperatures continue to rise, pollen seasons are beginning earlier than historically observed.

Earlier pollen release means that people with allergies may experience symptoms for longer periods each year. It can also make it more difficult for individuals, healthcare providers, and public health services to predict and manage seasonal allergic disease.

- **Longer Pollen Seasons:** Rising temperatures are extending growing seasons and delaying the end of pollen production. This results in longer periods during which allergenic pollen is present in the environment.

In some regions, pollen seasons now last several weeks longer than they did in previous decades. Longer exposure periods increase cumulative allergen exposure and may contribute to worsening symptoms, increased medication use, and greater healthcare demand.

- **Increased Pollen Production:** Higher atmospheric CO_2 concentrations can stimulate plant growth and increase pollen production in many species. Research has shown that some allergenic plants produce significantly greater quantities of pollen under elevated CO_2 conditions.

This means that individuals may be exposed to higher concentrations of allergens during pollen seasons, increasing the likelihood and severity of allergic reactions.

- **Increased Allergenicity:** A changing climate may not only increase the amount of pollen produced but also its allergenic potency.

Studies suggest that elevated CO_2 concentrations and environmental stressors can increase the concentration of allergenic proteins within pollen grains. As a result, pollen may become more capable of triggering allergic responses even at similar exposure levels.

Air pollution can further interact with pollen, increasing inflammatory responses and potentially worsening symptoms among people with asthma and allergies.

- **Changes in Species Distribution:** A changing climate is altering the geographical distribution of plants and fungi. Some highly allergenic species are expanding into areas where they were previously uncommon or absent.

This may expose populations to new allergens to which they have had limited previous exposure. The spread of invasive allergenic plants, such as ragweed in parts of Europe, is a growing concern because of its highly allergenic pollen and potential to cause widespread respiratory symptoms.

- **Extreme Weather Events:** Extreme weather events can significantly influence aeroallergen exposure.

Heavy rainfall, flooding, drought, heatwaves, and storms can alter plant growth patterns, pollen production, and fungal spore release. Thunderstorms are of particular concern because they can trigger sudden increases in airborne allergen concentrations.

“Thunderstorm asthma” events occur when pollen grains are broken into smaller particles during storm conditions and dispersed widely through the air. These particles can penetrate deeper into the lungs than intact pollen grains and may trigger severe asthma attacks in susceptible individuals.

As a changing climate increases the frequency and intensity of some extreme weather events, the risk of such episodes may increase.

Health Impacts

Respiratory Health - The most significant health impacts of aeroallergens relate to respiratory disease.

Exposure to pollen and fungal spores can trigger:

- Allergic rhinitis (hay fever)
- Asthma symptoms
- Asthma exacerbations
- Wheezing
- Coughing
- Breathlessness
- Reduced lung function

People with existing respiratory conditions may experience worsening symptoms during periods of high aeroallergen exposure. In severe cases, this can lead to increased use of emergency healthcare services and hospital admissions.

Allergic Disease - Allergic diseases are among the most common chronic health conditions globally.

Climate-related increases in aeroallergen exposure may contribute to:

- Increased prevalence of allergies.
- Earlier onset of allergic disease in children.
- More severe symptoms.
- Longer periods of illness.
- Greater medication use.

There is also concern that prolonged exposure may increase sensitisation, meaning that more individuals may develop allergic conditions over time.

Mental Health and Wellbeing - Persistent allergy symptoms can affect quality of life, sleep, productivity, and mental wellbeing.

Individuals experiencing prolonged allergic symptoms may report:

- Fatigue.
- Irritability.
- Reduced concentration.
- Anxiety.
- Lower quality of life.

For people with severe asthma or respiratory disease, concerns about symptom management during periods of high pollen exposure can contribute to psychological stress.

Sleep and Daily Functioning - Allergic rhinitis and respiratory symptoms can significantly disrupt sleep quality.

Symptoms such as nasal congestion, coughing, wheezing, and breathing difficulties can lead to:

- Poor sleep quality.
- Daytime fatigue.
- Reduced productivity.
- Impaired concentration.
- Lower educational attainment among children and young people.

As pollen seasons become longer and more intense, sleep-related impacts may become increasingly important from a public health perspective.

Health System Impacts

Climate-related increases in aeroallergen exposure are expected to place additional pressure on health and care services.

Potential impacts include:

- Increased GP consultations.
- Greater demand for allergy medications.
- Increased emergency department attendances.
- Higher rates of asthma-related hospital admissions.
- Increased demand for respiratory and allergy services.
- Greater pressure on primary care during peak pollen periods.

Health systems may need to adapt by improving surveillance, forecasting, prevention, patient education, and clinical management of climate-sensitive respiratory conditions.

Wider Social and Economic Impacts

The impacts of aeroallergens extend beyond health services.

Education - Children and young people experiencing allergic disease may experience:

- Increased school absences.
- Reduced concentration.
- Lower educational performance.
- Reduced participation in outdoor activities.

Employment and Productivity - Among working-age adults, allergy symptoms can contribute to:

- Reduced workplace productivity.
- Increased sickness absence.
- Reduced ability to undertake outdoor work.
- Greater occupational health challenges during high pollen periods.

Physical Activity - High pollen concentrations may discourage outdoor physical activity among people with allergies and asthma.

Reduced participation in outdoor recreation and active travel can have wider implications for physical health, mental wellbeing, and social participation.

Health Inequalities - The impacts of aeroallergens are not experienced equally across the population.

Certain groups may be disproportionately affected, including:

- Children and young people.
- Older adults.
- People with asthma or chronic respiratory disease.
- Individuals with multiple long-term health conditions.
- People living in poor-quality housing.
- Communities exposed to higher levels of air pollution.
- Lower-income households with limited ability to manage indoor environmental conditions.

A changing climate therefore has the potential to widen existing respiratory health inequalities if adaptation measures are not targeted towards vulnerable populations.

Implications for Public Health

Aeroallergens are increasingly recognised as a climate-sensitive environmental health risk. As a changing climate continues to alter pollen seasons, allergen concentrations, and respiratory disease patterns, the burden of allergic and respiratory illness is likely to increase.

Public health responses will increasingly need to focus on:

- Monitoring and forecasting aeroallergen exposure.
- Public awareness and education.
- Climate-sensitive healthcare planning.
- Protection of vulnerable populations.
- Integration of aeroallergens into climate adaptation and health protection strategies.

Addressing aeroallergen-related health risks will be an important component of building climate-resilient and healthy communities in the coming decades.

Current International and National Response(s):

World Health Organization (WHO)

The WHO increasingly recognises aeroallergens as an important pathway through which climate change affects health. Recent WHO assessments highlight that climate change and air pollution interact to worsen allergic and respiratory diseases. Rising temperatures and CO_2 concentrations are associated with earlier and longer pollen seasons and greater pollen production, while air pollution can increase pollen allergenicity and intensify allergic responses.

WHO's climate-health work increasingly emphasises:

- Strengthening climate-resilient health systems.
- Improving environmental health surveillance.
- Integrating air quality and aeroallergen monitoring.
- Protecting vulnerable populations with asthma and allergies.
- Raising public awareness of climate-sensitive respiratory risks.

European Climate and Health Observatory

The European Environment Agency and the European Climate and Health Observatory have identified pollen and aeroallergens as a major climate-health priority.

European assessments conclude that climate change is:

- Extending pollen seasons.
- Increasing pollen concentrations.
- Increasing pollen allergenicity.
- Facilitating the spread of invasive allergenic species such as ragweed.
- Increasing the likelihood of new allergic sensitisation among previously unaffected populations.

The Observatory warns that climate-driven increases in pollen exposure are likely to:

- Increase allergic rhinitis (hay fever).
- Increase asthma prevalence and exacerbations.
- Increase healthcare costs.
- Affect mental wellbeing and quality of life.
- Increase school and workplace absences.

International Monitoring and Early Warning Systems

A major international response has been the development of pollen monitoring and forecasting systems.

Across Europe:

- Pollen concentrations are routinely monitored.
- Forecasting systems provide daily pollen risk information.
- Early warning systems are increasingly integrated into environmental and public health services.
- The European Aeroallergen Network and Copernicus Atmosphere Monitoring Service (CAMS) provide pollen forecasts and allergy-risk information across Europe.

These systems support both healthcare planning and individual behaviour change by enabling people to reduce exposure during high-risk periods.

UK National Response

Recognition Within Climate Risk Assessment

The UK increasingly recognises aeroallergens as a climate-sensitive health risk within broader climate adaptation planning.

The national evidence base identifies:

- Longer growing seasons.
- Increased pollen production.
- Increased allergic disease burden.
- Interactions between pollen, heat, air pollution and respiratory disease.

Recent evidence suggests that pollen seasons in the UK are becoming longer and more severe, with some tree pollen seasons beginning one to two weeks earlier than in previous decades. Seasonal pollen severity has increased in parts of the UK and is projected to continue increasing as the climate warms.

Health Protection and Forecasting

The UK's primary response has focused on:

- National pollen forecasting.
- Public health advice.

- Integration of pollen information into weather and environmental monitoring.
- Clinical management of asthma and allergic disease.

Pollen forecasts are routinely communicated to the public through meteorological and health information services, helping individuals manage symptoms and reduce exposure.

There is also growing recognition that aeroallergens should be considered alongside:

- Heat-health planning.
- Air quality management.
- Respiratory disease prevention.
- Climate adaptation planning.

Air Quality and Respiratory Health

Increasingly, UK public health responses recognise the interaction between:

- Air pollution.
- Aeroallergens.
- Climate change.
- Respiratory health.

Research suggests that air pollution can increase the inflammatory effects of pollen and worsen symptoms among people with asthma and allergic conditions. This has strengthened calls for integrated approaches to air quality improvement and climate adaptation.

Emerging Adaptation Measures

Nationally and internationally, responses are increasingly focusing on adaptation rather than solely clinical treatment.

Emerging approaches include:

Improved Monitoring and Surveillance

- Expanded pollen monitoring networks.
- Better forecasting models.
- Real-time environmental surveillance.
- Integration of climate and health datasets.

Climate-Sensitive Healthcare

- Earlier diagnosis of allergic disease.
- Improved asthma management.
- Better integration of pollen forecasts into clinical advice.
- Increased awareness among healthcare professionals.

Urban and Environmental Planning

- Consideration of allergenic species in tree planting programmes.
- Climate-sensitive urban greening.
- Improved air quality management.
- Green infrastructure planning that balances biodiversity and health considerations.

Public Communication and Health Literacy

- Pollen and allergy forecasts.
- Early warning systems.
- Public education campaigns.
- Advice on reducing exposure during high-risk periods.

Key Challenges

Despite increasing recognition of the issue, several challenges remain:

- Aeroallergens are often underrepresented within climate adaptation plans.
- Monitoring focuses primarily on pollen concentrations rather than allergen potency.
- Health systems often treat allergic disease as a seasonal issue rather than a climate-related health risk.
- Climate-health surveillance systems rarely integrate aeroallergen exposure and health outcomes.
- Public awareness of the climate-allergy connection remains limited.

The European Climate and Health Observatory notes that pollen allergies remain underdiagnosed and undertreated in many countries, despite increasing climate-related exposure risks.

Overall Assessment

The national and international response is increasingly recognising aeroallergens as an emerging climate-health issue. The primary focus has been on strengthening monitoring, forecasting, public information, and clinical management of allergic disease. However, there is a growing shift towards treating aeroallergens as part of wider climate adaptation, air quality, respiratory health, and environmental planning strategies.

As a changing climate continues to alter pollen seasons, allergen exposure, and respiratory disease patterns, adaptation measures are likely to become increasingly important for protecting population health, reducing healthcare demand, and addressing climate-related health inequalities.

Local East Sussex Response to Build From

The local response in East Sussex to aeroallergens has been **largely indirect**, embedded within broader work on climate adaptation, air quality, respiratory health, healthy places, green infrastructure, and public health protection rather than through a dedicated aeroallergen strategy. However, many of the building blocks needed to address climate-related allergy and respiratory risks are already present.

East Sussex has not yet developed a specific climate adaptation programme focused solely on aeroallergens. However, the county's response to a changing climate, air quality, respiratory health, healthy place-making, green infrastructure and climate adaptation provides an emerging framework through which aeroallergen-related health risks can be addressed.

As a changing climate increases the duration and intensity of pollen seasons and alters patterns of respiratory disease, local adaptation measures aimed at improving air quality, increasing climate resilience, supporting vulnerable populations, and creating healthier environments are becoming increasingly relevant.

Recognition of Climate-Related Health Risks

East Sussex County Council's climate adaptation work recognises that a changing climate will have significant impacts on health and wellbeing across the county. The East Sussex Climate Change Risk and Vulnerability Assessment identifies health risks associated with rising temperatures, changing environmental conditions and increasing climate hazards, providing a foundation for future adaptation planning.

While aeroallergens are not currently identified as a standalone climate risk within county-level adaptation documents, many of the environmental changes recognised

locally—including rising temperatures, longer growing seasons and changing weather patterns—are known drivers of increasing pollen and fungal spore exposure. These factors are likely to influence future respiratory health needs within East Sussex.

Air Quality and Respiratory Health

The strongest local response relevant to aeroallergens has been through air quality and respiratory health work.

The East Sussex Local Transport Plan Health Impact Assessment recognises air quality as a major determinant of health and highlights the links between environmental exposures, respiratory disease and health inequalities. It identifies asthma and other respiratory conditions as important health outcomes affected by environmental quality and notes that vulnerable groups, including children, older adults, pregnant women and people with pre-existing health conditions, are disproportionately affected by poor air quality.

This is particularly important because there is increasing evidence that air pollution and aeroallergens interact. Pollutants can increase the inflammatory response to pollen exposure and worsen symptoms among people with asthma, allergic rhinitis and other respiratory conditions. Consequently, measures that improve air quality may also help reduce some aeroallergen-related health impacts.

Local policies supporting:

- reduced traffic emissions,
- active travel,
- public transport,
- urban greening,
- reduced congestion,

may therefore deliver co-benefits for respiratory health and climate adaptation.

Green Infrastructure and Healthy Places

East Sussex has increasingly recognised the health benefits of access to natural environments through its Healthy Places Framework and planning guidance.

The county's healthy place-making approach promotes access to green and blue spaces, biodiversity, climate adaptation and opportunities for physical activity. Green infrastructure is recognised as an important contributor to physical health, mental wellbeing and climate resilience.

However, a changing climate presents a challenge for green infrastructure planning because some plant species contribute more significantly to allergenic pollen exposure than others. Emerging evidence internationally suggests that urban greening strategies need to balance biodiversity, cooling, air quality improvement and public health considerations, including aeroallergen exposure.

Although East Sussex has not yet adopted formal aeroallergen-sensitive planting guidance, future climate adaptation planning may benefit from considering:

- allergenic characteristics of tree and plant species,
- seasonal pollen production,
- proximity of planting to schools, healthcare facilities and residential areas,
- interactions between air quality and pollen exposure.

Climate Adaptation and Resilience Planning

Current adaptation work focuses on improving resilience to heat, flooding, storms and other climate hazards. These programmes provide an opportunity to incorporate aeroallergen risks into future climate-health planning.

Potential future adaptation measures could include:

- monitoring climate-related changes in pollen seasons,
- integrating pollen considerations into climate risk assessments,
- strengthening links between respiratory health and climate adaptation planning,
- improving awareness among healthcare professionals,
- developing local public information on pollen, asthma and a changing climate.

The Climate Change Risk and Vulnerability Assessment provides a platform through which emerging climate-health risks, including aeroallergens, could be considered in future updates.

Healthcare and Public Health Response

Current healthcare responses focus primarily on the diagnosis and management of asthma, allergic rhinitis and respiratory disease through primary care and specialist services.

At present there is limited evidence of dedicated local surveillance of climate-related pollen exposure or aeroallergen-related health outcomes. Most monitoring relies on national pollen forecasting systems and routine healthcare activity.

However, increasing awareness of climate-related respiratory risks may create opportunities to:

- Improve clinical awareness of changing pollen seasons
- Support earlier intervention for vulnerable patients
- Strengthen self-management support for asthma and allergies
- Integrate climate-health messaging into respiratory health programmes

Gaps and Opportunities

While East Sussex has developed strong foundations through climate adaptation, healthy place-making and air quality work, opportunities remain to strengthen the local response to aeroallergens.

Potential future actions include:

- Incorporating aeroallergens into future Climate Change Risk and Vulnerability Assessments
- Monitoring local respiratory health trends associated with pollen seasons
- Linking aeroallergen risks to heat-health and air-quality planning
- Developing public awareness campaigns on a changing climate, pollen and respiratory health
- Providing guidance on climate-sensitive green infrastructure and planting
- Including aeroallergen considerations within healthy place-making and planning policies
- Strengthening partnerships between public health, environmental health, planning and healthcare services

The local East Sussex response to aeroallergens is currently embedded within wider climate adaptation, air quality, respiratory health and healthy environments work rather than through dedicated aeroallergen programmes. Existing policies that improve air quality, support active travel, enhance green infrastructure and strengthen climate resilience already contribute to reducing respiratory health risks. As a changing climate continues to alter pollen seasons and allergen exposure, there is an opportunity to build on these foundations and integrate aeroallergens more explicitly into future climate-health adaptation planning across East Sussex.

5. Indoor and Outdoor Air Quality and Public Health - Considerations, Opportunities and Action Steps

High Level Strategic Opportunity:

Adopt a whole-system, health-centred air quality strategy that applies the prevent → mitigate → avoid hierarchy to reduce pollution at source, lower environmental concentrations, and minimise exposure—while prioritising protection for vulnerable populations. This should include accelerating low- and zero-emission transport and active travel, lobbying for strengthening regulation of industrial, construction, agricultural, and domestic heating emissions, and embedding climate–health considerations in planning and development. Complement these measures by improving indoor and outdoor air quality through ventilation standards, green infrastructure, and targeted clean air zones, while empowering communities and healthcare professionals with real-time air quality information and guidance to reduce exposure. Delivery should be supported by equity-focused interventions in high-risk communities, strengthened monitoring and data transparency, alignment with WHO and UKHSA air quality guidelines, and coordinated cross-sector governance across public health, planning, transport, housing, and environmental systems.

Rationale:

Air quality is a key focus of the Environment, Climate and Health – A Systemwide Health Impact Assessment for East Sussex (ECH-HIA) because it is one of the most significant environmental determinants of health and is closely interconnected with a changing climate. Many of the activities that contribute to a changing climate, such as the use of fossil fuels for transport, heating and energy generation, also contribute to air pollution. A changing climate can further worsen air quality through higher temperatures, more frequent heatwaves, wildfire smoke, and longer aeroallergen seasons. Poor air quality is associated with a wide range of health impacts, including respiratory and cardiovascular disease, cancer, adverse pregnancy outcomes, cognitive decline and premature mortality, with children, older people, those with existing health conditions and disadvantaged communities often experiencing the greatest impacts. Focusing on air quality provides an important opportunity to protect health, reduce health inequalities and realise the significant health co-benefits of

climate action through cleaner air, healthier environments and more sustainable transport and energy systems.

Considerations, Opportunities and Action Steps

Opportunity 1. Drive Prevention by Reducing Emissions at Source

Action Steps:

- Apply the hierarchy of prevent → mitigate → avoid across all systems—ensuring air quality policies are climate-resilient, equitable, and centred on protecting health, particularly for the most vulnerable.
- Transport - Accelerate electrification of light vehicles, public transport, and rail; expand low-emission zones around schools, hospitals, and care homes.
- Transport - Support modal shift by integrating active and sustainable travel into local plans, ensuring safe walking/cycling networks and accessible public transport.
- Industry and Agriculture - Strengthen regulation and enforcement on construction and industrial emissions, prioritising siting away from residential areas.
- Agriculture - Support farmers with incentives for ammonia reduction measures (e.g., slurry injection, covered storage).
- Phase down solid fuel heating (wood stoves) in urban areas; enforce smoke control areas and promote cleaner heating alternatives.

Opportunity 2. Deliver Mitigation by Reducing Environmental Concentrations

Action Steps:

- Support and encourage climate–health impact assessments in development approvals, with requirements for green buffers, low-pollution planting, and reduced traffic near vulnerable settings.
- Co-design Clean Air or Low Emission Zones in pollution hotspots, engaging residents to maximise equity and local support.
- Require effective, energy-efficient ventilation in all public buildings, schools, and healthcare settings.
- Lobby for the development of national standards and assign clear ownership for indoor air quality policy

- Encourage use of indoor air quality sensors in public settings, linked to early warning and community alerts.

Opportunity 3. Avoid and Reduce Individual Exposure

Action Steps:

- Expand real-time, localised air quality and pollen alert systems (via apps, SMS, radio, community channels).
- Equip healthcare professionals to provide air quality advice to at-risk patients (e.g., asthma, COPD, cardiovascular disease).
- Promote behaviour change campaigns:
- “Cleaner commutes” (e.g., walking on low-traffic routes).
- Guidance on indoor air quality (ventilation, avoiding indoor smoking, safe use of cleaning products).
- Awareness of high-pollution activities (e.g., DIY, wood burning).

Opportunity 4. Protect Vulnerable Populations

Action Steps:

- Prioritise interventions in deprived areas and high-risk groups (children, elderly, respiratory/cardiac patients).
- Where possible provide schools and care homes with air filtration and pollution-adaptive ventilation.
- Embed air quality health risk screening into primary care and social care pathways.

Opportunity 5. Strengthen Governance, Evidence, and Monitoring

Action Steps:

- Align local planning and transport policies with UKHSA and WHO air quality targets.
- Expand local authority monitoring networks, including citizen science projects for hyperlocal data.
- Create public-facing dashboards to track progress against WHO thresholds and health outcomes (e.g., asthma admissions, cardiovascular disease).
- Establish cross-sector taskforces (public health, planning, transport, housing, environment) to deliver joint air quality action plans.

Context and Impacts:

Air quality is one of the most significant environmental determinants of health and is closely linked to a changing climate. Air pollution and a changing climate share many common sources, particularly the combustion of fossil fuels for transport, industry, energy generation and heating. As a result, actions that reduce greenhouse gas emissions often deliver immediate health benefits through improvements in air quality.

A changing climate also influences air quality directly. Rising temperatures, changing weather patterns, drought, wildfires, longer pollen seasons and increased atmospheric stagnation can worsen air pollution and increase exposure to harmful airborne pollutants. A changing climate can therefore both exacerbate existing air quality problems and create new environmental health risks.

Poor air quality is associated with a wide range of adverse health outcomes, including respiratory disease, cardiovascular disease, cancer, adverse pregnancy outcomes, cognitive decline, and premature mortality. It is estimated to contribute to millions of deaths globally each year and remains one of the leading environmental causes of ill health worldwide.

Increasingly, a changing climate and air quality are being addressed together through public health, environmental and climate adaptation policies.

A changing climate can worsen air pollution episodes by altering weather patterns and exacerbating heatwaves. Poor air quality is already a significant environmental risk, contributing to cardiovascular and respiratory diseases, and increased mortality. The World Health Organisation [WHO] has described air pollution as a global health emergency and, in the context of a changing climate, will continue to affect all our lives11. WHO targets are defined as ‘the lowest exposure level of an air pollutant above which … there is an increase in adverse health effects’. The World Health Organization (WHO) provides evidence of links between exposure to air pollution and type 2 diabetes, obesity, systemic inflammation, Alzheimer’s disease and dementia. The International Agency for Research on Cancer has classified air pollution, in particular PM2.5, as a leading cause of cancer.

Air pollution refers to gases or particles in the air that can harm the health of humans, animals and plants.

General principles in the management of air pollution include the hierarchy of:

- prevention [prevent or reduce emissions of pollutants into the air]
- mitigate [take steps to reduce air pollution] by reducing environmental concentrations
- avoid [avoid exposure to air pollution] by reducing individual exposure

The UK Health Security Agency's (UKHSA) Health Effects of Climate Change (HECC) Report (2023) identifies air quality as one of the most significant pathways through which a climate change affects health in the UK. The report highlights that climate change and air pollution are closely interconnected and should be addressed through integrated climate and public health policies.

The HECC report emphasises that climate change can worsen air quality through several mechanisms, including:

- Increased formation of ground-level ozone during hotter weather.
- Increased frequency and intensity of heatwaves.
- Increased risk of wildfire smoke exposure.
- Longer and more intense aeroallergen seasons.
- Interactions between air pollution, heat, and respiratory disease.
- Changes in atmospheric conditions that influence pollutant concentrations and dispersion.

The report identifies particulate matter ($PM_{2.5}$), nitrogen dioxide (NO_2), and ground-level ozone as pollutants of particular concern because of their well-established links to respiratory disease, cardiovascular disease, hospital admissions, premature mortality, and reduced quality of life. Climate change is expected to influence future exposure to these pollutants, particularly during periods of prolonged hot weather.

Air pollution influences many different aspects of health, including respiratory disease, cardiovascular disease, lung cancer, perinatal health as well as emerging evidence of mental health and cognition. Estimates of annual mortality related to air pollution in the UK is equivalent to between 28,000 and 36,000 deaths.

Key Climate-Related Air Quality Risks

National and international evidence identifies several emerging risks.

A changing climate has the potential to amplify these inequalities unless adaptation measures are targeted appropriately and simultaneously air pollution affects people and vulnerable groups in different ways. Older people, children and those with pre-existing health conditions are more sensitive to the health impacts of air pollution. In addition, the most deprived people in society often have poorer health and less access to high-quality medical care, increasing their vulnerability.

Combined Heat and Air Pollution Risks

A key finding of the HECC report is that climate-related hazards often interact. The report highlights that heat, and air pollution can occur simultaneously, creating

compound risks that may amplify adverse health effects. During heatwaves, higher temperatures can increase ozone formation and worsen respiratory illness, while vulnerable populations may experience greater exposure due to housing conditions, existing health conditions, or socioeconomic disadvantage.

The report identifies people with asthma, chronic respiratory disease, cardiovascular disease, older adults, children, pregnant women, and low-income communities as particularly vulnerable to these combined environmental exposures. Existing health inequalities may therefore be widened by climate-related changes in air quality.

Air Quality as a Climate and Health Opportunity

Importantly, the HECC report concludes that some of the greatest potential health gains from climate action can be achieved through improvements in air quality. Measures that reduce greenhouse gas emissions often produce immediate health benefits through cleaner air.

Examples include:

- Reducing reliance on fossil fuels.
- Expanding active travel.
- Increasing public transport use.
- Decarbonising energy systems.
- Improving housing quality and energy efficiency.
- Creating healthier urban environments.

The report describes these as “health co-benefits” of climate action, emphasising that climate mitigation policies can simultaneously reduce air pollution, prevent illness, improve wellbeing, and reduce pressure on health services.

Implications for Public Health

The HECC report argues that air quality should be considered a central component of climate adaptation and health protection planning. It highlights the need for:

- Integrated climate and air quality policies.
- Improved environmental and health surveillance.
- Protection of vulnerable populations.
- Climate-resilient urban and transport planning.
- Public awareness and risk communication.
- Continued monitoring of emerging risks such as wildfire smoke, aeroallergens, and heat-pollution interactions.

The report concludes that while climate change presents increasing risks to air quality and health, it also presents significant opportunities. By aligning climate mitigation, adaptation, transport, housing and environmental policies with health objectives, the UK can achieve substantial reductions in air pollution-related illness while simultaneously addressing a changing climate.

Current International and National Response(s):

The national and international response has evolved from pollution control towards a broader climate-health approach. Air quality is increasingly recognised as both a changing climate issue and a major public health challenge. Many of the most effective climate mitigation measures—such as reducing fossil fuel use, promoting active travel, improving public transport and creating greener urban environments—also deliver some of the largest immediate health benefits through cleaner air.

Consequently, improving air quality is now widely regarded as one of the most important opportunities to simultaneously address a changing climate, reduce health inequalities, improve population health and build climate-resilient communities.

Nationally and internationally, responses increasingly focus on:

- Decarbonising transport and energy systems.
- Promoting active travel.
- Expanding green infrastructure.
- Improving air quality monitoring.
- Integrating air quality and climate adaptation planning.
- Protecting vulnerable populations.
- Developing climate-resilient and healthy urban environments.
- Strengthening public awareness and environmental health literacy.

Chief Medical Officer's Annual Report 2022, Air Pollution

The Chief Medical Officer's Annual Report 2022, Air Pollution sets outs specific recommendations for how we should be responding to outdoor and indoor air pollution via a specific set of recommended considerations, opportunities and action steps:

Transport

- The electrification of light vehicles and public transport is important for reducing air pollution from vehicle tailpipes – momentum must be maintained, and

accelerated wherever possible. Emissions from tyres and road wear will not be improved by electrification, and this is a key research and innovation need.

- A greater range of options for reducing air pollution emissions from heavy vehicles is needed. Some specialised vehicles such as refrigerated units need to be addressed, especially in urban areas.
- The electrification of railways can significantly reduce air pollution emissions from trains and improve air quality for travellers, staff and those living nearby. Where this is not possible, bi-mode or other low-pollution technologies should be used. Closed spaces are important, for example we should look to end diesel trains being left running in enclosed stations. Urban planning.
- With national government, local authorities are central in the response to air pollution. Urban planning should support reducing air pollution concentrations locally – such as reducing air pollution near schools and healthcare settings. Shifting to active travel where possible has direct health wins as well as reducing air pollution from vehicles – planning should support this.

Industry

- The substantial improvements from industrial processes over recent years are impressive. Wherever possible remaining industries that emit pollution should be sited away from densely populated areas. Where they cannot, such as construction, mitigations can significantly reduce the impact, and they should be adhered to.

Agriculture

- Ammonia emissions from agriculture contributes to secondary particulate matter air pollution, which can travel large distances and affect populated areas. Significant reductions in ammonia air pollution could be achieved by precision application of slurry to, or into soil, and covering slurry-stores. There would be capital costs, but these changes could be self-sustaining afterwards.

The NHS

- The NHS is committing to halving its contribution to poor air quality within a decade while reducing health inequalities.
- The training of healthcare staff should include the health effects of air pollution and how to minimise these, including communication with patients.

Indoor air pollution

- People spend large periods of time indoors and many indoor places are public, where individuals have little control over the quality of air they breathe. These two factors should be recognised in the planning and development of public indoor spaces.
- Effective ventilation, while minimising energy use and heat loss, is a priority for reducing air pollution, respiratory infections and achieving net zero. This is a major engineering challenge which needs solving.
- While there is co-ordination across government, the ownership of indoor air quality policy within government needs to be clarified.

Wood stoves and other solid fuel heating

- The use of wood stoves is increasing and can impact air quality significantly in urban areas. Air pollution emissions can be reduced, but not fully eliminated, by using modern, less polluting stoves and burning wood that is dry. In smoke control areas, the rules should be adhered to.

The World Health Organisation (WHO)

The World Health Organisation (WHO) identifies air pollution as one of the largest environmental threats to human health and recognises a changing climate and air pollution as interconnected public health challenges.

WHO's approach emphasises:

- Reducing emissions from fossil fuels.
- Strengthening climate mitigation and adaptation policies.
- Improving air quality monitoring and surveillance.
- Protecting vulnerable populations.
- Integrating air quality and climate considerations into health policy.

The WHO Air Quality Guidelines provide evidence-based recommendations for pollutants including:

- Particulate matter (PM2.5 and PM10).
- Nitrogen dioxide (NO_2).
- Ozone (O_3).
- Sulphur dioxide (SO_2).

- Carbon monoxide (CO).

WHO has consistently highlighted that reducing air pollution represents one of the fastest ways to achieve both climate and health benefits.

The United Nations and Climate Agreements

The United Nations increasingly recognises clean air as central to climate action and sustainable development.

International Climate Agreements and initiatives now emphasise:

- Decarbonisation of transport and energy systems.
- Reduction of short-lived climate pollutants.
- Sustainable urban development.
- Clean energy transitions.
- Climate-resilient health systems.

The health co-benefits of cleaner air are increasingly used to justify accelerated climate action because reductions in pollution often generate health gains much sooner than climate benefits alone.

European Response

Across Europe, air quality has become a major component of climate adaptation and public health planning.

The European Environment Agency and the European Climate and Health Observatory have identified several climate-related air quality risks including:

- Increased ground-level ozone formation during heatwaves.
- Wildfire smoke exposure.
- Longer aeroallergen seasons.
- Interactions between heat and air pollution.
- Increased respiratory and cardiovascular disease burden.

European adaptation strategies increasingly promote:

- Low-emission transport systems.
- Urban greening.
- Sustainable mobility.
- Climate-sensitive urban design.

- Integrated climate-health surveillance.

The UK has progressively strengthened its response to air pollution through legislation, public health policy, environmental regulation and climate commitments.

Air quality is recognised as a major public health issue, with evidence linking pollution to:

- Asthma.
- Chronic obstructive pulmonary disease (COPD).
- Coronary heart disease.
- Stroke.
- Lung cancer.
- Dementia.
- Poor birth outcomes.

Increasingly, national policy recognises that a changing climate may worsen some forms of air pollution, particularly:

- Ozone pollution during hot weather.
- Wildfire smoke.
- Aeroallergen-related respiratory impacts.
- Combined heat and pollution events.

Clean Air Strategy

The UK Clean Air Strategy represents one of the most comprehensive national approaches to air quality. It aims to reduce emissions from:

- Transport.
- Agriculture.
- Industry.
- Domestic heating.
- Waste management.

Importantly, the strategy recognises that improving air quality can deliver substantial public health benefits while supporting wider climate objectives.

Environmental Improvement and Climate Adaptation

The UK Climate Change Risk Assessment (2022) identifies air quality as an emerging climate-health risk.

National adaptation planning increasingly considers:

- Climate-related changes in pollution patterns.
- Heat and air quality interactions.
- Wildfire smoke risks.
- Climate-sensitive respiratory disease.
- Vulnerability of at-risk populations.

This reflects a shift from treating air quality solely as an environmental issue towards recognising it as a climate adaptation and health protection priority.

Weather-Health Alerts and Public Health Protection

The UK Health Security Agency (UKHSA) increasingly integrates environmental hazards into public health preparedness.

Recent approaches have strengthened:

- Heat-health alerts.
- Air quality information.
- Public communication.
- Protection of vulnerable groups.
- Emergency planning for environmental health hazards.

This integrated approach recognises that heat, air pollution and respiratory disease often occur together and may amplify health impacts.

Local East Sussex Response to Build From:

East Sussex has developed a strong foundation for addressing air quality through public health, environmental management, transport planning and climate adaptation. The county's Air Quality JSNA, Healthy and Sustainable Places Framework and Local Transport Plan all recognise the significant health burden associated with air pollution and the need for coordinated action. Increasingly, air quality is being understood not only as an environmental issue but also as a climate adaptation and health inequalities issue. Strengthening the integration of air quality, climate

resilience and public health planning will help East Sussex reduce future health risks while supporting healthier, more sustainable and climate-resilient communities.

While much of this work predates the growing recognition of a changing climate as a health issue, there is increasing alignment between local air quality action and climate adaptation objectives.

In East Sussex environmental and climate-related air quality action includes:

- A dedicated Air Quality JSNA providing a robust evidence base.
- Strong integration between transport, health and environmental planning.
- Established air quality monitoring arrangements.
- Recognition of air quality within Healthy Places and health inequalities work.
- Increasing focus on active travel and sustainable transport.
- Existing climate adaptation and resilience programmes.

By addressing the intersection of a changing climate, air quality, and health, the East Sussex system can:

- **Reduce disease burden** from respiratory and cardiovascular conditions.
- Protect children and vulnerable populations from long-term health impacts.
- **Build climate-resilient infrastructure** that supports wellbeing and health equity.
- Align environmental and health outcomes through joined-up local action.

The East Sussex Air Quality Joint Strategic Needs Assessment (JSNA) identifies air pollution as an important public health issue and highlights the need to understand both the direct health effects of air pollution and the actions required to improve air quality across the county. The 2024 Air Quality JSNA provides a detailed assessment of the health impacts of air pollution, local sources of exposure, inequalities, and current management arrangements across East Sussex.

Understanding Air Quality as a Climate and Health Issue

Nationally, the UK Health Security Agency's Health Effects of Climate Change (HECC) Report (2023) identifies air quality as one of the most important pathways linking climate change and health. A changing climate can worsen air pollution through higher temperatures, increased ozone formation, wildfire smoke, and interactions with aeroallergens.

Locally, East Sussex recognises that environmental quality is a key determinant of health. The Healthy Places Framework identifies air pollution as one of the greatest environmental risks to health and acknowledges that pollution from transport,

construction and commercial activities can negatively affect physical health, wellbeing and quality of life.

Air Quality Monitoring and Management

District and borough councils have the statutory responsibility for monitoring local air quality and managing Air Quality Management Areas (AQMAs). Current monitoring has identified areas where air quality objectives are not consistently achieved, particularly in locations affected by traffic congestion and transport emissions.

East Sussex currently has Air Quality Management Areas in:

- Lewes town centre.
- Newhaven Ring Road.

These locations experience the highest levels of traffic-related air pollution within the county and remain priorities for intervention.

The JSNA notes that while overall air quality in East Sussex is generally good compared with many urban areas, localised pollution hotspots continue to affect some communities and may contribute to adverse health outcomes.

Transport and Active Travel

The strongest climate-health response relating to air quality can be seen within the East Sussex Local Transport Plan (LTP4). The LTP is a strong example of where local action is being taken now at all levels in Sussex to address air quality and will be recognised in future policy decision-making processes through the East Sussex Local Transport Plan and its Health Impact Assessment for LTP4.

The LTP4 Health Impact Assessment recognises air quality as a major determinant of health and highlights the importance of reducing transport emissions while promoting healthier travel behaviours. Public consultation identified “safety, health and air quality” as the most important theme for future transport planning, with almost four-fifths of respondents highlighting its importance

The East Sussex system is working to develop and implement consistent, robust Local Plan policies on air quality, including securing developer contributions to air quality mitigation measures. The aim is to strengthen policies in the plans to prioritise active and sustainable travel, enabling walkable environments and mix use communities, whilst reducing the need to travel by car. This will maximise benefits to local air quality and reduce exposure to pollution during design stages.

Clean Air Zones (areas where access is restricted to vehicles that meet a set emission standard) or schemes which redesign road space to prioritise people walking, wheeling, and cycling in pollution hotspots remain an area for local, political discussions. It is important with the development of these types of measures that they are co-designed with local communities. Current evidence suggests Low Emission Zones (LEZs) can reduce air pollution-related health outcomes, with the most consistent effect on cardiovascular disease.

Key transport-related responses include:

- Promoting walking, wheeling and cycling.
- Improving public transport accessibility.
- Reducing dependence on private vehicles.
- Supporting decarbonisation of transport.
- Improving urban environments and reducing congestion.

These actions provide significant co-benefits by simultaneously reducing greenhouse gas emissions, improving air quality, increasing physical activity and supporting healthier communities.

Health Inequalities and Vulnerable Populations

The East Sussex response increasingly recognises that air pollution contributes to health inequalities.

Evidence within the JSNA and Local Transport Plan highlights that some population groups are more vulnerable to the effects of poor air quality, including:

- Children and young people.
- Older adults.
- Pregnant women.
- People with asthma and chronic respiratory disease.
- People with cardiovascular disease.
- Communities living close to busy roads and transport corridors.

Air pollution affects health throughout the life course. Local evidence highlights links between air pollution and:

- Low birth weight and pre-term birth.
- Childhood asthma and impaired lung development.
- Coronary heart disease and stroke.

- Chronic obstructive pulmonary disease (COPD).
- Lung cancer.
- Diabetes.
- Dementia and accelerated decline in lung function among older adults.

This aligns with the wider East Sussex commitment to reducing health inequalities and improving healthy life expectancy.

Healthy Places and Green Infrastructure

East Sussex's Healthy and Sustainable Places Framework promotes the creation of healthier, more sustainable environments that support both climate resilience and public health.

The framework recognises that environmental quality influences:

- Physical health.
- Mental wellbeing.
- Opportunities for physical activity.
- Community wellbeing.
- Quality of life.

Measures to increase green infrastructure, improve urban environments, reduce traffic exposure and create healthier neighbourhoods contribute to both climate adaptation and air quality improvement.

Climate Adaptation and Resilience

The East Sussex Climate Change Risk and Vulnerability Assessment identifies environmental hazards as emerging climate risks for the county. While local adaptation work has traditionally focused on heat, flooding and severe weather, there is growing recognition that a changing climate may also influence future air quality through:

- Increased heatwave frequency.
- Higher ground-level ozone concentrations.
- Longer aeroallergen seasons.
- Increased wildfire smoke exposure.
- Combined heat and pollution events.

This reflects the national findings of the UKHSA HECC report and creates opportunities to integrate air quality more explicitly within climate adaptation planning.

Opportunities for Further Development

The Air Quality JSNA identifies opportunities to strengthen the local response further. These include:

- Better integration of a changing climate, air quality and health planning.
- Increased monitoring of climate-sensitive pollutants such as ozone.
- Improved understanding of indoor air quality.
- Enhanced surveillance of health impacts associated with air pollution.
- Greater focus on communities experiencing multiple vulnerabilities.
- Stronger integration of air quality considerations into adaptation planning.
- Increased public awareness of the links between a changing climate, air pollution and

6. Chemicals and Public Health - Considerations, Opportunities and Action Steps

High Level Strategic Opportunity:

Protect public health and the environment by adopting a health-first chemical policy, phasing out harmful chemical use in public services, and prioritising soil restoration as a strategic resource for food security, climate resilience, and ecosystem health.

Rationale:

Chemicals are a key focus of this HIA because a changing climate can influence how hazardous substances are released, transported, concentrated and absorbed within the environment and human populations. Rising temperatures, flooding, droughts, coastal change, wildfires and other extreme weather events can increase exposure to pollutants in the air, water, soil and food system, potentially affecting respiratory, cardiovascular, neurological and developmental health. A changing climate can also amplify existing environmental inequalities, with vulnerable and disadvantaged communities often experiencing greater exposure and lower capacity to adapt. While

less visible than some other climate-related hazards, chemical exposures have the potential to affect health through multiple pathways and may become more significant as the climate continues to change. Understanding and managing these risks is therefore an important part of building climate resilience, protecting public health and reducing health inequalities.

Considerations, Opportunities and Action Steps

Opportunity 1. Create a Health-First Chemical Policy

Action Steps:

- Localize and democratize decisions on chemical use with a public health lens.

Opportunity 2. Increase Green Service Provision

Action Steps:

- Transition public sector services and maintenance away from toxic or non-ecological chemical inputs.
- Pass local ordinances banning chemical pesticides on public property and restricting use in residential developments.

Opportunity 3. Recognise Soil as a Strategic Public Health Resource

Action Steps:

- Recognize **soil health restoration** as fundamental to food security, water management, carbon sequestration, and long-term public health.
- Create a **Soil Health Action Plan** in collaboration with farmers, and environmental scientists.
- **Begin soil regeneration pilots** on underused land, former industrial sites, and peri-urban agriculture zones.

Opportunity 4. Phase Out Harmful Chemicals in Public Services

Action Steps:

- Transition all local government-maintained green spaces to pesticide-free management by a set deadline (e.g., 2026).

Context and Impacts:

Chemicals represent an often overlooked but increasingly important pathway through which a changing climate affects human health. A changing climate influences the production, distribution, environmental behaviour, exposure pathways and toxicity of both naturally occurring and manufactured chemicals. Rising temperatures, changing rainfall patterns, flooding, droughts, wildfires and other extreme weather events can increase human exposure to harmful chemicals and amplify associated health risks.

The relationship between a changing climate and chemicals is complex because a changing climate not only alters environmental conditions but can also affect how chemicals are released, transported, transformed and accumulated within ecosystems and human populations. Consequently, a changing climate may increase existing chemical risks while creating new and emerging hazards for public health. A changing climate is altering the nature, scale and distribution of chemical risks. While these impacts are less visible than floods or heatwaves, they have the potential to affect population health through multiple pathways including air quality, water quality, food systems and environmental contamination.

As temperatures continue to rise and extreme weather events become more frequent, climate adaptation strategies must increasingly consider chemical exposures as a critical component of climate and health resilience.

A changing climate does not create chemical hazards in isolation; it amplifies existing environmental risks and creates new exposure pathways. Effective climate-health adaptation therefore requires integrated action across public health, environmental protection, planning, infrastructure and emergency preparedness to minimise chemical-related health impacts and reduce environmental health inequalities.

How A changing climate Influences Chemical Risks

1. Increased Chemical Release During Extreme Weather Events

Flooding, storms, coastal erosion and wildfires can damage industrial facilities, waste sites, agricultural land and transport infrastructure, leading to the release of hazardous substances into the environment.

Examples include:

- Release of sewage and wastewater contaminants during flooding.
- Leakage from fuel storage facilities and industrial sites.
- Mobilisation of contaminants from former landfill sites.
- Coastal flooding releasing historical pollutants trapped in sediments.
- Wildfire smoke containing toxic compounds and particulate matter.

As extreme weather events become more frequent and severe, accidental chemical releases are expected to increase.

2. Rising Temperatures and Chemical Toxicity

Higher temperatures can alter the behaviour and toxicity of many chemicals. Climate-driven warming can:

- Increase chemical volatility, allowing pollutants to evaporate more easily.
- Increase concentrations of ground-level ozone and photochemical smog.
- Alter degradation rates and environmental persistence.
- Enhance human absorption and physiological responses.

Research suggests some pollutants become more harmful under warmer conditions, particularly when combined with heat stress.

3. Air Pollution and Secondary Chemical Formation

Temperature increases contribute to the formation of harmful air pollutants, particularly:

- Ground-level ozone
- Secondary particulate matter
- Nitrogen oxides (NOx)
- Volatile organic compounds (VOCs)

These pollutants are associated with:

- Respiratory disease
- Cardiovascular disease
- Stroke
- Asthma exacerbations
- Premature mortality

A changing climate is therefore expected to worsen certain forms of air pollution, even where emissions are reduced.

4. Agricultural Chemicals and Food Systems

A changing climate may increase reliance on pesticides, herbicides and fertilisers due to:

- Changes in pest distribution.
- New crop diseases.
- Reduced agricultural productivity.
- Increasing food insecurity.

This can increase environmental contamination and human exposure through:

- Food consumption.
- Water supplies.
- Occupational exposure among agricultural workers.

There are also concerns that a changing climate may alter the environmental persistence and effectiveness of pesticides, leading to increased application rates.

5. Water Quality and Chemical Contamination

Flooding, drought and changing precipitation patterns can significantly affect water quality.
Potential impacts include:

- Increased concentration of contaminants during drought.
- Overflow of wastewater systems during heavy rainfall.
- Contamination of drinking water sources.
- Increased nutrient pollution and harmful algal blooms.

These changes can expose populations to a range of harmful chemicals and biological contaminants.

6. Wildfires and Toxic Smoke Exposure

Wildfires are increasing globally and are projected to become more frequent in some UK landscapes.
Wildfire smoke contains:

- Fine particulate matter (PM2.5)
- Carbon monoxide

- Benzene
- Formaldehyde
- Polycyclic aromatic hydrocarbons (PAHs)

Exposure is linked to:

- Respiratory disease
- Cardiovascular disease
- Pregnancy complications
- Increased mortality
- Mental health impacts

Wildfires can also mobilise historical contaminants stored in soils and vegetation.

Health Impacts

Physical Health

Chemical exposures associated with a changing climate may contribute to:

Respiratory Conditions

- Asthma
- Chronic obstructive pulmonary disease (COPD)
- Reduced lung function

Cardiovascular Disease

- Heart attacks
- Stroke
- Hypertension

Neurological Effects

- Cognitive impairment
- Developmental disorders
- Neurotoxicity

Cancer

- Long-term exposure to carcinogenic pollutants

Reproductive and Developmental Effects

- Adverse pregnancy outcomes
- Developmental disorders in children

Mental Health

Chemical-related environmental incidents can also affect mental health through:

- Anxiety regarding contamination.
- Stress associated with environmental disasters.
- Displacement following industrial accidents or flooding.
- Concerns about food and water safety.

Vulnerable Populations

Certain groups face higher risks from chemical exposures:

Children

- Higher exposure relative to body weight.
- Developing organs and immune systems.

Older Adults

- Reduced physiological resilience.
- Increased prevalence of chronic disease.

Pregnant Women

- Increased vulnerability to developmental toxins.

Low-Income Communities

- Often located closer to industrial facilities or contaminated sites.

- Lower adaptive capacity.

Outdoor Workers

- Increased exposure during heat events and poor air quality episodes.

A changing climate therefore risks widening existing environmental health inequalities.

Chemicals and Climate Justice

The distribution of chemical risks is not equal.

Communities already experiencing deprivation frequently face:

- Poorer air quality.
- Higher industrial exposure.
- Greater flood risk.
- Lower-quality housing.

A changing climate can amplify these environmental inequalities, reinforcing the need for an equity-focused approach to climate adaptation and public health.

UK and East Sussex Context

Within East Sussex, chemical-related climate risks intersect with several local priorities:

Flooding and Coastal Change

Potential mobilisation of contaminants from:

- Former industrial land.
- Waste sites.
- Agricultural land.
- Wastewater infrastructure.

Air Quality

Warmer temperatures may exacerbate:

- Ground-level ozone formation.

- Air pollution episodes.
- Health impacts among vulnerable populations.

Agriculture

Changes in pest pressures may increase:

- Pesticide use.
- Nutrient runoff.
- Water contamination risks.

Wildfire Risk

Heathland and woodland fire risks are expected to increase, creating:

- Smoke exposure.
- Air quality impacts.
- Risks to vulnerable residents.

Strategic Implications

A changing climate is altering the nature, scale and distribution of chemical risks. While these impacts are less visible than floods or heatwaves, they have the potential to affect population health through multiple pathways including air quality, water quality, food systems and environmental contamination.

As temperatures continue to rise and extreme weather events become more frequent, climate adaptation strategies must increasingly consider chemical exposures as a critical component of climate and health resilience.

Current International and National Response(s):

International and national policy is increasingly recognising that a changing climate amplifies chemical and pollution-related health risks through impacts on water quality, air quality, food systems and environmental contamination. The direction of travel is towards integrated climate-health-environment governance, combining adaptation, prevention, surveillance and resilience-building.

For local authorities, the challenge is no longer simply managing pollution or responding to a changing climate separately. Instead, the emerging expectation is to address chemicals, climate and health as interconnected systems. This creates a significant opportunity for East Sussex to position itself at the forefront of climate-

health adaptation by embedding chemical risk management within its wider Healthy Places, Planning for Health and climate resilience agendas.

International Response

United Nations and WHO

The World Health Organization (WHO) increasingly recognises chemical pollution as one of the major environmental determinants of health and has highlighted the interactions between a changing climate, pollution and health risks.

The WHO's work focuses on:

- Reducing exposure to hazardous chemicals.
- Strengthening environmental health surveillance.
- Improving drinking water quality and sanitation.
- Protecting vulnerable populations.
- Supporting climate-resilient health systems.

WHO's COP26 Special Report on Climate Change and Health identifies chemical pollution, air pollution and contaminated water as key pathways through which climate change affects health.

UN Sustainable Development Goals (SDGs)

Several SDGs directly address chemicals and climate-health interactions, including:

- SDG 3: Good Health and Wellbeing.
- SDG 6: Clean Water and Sanitation.
- SDG 11: Sustainable Cities and Communities.
- SDG 12: Responsible Consumption and Production.
- SDG 13: Climate Action.
- SDG 14 & 15: Protection of ecosystems.

These goals encourage countries to address environmental pollution and climate adaptation together.

Strategic Approach to International Chemicals Management (SAICM)

The Strategic Approach to International Chemicals Management provides a global framework for improving chemical safety and reducing chemical-related harm.

Recent priorities include:

- Emerging contaminants.
- Endocrine-disrupting chemicals.
- Climate-related chemical risks.
- Sustainable chemical management.
- Pollution prevention.

In 2023, countries adopted the new Global Framework on Chemicals, recognising the need to strengthen resilience to climate-related environmental health risks.

Global Chemicals Conventions - Several international treaties support chemical risk reduction:

- **Stockholm Convention:** Controls persistent organic pollutants (POPs) which may be mobilised through flooding, wildfires and environmental change.
- **Basel Convention:** Regulates hazardous waste movements and management.
- **Rotterdam Convention:** Improves information sharing and management of hazardous chemicals and pesticides.

A changing climate is increasingly recognised as a factor affecting the effectiveness of these agreements.

Intergovernmental Panel on Climate Change (IPCC)

The IPCC has highlighted:

- Increased contaminant mobilisation from flooding.
- Water quality deterioration.
- Increased wildfire smoke exposure.
- Chemical interactions with climate-related hazards.
- Recent reports emphasise the need for integrated adaptation strategies that address pollution, climate and health simultaneously.

European Response

Although the UK has left the European Union, many European approaches remain influential.

European Green Deal

The European Green Deal includes:

- Zero Pollution Action Plan.
- Chemicals Strategy for Sustainability.
- Climate adaptation measures.
- Protection of water resources.

The strategy aims to create a “toxic-free environment” while improving climate resilience.

Chemicals Strategy for Sustainability

The EU’s Chemical Strategy seeks to:

- Phase out harmful chemicals.
- Improve chemical monitoring.
- Address combined exposures.
- Strengthen environmental health protections.

There is increasing recognition that a changing climate may alter exposure pathways and increase chemical risks.

UK National Response

UKHSA has a growing role in understanding environmental hazards, a changing climate, chemical exposures, responses and preparedness.

Key areas of work include:

- Environmental public health surveillance.
- Chemical incident response.
- Drinking water quality assessment.
- Health impact assessments.
- Climate-health adaptation planning.

UKHSA recognises that climate change may increase exposure to:

- Water contaminants.
- Air pollutants.
- Harmful algal blooms.

- Industrial pollution incidents.

UK National Adaptation Programme (NAP3)

The Third National Adaptation Programme identifies several priorities relevant to chemicals and health:

- Water resource resilience.
- Pollution management.
- Environmental monitoring.
- Climate-resilient infrastructure.
- Protection of public health.
- It promotes a shift from reactive responses towards proactive adaptation.

Environment Agency

The Environment Agency plays a central role in:

- Water quality regulation
- Pollution control
- Contaminated land management
- Flood risk management
- Catchment management

Increasing attention is being given to:

- Perfluoroalkyl and Polyfluoroalky Substances also known as PFAS ("forever chemicals") and there is now a PFAS Plan
- Pharmaceuticals
- Agricultural pollutants
- Emerging contaminants

Drinking Water Inspectorate (DWI)

The DWI regulates drinking water quality in England and Wales.

Current priorities include:

- Monitoring emerging contaminants.
- Climate resilience of water systems.
- Water safety planning.

- Managing contamination risks from flooding and drought

UK Chemicals Strategy

The UK Chemicals Strategy seeks to:

- Protect human health
- Reduce environmental contamination
- Improve chemical management
- Address emerging risks

Future developments are expected to increasingly recognise climate-related exposure pathways.

Water Sector Response

Water companies are becoming key climate-health adaptation partners.

South East Water is already responding to climate-related risks including:

- Chromium VI contamination
- Chlorinated solvents
- Pesticides
- Pharmaceuticals
- Harmful algal blooms
- Drought impacts

Responses include:

- Enhanced monitoring
- Catchment management
- Source water protection
- Nature-based solutions
- Climate adaptation planning

Water UK

The sector is investing in:

- Resilient water infrastructure.
- Improved treatment technologies.

- Catchment-based approaches.
- Environmental monitoring systems.

Public Health Approaches

Emerging best practice increasingly focuses on:

Prevention

- Reducing pollution at source.
- Sustainable chemical management.
- Green infrastructure.
- Nature-based solutions.

Monitoring and Early Warning

- Water quality monitoring.
- Air quality surveillance.
- Harmful algal bloom monitoring.
- Environmental health intelligence.

Vulnerability Assessment

Identifying populations at greatest risk from:

- Contaminated water.
- Poor air quality.
- Flood-related pollution.
- Industrial incidents.

Climate-Resilient Health Systems

Health services are increasingly being encouraged to consider:

- Chemical incidents.
- Environmental contamination.
- Water quality disruption.
- Climate-related environmental hazards.

Adaptation and Public Health Responses

Effective responses include:

Monitoring and Surveillance

- Environmental monitoring.
- Air quality monitoring.
- Water quality surveillance.

Climate-Resilient Infrastructure

- Flood-resistant wastewater systems.
- Sustainable drainage systems.
- Safe storage of hazardous materials.

Planning and Regulation

- Health Impact Assessments.
- Environmental Impact Assessments.
- Land-use planning controls.

Public Health Protection

- Heat and air quality alerts.
- Public information campaigns.
- Protection of vulnerable populations.

Cross-Sector Collaboration

- Public Health
- Environmental Health
- Planning
- Water companies
- Environment Agency
- NHS and social care

Local East Sussex Response to Build From:

The reality is that **East Sussex does not currently have a dedicated chemicals-and-health climate adaptation programme** in the same way it has work programmes for flooding, overheating, air quality, planning, active travel or climate adaptation. However, there are a number of existing activities across Public Health, Environmental Health, Planning, Climate Change, Water Management and Emergency Planning that collectively contribute to managing chemical risks associated with a changing climate.

From a climate and health perspective, East Sussex's response is currently best understood as being delivered through a combination of **prevention, preparedness, regulation, planning, environmental monitoring and partnership working**.

East Sussex is well positioned to align with emerging national and international approaches through:

- Climate adaptation planning
- Healthy Places programmes
- Planning for Health tools
- Health Impact Assessments
- Climate and health assessments
- Partnership working with water companies, Environment Agency and NHS partners

Future climate and health assessments could explicitly incorporate:

- Chemical contamination pathways
- Emerging contaminants
- Water quality risks
- Pharmaceutical and pesticide pollution
- Harmful algal blooms

Key local opportunities include:

- Integrating chemical risks into climate-health/climate and chemical health assessments.
- Developing climate and health data profiles.
- Strengthening water quality resilience planning.
- Embedding chemical exposure considerations into planning and development.
- Incorporating chemical risks within a future East Sussex Healthy and Sustainable Places Partnership.

- Working more closely with the water companies, Environment Agency and Catchment Partnerships for example.
- Influence better enforcement and regulation of chemicals

The East Sussex response to chemicals and climate-related health impacts is currently delivered through a combination of climate adaptation planning, Planning for Health, water resource management, environmental regulation, air quality management and emergency preparedness. While substantial foundations exist, chemical risks are not yet addressed as a distinct climate-health priority. The next stage of development would be to explicitly integrate chemicals, water quality, emerging contaminants and environmental exposures into climate-health assessments, Health Impact Assessments, adaptation plans and Healthy Places programmes, creating a more comprehensive and preventative climate-health system.

7. Drought and Public Health - Considerations, Opportunities and Action Steps

High Level Strategic Opportunity:

Boost climate resilience by mandating and incentivising rainwater harvesting, retrofitting water-saving infrastructure, and promoting community-scale systems to conserve water, reduce flooding and coastal impacts, and prepare for drought.

Rationale:

Drought is a key focus of this HIA because it is a significant and growing climate-related risk that can affect water security, food systems, environmental quality and population health. A changing climate is expected to increase the frequency and severity of droughts through hotter, drier summers, changing rainfall patterns and increased pressure on water resources. In areas such as South East England, where water resources are already under stress, drought can reduce water availability, affect water quality, damage ecosystems and disrupt agricultural production, potentially leading to higher food prices and increased food insecurity. These impacts can have disproportionate effects on vulnerable communities, including older people, low-income households and those with existing health conditions. Understanding drought risk is therefore essential for protecting public health, building resilience,

safeguarding water and food supplies, and reducing future health inequalities in a changing climate.

Considerations, Opportunities and Action Steps

Opportunity 1: Require, distribute and launch Mandatory Infrastructure

Action Steps:

- Require water butts (rain barrels) in all new residential and commercial developments.
- Where possible, distribute **water butts and DIY greywater kits** via councils and community hubs.
- Introduce water conservation requirements in all planning applications.
- Launch a **"Fix the Leaks"** national repair campaign for public infrastructure and private homes.

Opportunity 2: Incentivise Retrofits

Action Steps:

- **Provide guidance, incentives and subsidies** for adding water-saving features to existing buildings:
- Water butts
- Rain gardens
- Permeable paving connected to water storage

Opportunity 3: Promote Community Systems

Action Steps:

- Support community-scale rainwater harvesting systems in places like schools, parks, and estates.
- Expand citizen water quality and usage monitoring programs to raise local accountability.
- Roll out education packs to households and small businesses on drought preparedness and clean water practices.

Wider Benefits: Dual Impact – These actions help manage both drought and urban flooding, enhancing climate resilience at multiple levels.

Context and Impacts:

The UK is relatively water secure, but not in every region.

Drought is often perceived as a gradual and less visible climate hazard compared with flooding, storms or heatwaves. However, drought represents one of the most significant long-term climate risks to human health, environmental sustainability, food systems, water security and economic resilience. A changing climate is projected to increase the frequency, duration and severity of drought events across many regions of the world, including the UK. Rising temperatures, changing rainfall patterns, increased evaporation and growing demands on water resources are placing increasing pressure on natural and human systems. Despite perceptions of high rainfall, the amount of usable water per person is extremely low, with rainfall increasingly coming in intense events that do not effectively recharge groundwater.

Although the UK is generally regarded as a water-secure nation, water availability varies considerably across regions. South East England, including East Sussex, is already one of the most water-stressed parts of the country. Climate projections suggest that hotter, drier summers combined with population growth and increased demand for water will place further strain on water resources, increasing the likelihood of drought and associated health impacts.

More frequent and severe droughts driven by low rainfall and higher temperatures could disrupt agriculture, leading to food shortages, price increases, and food insecurity.

Understanding Drought and the Water Cycle

The Earth's water cycle is fundamental to life. Water enters the atmosphere primarily through the evaporation of seawater and terrestrial water sources. As warm air rises and cools, water vapour condenses and returns to the Earth's surface as rain, snow or hail. This process replenishes rivers, reservoirs, groundwater and soils.

Freshwater accounts for only approximately 3% of the world's water resources, yet it underpins ecosystems, food production, economic activity and public health. Agriculture alone consumes around 70% of global freshwater withdrawals.

A changing climate is disrupting the water cycle by:

- Increasing evaporation rates through higher temperatures.

- Altering seasonal rainfall patterns.
- Increasing the frequency of prolonged dry periods.
- Reducing groundwater recharge.
- Increasing the intensity of rainfall events, meaning more water runs off quickly rather than replenishing soils and aquifers.

The result is a growing risk of water scarcity, drought and competition for limited water resources.

The impacts of this – ranging from water shortages to drought, harvest failure, famine and even war – are more apparent abroad than in the wet, temperate climate of the UK, although we contribute to the problem by importing foods from drier regions. However, even in this country, region and area of East Sussex, the pumping of ground water to irrigate fields is a key contributor to droughts during hot summers.

The UK Climate Change Risk Assessment identifies water availability as one of the most significant long-term climate risks facing the UK.

Climate projections suggest that:

- Summers will become hotter and drier.
- Winter rainfall may increase but become more variable.
- Extreme rainfall events will become more intense.
- Drought periods will become more frequent and prolonged.
- Water demand will increase.

For South East England, drought risk is expected to increase significantly because the region already experiences lower annual rainfall than many other parts of the UK while supporting a large population and intensive agricultural activity.

Water Quality and Environmental Health

Drought affects not only water quantity but also water quality. Reduced river flows and lower reservoir levels can increase the concentration of:

- Agricultural pollutants.
- Pesticides.
- Nutrients.
- Pharmaceuticals.
- Industrial contaminants.

Warmer temperatures combined with nutrient-rich waters also increase the likelihood of harmful algal blooms, including blue-green algae, which can produce toxins harmful to humans and animals.

Evidence from water companies, including South East Water, suggests that a changing climate is already increasing these challenges in some water catchments.

Ecosystems and Natural Capital

Healthy ecosystems provide essential services that support human health and wellbeing.

Drought can damage:

- Rivers and wetlands.
- Woodlands and habitats.
- Biodiversity.
- Soil quality.

The degradation of these natural systems can reduce their ability to:

- Filter pollutants.
- Store water.
- Regulate temperatures.
- Support food production.

This can create additional pressures on both environmental and public health systems.

Health Inequalities

The impacts of drought are not experienced equally.

Groups likely to be disproportionately affected include:

- Low-income households.
- Rural communities.
- Older people.
- People with long-term health conditions.
- Farmers and agricultural workers.
- Communities already experiencing food insecurity.

A changing climate therefore risks exacerbating existing health inequalities if adaptation measures are not targeted towards vulnerable populations.

Food Systems, Agriculture and Food Security

One of the most important pathways linking drought to health is through impacts on food production and food security.

More frequent and severe droughts can:

- Reduce crop yields.
- Increase livestock stress and mortality.
- Damage agricultural productivity.
- Increase irrigation demands.
- Reduce food availability.

This can lead to:

- Food shortages.
- Higher food prices.
- Supply chain disruption.
- Reduced nutritional quality of food.
- Increased food insecurity.

The National Food Strategy highlights the interconnected nature of food, water and climate systems. Although the UK produces a significant proportion of its own food, it remains highly dependent on imported food products, many of which originate from regions already experiencing severe water stress and drought.

As a changing climate intensifies globally, disruptions in food-producing regions may increasingly affect food availability and affordability within the UK.

Current International and National Response(s):

The United Nations estimates that droughts affect billions of people worldwide and that, without significant adaptation, drought impacts are likely to intensify throughout the 21st century. Recognising these risks, international organisations, governments and research institutions have increasingly shifted from crisis management towards proactive drought preparedness, resilience-building and climate adaptation.

The United Nations Convention to Combat Desertification UNCCD is the primary international body leading global action on drought and land degradation.

Key priorities include:

- Drought preparedness rather than emergency response
- Sustainable land management
- Water security
- Ecosystem restoration
- Climate resilience

In 2022, the UNCCD launched the International Drought Resilience Alliance (IDRA) to accelerate global drought preparedness and adaptation. The alliance aims to:

- Improve drought monitoring and forecasting.
- Strengthen early warning systems.
- Share international best practice.
- Increase investment in drought resilience.
- Support vulnerable countries and communities.

The overall objective is to move from managing drought disasters to managing drought risks.

World Health Organization (WHO)

The WHO recognises drought as a major climate-sensitive health risk.

Its work focuses on:

Health Impacts of Drought

- Malnutrition and food insecurity.
- Waterborne disease.
- Poor sanitation and hygiene.
- Mental health impacts.
- Heat-related illness.
- Population displacement.

Climate-Resilient Health Systems

WHO promotes:

- Climate-health risk assessments.
- Drought preparedness planning.
- Health surveillance systems.
- Vulnerability assessments.

- Integration of climate risks into health policy.

The WHO COP26 Health Programme specifically highlights food security, water security and climate adaptation as critical health priorities.

Intergovernmental Panel on Climate Change (IPCC)

The IPCC identifies drought as one of the most significant climate-related risks globally.

Recent assessments conclude that:

- Agricultural drought is increasing.
- Ecological drought is becoming more common.
- Water scarcity will worsen in many regions.
- Food production systems face growing risks.
- Vulnerable populations are disproportionately affected.

The IPCC emphasises adaptation response such as:

- Water resource management.
- Nature-based solutions.
- Sustainable agriculture.
- Climate-resilient infrastructure.
- Public health preparedness.

United Nations Food and Agriculture Organization (FAO)

The FAO focuses on protecting food systems from climate-related drought. Key Approaches include:

Climate-Smart Agriculture

Promoting:

- Drought-resistant crops.
- Efficient irrigation.
- Soil conservation.
- Sustainable water use.

Water Efficiency

Supporting:

- Precision agriculture.
- Reduced water consumption.
- Improved irrigation technologies.

Food Security Planning

Strengthening resilience of food systems and supply chains.

The FAO recognises drought as one of the greatest threats to global food security.

World Meteorological Organization (WMO)

The WMO supports countries through:

Drought Monitoring

- Global drought monitoring systems.
- Seasonal forecasting.
- Climate intelligence.

Early Warning Systems

The UN's **Early Warnings for All Initiative** seeks to ensure all countries have access to multi-hazard early warning systems by 2027.

These systems provide advance warning of:

- Drought.
- Heatwaves.
- Water shortages.
- Agricultural impacts.

Sustainable Development Goals (SDGs)

Several SDGs directly address drought and its health impacts:

SDG 2 – Zero Hunger

Addressing food insecurity and malnutrition.

SDG 3 – Good Health and Wellbeing

Reducing health risks associated with a changing climate.

SDG 6 – Clean Water and Sanitation

Ensuring sustainable water management.

SDG 13 – Climate Action

Strengthening adaptation and resilience.

SDG 15 – Life on Land

Protecting ecosystems and combating desertification.

European Response

European Union Climate Adaptation Strategy - The EU has identified drought as a major climate risk. Actions include:

- Water resilience planning.
- Sustainable water use.
- Drought risk assessments.
- Climate adaptation investment.

Water Framework Directive promotes:

- Protection of water resources.
- Catchment-based management.
- Water quality improvement.

European Green Deal - recognises drought as a threat to:

- Public health.
- Food production.
- Biodiversity.
- Economic stability.

Global Public Health Response

Increasingly, drought is being viewed as a public health issue rather than solely an environmental or agricultural problem.

Emerging international approaches focus on:

Prevention - Reducing vulnerability before drought occurs.

Preparedness - Developing plans for:

- Water shortages.
- Food insecurity.
- Health system resilience.

Protection of Vulnerable Groups - Particular attention is given to:

- Children.
- Older people.
- Low-income communities.
- Rural populations.
- Indigenous communities.

Health Equity - Many organisations recognise that drought disproportionately affects those least able to adapt.

Nature-Based Solutions

A major international trend is the use of nature-based solutions to improve drought resilience. Examples include:

- Wetland restoration.
- River restoration.
- Reforestation.
- Sustainable land management.
- Soil health improvement.

These approaches can:

- Improve water retention.
- Reduce flood and drought risk.
- Improve biodiversity.
- Deliver health and wellbeing benefits.

Emerging Areas of International Action

Increasing attention is being given to:

Drought and Mental Health

Recognition of:

- Climate anxiety.
- Farmer distress.
- Community stress.
- Loss of livelihoods.

Drought and Health Systems

Improving resilience of:

- Hospitals.
- Water supplies.
- Public health services.

Drought and Food Systems

Creating more resilient food production and supply chains.

Drought and Climate Justice

Recognising that countries contributing least to a changing climate often experience the most severe drought impacts.

Key International Messages

The international response increasingly recognises that drought is:

- A climate issue.
- A health issue.
- A food security issue.
- A water security issue.
- A social justice issue.

The overall international and national strategic direction of travel is towards:

Prevent- Reduce vulnerability before drought occurs by reducing future water stress and environmental degradation.

Prepare - Develop early warning systems and resilience plans. Improve forecasting, monitoring and drought planning.

Protect - Safeguard vulnerable populations and critical services including food systems.

Adapt - Strengthen long-term resilience of water, food, health and environmental systems. Build long-term resilience within water, agricultural, environmental and health systems.

Transform - Move towards climate-resilient societies capable of thriving in a warmer and more water-constrained future. Create more sustainable and climate-resilient communities, economies and ecosystems.

Internationally, drought is no longer viewed solely as a temporary water shortage but as a complex systemic risk affecting health, food systems, economies, ecosystems and social wellbeing. The global response is increasingly focused on resilience, adaptation and prevention, recognising that proactive investment today is significantly more cost-effective than responding to escalating drought impacts in the future. These lessons are directly relevant to water-stressed regions such as South East England and East Sussex, where climate projections indicate that drought will become an increasingly important climate-health challenge throughout the coming decades.

National Responses

The UK's response to drought has evolved from a narrow focus on water supply management towards a broader climate adaptation and public health agenda. National policy increasingly recognises that drought is not simply an environmental issue but a systemic risk affecting water security, food production, ecosystems, economic resilience and population health. Future success will depend on integrated action across government, health systems, water companies, agriculture, local authorities and communities to build resilience to a hotter, drier and more uncertain climate.

Current national measures include:

- UK National Adaptation Programme (NAP3)
- Water Resource Management Plans
- Drought Plans
- Catchment management programmes
- Environmental monitoring
- Water efficiency campaigns

National Adaptation Programme (NAP3)

The Third National Adaptation Programme (NAP3) is the UK Government's primary strategy for adapting to a changing climate.

The programme identifies drought and water scarcity as major climate risks and focuses on:

- Improving water resource resilience.
- Protecting public health from climate impacts.
- Increasing climate resilience across infrastructure and services.
- Supporting nature-based solutions.
- Strengthening local adaptation planning.

NAP3 recognises that drought can have cascading impacts across water supplies, agriculture, ecosystems, food security, energy systems and public health.

UK Climate Change Risk Assessment (CCRA)

The Climate Change Committee's Climate Change Risk Assessment identifies several drought-related priority risks:

Water Supply Risks

- Reduced water availability.
- Increased demand during hotter summers.
- Greater pressure on reservoirs and groundwater.

Health Risks

- Heat-related illness.
- Water quality deterioration.
- Food insecurity.
- Mental health impacts.

Environmental Risks

- Ecosystem degradation.
- Reduced river flows.
- Biodiversity loss.

The assessment emphasises the need for long-term adaptation and resilience planning.

Water Resource Management

Environment Agency National Framework for Water Resources - The Environment Agency has developed a long-term framework aimed at ensuring resilient water supplies up to 2050 and beyond.

Key actions include:

- Reducing water demand.
- Increasing water efficiency.
- Developing new water infrastructure.
- Improving drought preparedness.
- Protecting groundwater and river systems.

The framework estimates that England could face a significant water deficit by the middle of the century without action.

Regional Water Resource Plans

Water companies are required to produce Water Resource Management Plans and Drought Plans that assess future climate risks and identify measures to maintain water supplies during periods of prolonged drought.

These plans include:

- Demand reduction programmes.
- Leakage reduction.
- Water transfers between regions.
- Reservoir development.
- Emergency drought measures.

Public Health Response

UK Health Security Agency (UKHSA)

The UKHSA increasingly recognises drought as a climate-sensitive public health issue.

Its work focuses on:

- Climate-health surveillance.
- Monitoring health impacts of adverse weather.
- Developing guidance for health and care services.
- Supporting adaptation planning.

Drought-related health concerns include:

- Heat-related illness.
- Reduced water quality.
- Food insecurity.
- Mental health impacts.
- Impacts on vulnerable populations.

Adverse Weather and Health Plan

The UKHSA Adverse Weather and Health Plan supports preparedness for weather-related health risks and recognises the interaction between drought, heat and public health.

The plan promotes:

- Prevention.
- Early warning systems.
- Community resilience.
- Protection of vulnerable populations.

Food Security, Agriculture and the National Food Strategy

The National Food Strategy identifies a changing climate and water scarcity as major risks to future food security.

Key concerns include:

- Reduced agricultural productivity.
- Crop failures.
- Supply chain disruption.
- Rising food prices.
- Dependence on imported food from drought-prone regions.

The strategy advocates:

- Sustainable food production.
- Improved water efficiency.
- Climate-resilient agriculture.
- Diversification of food systems.

Environmental Land Management Schemes (ELMS)

The Government's agricultural support schemes encourage:

- Sustainable land management.
- Soil conservation.
- Water retention.
- Nature recovery.

These measures aim to improve resilience to drought while delivering environmental benefits.

Environmental and Ecosystem Protection and the Environment Act 2021

The Environment Act provides a framework for:

- Improving water quality.
- Protecting ecosystems.
- Enhancing biodiversity.
- Supporting environmental resilience.

Healthy ecosystems are increasingly recognised as critical to drought resilience because they help:

- Store water.
- Improve soil moisture.
- Reduce flood and drought risk.
- Support water quality.

Nature-Based Solutions

National policy increasingly promotes:

- Wetland restoration.
- Peatland restoration.
- River restoration.
- Woodland creation.

These interventions help retain water within landscapes and improve resilience to prolonged dry periods.

Emergency Planning and Drought Preparedness

The UK has established drought planning mechanisms involving:

- (DEFRA)
- Environment Agency.
- Water companies.
- Local Resilience Forums.
- Local authorities.

Drought plans typically include:

- Water use restrictions.
- Public communications.
- Environmental monitoring.
- Emergency supply arrangements.

The emphasis is increasingly on preparedness rather than crisis response.

Research, Monitoring and Early Warning Systems

National organisations continue to invest in:

Monitoring

- Groundwater levels.
- River flows.
- Reservoir storage.
- Soil moisture.
- Water quality.

Forecasting

The Met Office, Environment Agency and UK Centre for Ecology and Hydrology provide:

- Seasonal drought forecasts.
- Water resource projections.
- Climate scenarios.

These systems support proactive decision-making and adaptation planning.

Addressing Health Inequalities

National policy increasingly recognises that climate impacts, including drought, disproportionately affect vulnerable populations.

Particular attention is given to:

- Low-income households.
- Rural communities.
- Older people.
- People with chronic health conditions.
- Those experiencing food insecurity.

This reflects growing recognition that climate adaptation and health equity must be addressed together.

Local East Sussex Response to Build From:

Water scarcity is another climate hazard important to East Sussex. The south of England was impacted by drought events in 2018, 2022 and 2023. Water scarcity can increase stress on vegetation, reduce growth rates and lead to declines in vegetation cover. Periods of drought provide fewer resources such as food and shelter for terrestrial wildlife, impacting survival rates and leading to population declines. The River Ouse has shown susceptibility to reduced flow during drought periods[12].

Water scarcity can disrupt business operations, potentially leading to increased costs due to the need for alternative water sources or water saving technologies. However, Southern Water allows businesses to be exempt from the first round of ‘hosepipe bans’ (Temporary Use Bans), although these are restricted in later rounds if droughts become more severe. South East Water allow concessions for small businesses whose sole operations are cleaning of nondomestic buildings.

East Sussex farmers are facing the impacts of a changing climate, including more frequent and severe droughts and an increased risk of wildfires, which can negatively impact crop yields, livestock, and infrastructure.

Effective responses to drought require a combination of mitigation, adaptation and resilience-building.

Local Responses

For East Sussex, opportunities include:

- Strengthening water resilience planning.
- Supporting sustainable agriculture.
- Promoting water efficiency.
- Protecting groundwater resources.
- Integrating drought considerations into Health Impact Assessments.
- Embedding water security within Healthy Places and climate adaptation programmes.

Strategic Implications

East Sussex monitors drought conditions through the Sussex Resilience Forum, providing early notifications and public messaging, and holding multi-agency meetings. Local resilience forums bring together emergency services, councils, utilities and other essential public and voluntary services to work in partnership to support the local community during incidents and emergencies.

Through the Sussex Resilience Forum (SRF), organisations work together to prepare for, respond to, and recover from emergencies. The SRF is responsible for coordinating and testing emergency plans and procedures so that member organisations are prepared to meet their duties specified under the Civil Contingencies Act. During an incident or emergency, members of the resilience forum work together to support the organisation/s that are leading the response.

Drought is a slow-moving but far-reaching climate hazard that threatens water security, food systems, environmental quality and public health. A changing climate is increasing the likelihood of more frequent and severe droughts, particularly in water-stressed regions such as South East England. Building resilience will require integrated action across water management, agriculture, public health, planning and climate adaptation to protect both people and place in a changing climate.

8. Flooding and Coastal Impacts and Public Health - Considerations, Opportunities and Action Steps

"Yes, one of the other issues that you're going to have is that the vulnerabilities are going to change. For example, we have our risk ratings for people that we would go and visit, but I guess we're not looking at coastal erosion as part of a home safety visit, whereas that would leave someone incredibly vulnerable if their house, The edge is getting closer and closer" (East Sussex Stakeholder- Emergency Services)

High Level Strategic Opportunity:

Enhance coastal climate resilience by integrating flood-resilient infrastructure, strengthened planning regulations, comprehensive risk assessments, community health and social support, and inclusive adaptation planning with local engagement and education.

Rationale:

Flooding and coastal impacts are a priority focus within this HIA because they represent some of the most significant and immediate climate-related risks to health in the UK, with a changing climate increasing the frequency and severity of flooding through heavier rainfall, rising sea levels and more intense storms. Flooding has wide-ranging direct and indirect public health consequences, including injuries, waterborne infections, disruption to healthcare services, displacement from homes, and damage to critical infrastructure. Evidence shows that the long-term mental health effects, such as anxiety, depression and post-traumatic stress disorder (PTSD), can be particularly significant and may persist long after floodwaters have receded. Coastal flooding and erosion also threaten homes, public services, transport networks and freshwater supplies, with vulnerable groups such as older people, children, pregnant women and those with existing health conditions facing the greatest risks. As flooding increasingly affects communities, healthcare facilities and essential services, understanding and addressing these impacts is critical to protecting public health and building resilience to future a changing climate.

Considerations, Opportunities and Action Steps

Opportunity 1. Develop, use and require Infrastructure & Development

Action Steps:

- Develop flood-resilient buildings to reduce damage and disruption.
- Use smart water butts and sustainable drainage systems (SuDS) in new developments.
- Require 12-month maintenance and monitoring of SuDS by builders.
- Develop **community-led pilot projects** for dune restoration and managed retreat.
- Integrate coastal impacts into East Sussex climate adaptation and emergency plans.
- Monitor and address water quality issues linked to coastal flooding (e.g., sewage overflow, saltwater intrusion into freshwater).

Opportunity 2. Strengthen Regulatory & Planning Measures

Action Steps:

- Strengthen building regulations and planning for flood-prone and coastal erosion areas.
- Strengthen the monitoring of SuDS in all relevant areas and developments.
- Where possible, encourage residents to prevent paving over gardens to maintain water tables and enhance natural drainage.

Opportunity 3. Ensure, conduct and make use of Funding & Risk Assessment

Action Steps:

- Ensure Section 106 and Community Infrastructure Levy funds account for flood risks.
- Conduct county-wide infrastructure impact assessments to quantify potential future losses from flooding.
- Work as a system to develop and launch a coastal risk and asset vulnerability assessment.

Opportunity 4. Integrate Health, Social and Community Considerations as part of providing support

Action Steps:

- Prepare healthcare services for injuries and illnesses related to coastal disasters.
- Recognise the mental health and displacement impact of flooding.
- Develop mental health support for communities facing displacement or loss
- Plan for long-term social resilience alongside physical infrastructure.
- Establish **cross-sector coastal resilience working groups** including health, environment, housing, and economy.

Opportunity 5. Make us of adaptation planning and education

Action Steps:

- Work to further develop understanding and mitigation measures to address coastal erosion and flooding from other sources (surface waters, rivers and groundwater for example) and as outlined by the East Sussex Flood Risk Management Strategy.

Involve coastal communities in decision-making and adaptation planning.

- Use storytelling and local knowledge to communicate risks and adaptation options.
- Provide educational programs on climate impacts, coastal ecology, and preparedness.

Context and Impacts:

Flooding and coastal flooding are among the most significant and immediate climate-related risks facing the UK. A changing climate is increasing the frequency, intensity and severity of flooding through rising sea levels, heavier rainfall events, more frequent storms and changes in weather patterns. Flooding can have profound and long-lasting impacts on physical health, mental wellbeing, healthcare services, infrastructure, housing, communities, ecosystems and local economies. Flooding is described as becoming more frequent and intense, shifting from “rare events” to repeated occurrences within short timeframes.

Unlike some climate hazards that emerge gradually over time, flooding can have sudden and devastating consequences. However, the impacts often persist long after floodwaters have receded, creating lasting effects on health, wellbeing and

community resilience. The UK Climate Change Risk Assessment identifies flooding and coastal change as one of the highest priority climate risks requiring urgent action.

Flooding can affect both physical and mental health and have direct and indirect effects. The long-term effects of flooding on mental health - depression, anxiety and PTSD - are likely to be significant and require more attention (UKHSA, 2023). Mental health impacts can result from immediate effects such as damage to property, and displacement from homes, but also disruption, including access to basic needs such as employment, education, health services and wider facilities. During the flooding, direct physical health effects include drowning, injuries caused by contact with objects in floodwater, hypothermia, electrical injuries, skin and gut infections from exposure to contaminated flood water.

Sewage overflow caused by flooding increases the risk of infectious disease, particularly in children. Floods increase the risk of viral infections such as norovirus, hepatitis A and rotavirus; infections caused by parasites Cryptosporidium spp. and Giardia (to a lesser extent); and bacterial infections due to Campylobacter spp., pathogenic E. coli, Salmonella enterica and, to a lesser degree, Shigella spp.

Stagnant water remaining after floods (e.g. in basements, gardens, parks, agricultural fields) may create suitable sites for mosquito breeding, increasing the risk of mosquito-borne diseases. Furthermore, the risk of heart attacks, respiratory problems and poor pregnancy outcomes may increase.

Indirect effects of flood events, both during and after flooding, include health issues caused by disruption of medical treatments; physical workload associated with clean-up and reconstruction; shortages of medical aid, electricity or safe water; and problems with supply chains of food, electricity or sanitation (Paterson et al., 2018). Floodwaters can cause property damage, which can lead to displacement and overcrowding. Living in housing affected by flooding can lead to pulmonary and systemic fungal infections (e.g. from airborne and dust borne Aspergillus) and mycotoxin exposure.

Flooding can also lead to loss of employment, lack of access to childcare and school services, and increased domestic violence (Mason et al., 2021). Up to 75% of people affected by flooding suffer from mental health problems: trauma, mental distress in the short term to posttraumatic stress disorder (PTSD), anxiety, insomnia, psychosis and depression (Munro et al., 2017; WHO Regional Office for Europe, 2013).

Populations that are particularly vulnerable to adverse effects of flooding include the elderly, children, people with chronic illnesses or physical impairments and pregnant women (WHO Regional Office for Europe, 2017). People accommodated in temporary shelters are more prone to acquire health problems due to the higher probability of exposure to infectious disease pathogens in communal accommodations and the

disruption of their regular healthcare provision. Emergency and ambulance service workers are at higher risk of waterborne diseases due to elevated occupational exposure, as they come into contact with contaminated flood water, debris and mud (ECDC, 2021).

Flooding is predicted to increasingly endanger assets, including hospitals, GP surgeries, care homes and emergency services stations[13].

A Changing Climate and Flood Risk

The UK's climate is becoming warmer and wetter, with heavier rainfall events occurring more frequently. Although summers are projected to become drier overall, rainfall is increasingly falling in intense downpours that can overwhelm drainage systems and watercourses.

A changing climate is increasing flood risk through several pathways:

Increased Heavy Rainfall - Warmer air holds more moisture. For every 1°C increase in temperature, the atmosphere can hold approximately 7% more water vapour. This increases the likelihood of intense rainfall events, flash flooding and surface water flooding.

Rising Sea Levels - Global sea levels have risen significantly over the past century and are projected to continue rising for centuries, even under lower emissions scenarios. Sea level rise increases the risk of:

- Coastal flooding.
- Storm surges.
- Coastal erosion.
- Saltwater intrusion into groundwater and freshwater systems.

Storm Intensity - A changing climate may increase the intensity of some storms, increasing risks to coastal communities and critical infrastructure.

Groundwater Flooding - Changes in seasonal rainfall patterns can increase groundwater flooding, particularly in areas with permeable geology such as chalk aquifers.

Types of Flooding

Flood risk in the UK arises from multiple sources:

- **River (Fluvial) Flooding -** Occurs when rivers exceed their capacity and overflow onto surrounding land.

- **Surface Water Flooding -** Occurs when rainfall overwhelms drainage systems and cannot infiltrate the ground quickly enough.
- **Groundwater Flooding -** Occurs when groundwater levels rise above the surface following prolonged rainfall.
- **Coastal Flooding-** Occurs when sea levels, tides and storm surges combine to inundate coastal areas.
- **Sewer Flooding -** Occurs when sewer systems are unable to cope with rainfall or become overwhelmed.

A changing climate is expected to increase risks from all of these flood types.

Coastal Flooding and Coastal Change - Coastal flooding presents particular challenges due to the combination of sea level rise, coastal erosion and storm activity.

The UK has over 17,000 kilometres of coastline, much of which is already vulnerable to coastal change. Rising sea levels increase the likelihood that coastal defences will be overtopped or damaged during storm events.

Coastal flooding can result in:

- Damage to homes and businesses.
- Loss of infrastructure.
- Contamination of freshwater supplies.
- Disruption to transport networks.
- Population displacement.

Coastal erosion may also threaten homes, public services and community assets, requiring difficult decisions regarding adaptation and managed retreat.

Current International and National Response(s):

The international and national response is increasingly based around five principles:

Prevent - Reduce future flood risk through climate mitigation and resilient development.

Prepare - Improve forecasting, warning systems and emergency planning.

Protect - Safeguard vulnerable populations, infrastructure and services.

Adapt - Develop long-term resilience to increasing flood and coastal risks.

Transform - Create climate-resilient places, communities and health systems capable of thriving despite future a changing climate.

The Paris Agreement recognises adaptation as a global priority alongside emissions reduction. Flooding and sea level rise are identified as key climate risks requiring urgent action.

International adaptation efforts focus on:

- Reducing flood risk.
- Protecting vulnerable populations.
- Strengthening community resilience.
- Building climate-resilient infrastructure.
- Integrating health into climate adaptation planning.

The Global Goal on Adaptation encourages countries to improve resilience to climate-related hazards, including flooding and coastal change.

Intergovernmental Panel on Climate Change (IPCC)

The IPCC identifies flooding and coastal flooding as among the most significant climate risks facing human populations globally.

Recent reports highlight:

- Increased frequency of extreme rainfall events.
- Accelerating sea-level rise.
- Increased coastal erosion.
- Greater flood-related displacement.
- Rising health risks from flooding.

The IPCC advocates:

Climate Adaptation

- Flood-resilient infrastructure.
- Nature-based solutions.
- Managed coastal adaptation.
- Early warning systems.
- Climate-resilient health systems.

Health Protection

The IPCC increasingly recognises flooding as a public health issue, highlighting impacts on:

- Physical health.
- Mental health.
- Healthcare services.
- Food and water security.
- Health inequalities.

World Health Organization (WHO)

The WHO identifies flooding as one of the most significant climate-sensitive health risks.

WHO priorities include:

Climate-Resilient Health Systems

- Healthcare preparedness.
- Emergency planning.
- Vulnerability assessment.
- Public health surveillance.

Health Adaptation

- Early warning systems.
- Community preparedness.
- Mental health support.
- Protection of vulnerable populations.

The WHO COP26 Health Programme emphasises integrating climate adaptation and health planning.

United Nations Office for Disaster Risk Reduction (UNDRR)

The UNDRR promotes implementation of the Sendai Framework for Disaster Risk Reduction.

Key objectives include:

- Understanding disaster risk.
- Strengthening governance.
- Investing in resilience.
- Enhancing preparedness.

Flooding is a central focus of the framework due to its growing frequency and impact.

Nature-Based Solutions

Globally, increasing emphasis is placed on:

- Wetland restoration.
- River restoration.
- Mangrove protection.
- Floodplain management.
- Sustainable drainage.

These approaches can reduce flood risk while delivering biodiversity, climate and health benefits.

UK Climate Change Risk Assessment (CCRA)

The UK Climate Change Risk Assessment identifies flooding and coastal change as one of the highest priority climate risks facing the country.

Priority risks include:

- Risks to communities.
- Risks to health and wellbeing.
- Risks to infrastructure.
- Risks to ecosystems.
- Risks to food systems.

The CCRA consistently highlights the need for faster adaptation action.

National Adaptation Programme (NAP3)

The Third National Adaptation Programme identifies flooding and coastal change as key areas requiring adaptation.

Key actions include:

- Increasing flood resilience.
- Protecting critical infrastructure.
- Strengthening community preparedness.
- Enhancing climate-resilient development.
- Supporting health system adaptation.

The programme emphasises a whole-system approach linking environment, infrastructure and health.

Environment Agency

The Environment Agency leads national flood and coastal erosion risk management.

National Flood and Coastal Erosion Risk Management Strategy

The strategy promotes:

Climate Resilience

- Preparing for future climate scenarios.
- Long-term adaptation planning.
- Sustainable flood management.

Nature-Based Solutions

- Natural flood management.
- Catchment restoration.
- Coastal habitat creation.

Community Resilience

- Flood awareness.
- Local preparedness.
- Community recovery.

Flood and Coastal Resilience Innovation Programme

England has invested significantly in innovative approaches to:

- Community adaptation.
- Property flood resilience.
- Nature-based solutions.
- Coastal transition planning.

The programme aims to prepare communities for future climate risks rather than simply defending against them.

UK Health Security Agency (UKHSA)

UKHSA increasingly recognises flooding as a major public health issue.

Health Protection

Focus areas include:

- Infectious disease risks.
- Mental health impacts.
- Vulnerable populations.
- Healthcare disruption.

Adverse Weather and Health Plan

The plan provides guidance for:

- Health services.
- Social care providers.
- Local authorities.
- Emergency planners.

The emphasis is on preparedness, prevention and resilience.

NHS and Health System Response

The NHS Green Plan and adaptation work increasingly recognise flooding risks.

Key priorities include:

- Protecting healthcare infrastructure.
- Maintaining continuity of services.
- Emergency preparedness.
- Climate-resilient healthcare facilities.

Flooding is recognised as a risk to:

- Hospitals.
- GP practices.
- Community services.

- Supply chains.

Planning and Development

The National Planning Policy Framework (NPPF) requires:

- Flood risk assessments.
- Sequential testing of development sites.
- Avoidance of inappropriate development in high-risk areas.

Climate change allowances are now incorporated into flood risk planning to ensure developments remain resilient over their lifetime.

Coastal Management

The UK has developed Shoreline Management Plans (SMPs) to guide long-term responses to coastal flooding and erosion.

These plans consider:

- Hold the line (maintain defences).
- Managed realignment.
- Adaptation.
- No active intervention.

Increasingly, adaptation and managed transition are recognised as necessary in some locations due to rising sea levels.

Public Health and Health Inequalities

National policy increasingly recognises that flood impacts are not distributed equally.

Groups at greatest risk include:

- Older people.
- Children.
- People with disabilities.
- People with long-term health conditions.
- Low-income households.
- Socially isolated individuals.

The Climate Change Committee, UKHSA and NHS all emphasise the need to address health inequalities within climate adaptation planning.

Internationally and nationally, flooding and coastal flooding are increasingly recognised as major climate-health challenges requiring integrated action across climate adaptation, public health, planning, infrastructure, emergency preparedness and community resilience. The direction of travel is away from solely defending against floodwaters and towards creating resilient communities, resilient health systems and climate-adapted places capable of managing increasing flood risks over coming decades.

Local East Sussex Response to Build From:

Flooding in East Sussex has **significant implications for population health**, extending beyond immediate physical harm to include long-term mental health impacts, risks associated with damp and mould in housing, hygiene issues linked to sewer flooding, and disruption to essential services. Housing has been identified as a key determinant through which flooding affects health, particularly where recovery is prolonged or repeated.

East Sussex operates under Flood Risk Management Strategy that provides priorities and objectives, mainly focusing on social, economic and environmental impacts of flooding. The current approach looks at residential property protection and risk assessments based off the infrastructure. Community based resilience approaches are being adapted to flooding risks with an emphasis on awareness and behaviour change by providing the relevant information and enabling individuals to take action.

The Blue Heart Project

The Blue Heart Project is trying out innovative ways to predict and mitigate the impact of flooding in Eastbourne and southern Wealden for the benefit of local people, businesses, and the environment. The project studies and communicates flood risks in Eastbourne and South Wealden, including issuing flood warnings and automatically controlling water levels to protect drainage. The project has developed a smart integrated water management system using sensor data and weather forecasts to predict flooding and understand how water travels through the area. The project engages with communities who have concerns regarding flooding or who have experienced it firsthand. Blue Heart is funded by DEFRA's Flood & Coastal Resilience Innovation Programme which champions innovative approaches to flood resilience and climate adaptation. The outcome the of this project is that it will create an understanding of the local water catchment and how it works within the communities of Eastbourne and south Wealden.

The East Sussex Flood Risk Assessment

The purpose of the East Sussex Flood Risk Assessment is to identify areas across the county where flood risk is likely to have the highest negative impact.

Utilising the approved formula each Lower Super Output Area (LSOA) has been ranked for flood risk, from most impacted to least impacted. These rankings were produced based on individual flood sources and an overall risk, taking into consideration all sources of flooding.

They have also been produced based on present day and future flood risk.

A list of the top 10 priority areas for flood risk intervention over the strategy period has been produced based on the outcomes of the assessment.

Guiding Principles for the East Sussex Flood Risk Strategy:

1. To empower communities to acknowledge, prepare and adapt to their flood risk now and into the future.
2. To work in partnership with others, to promote sustainable flood risk management and sustainable drainage across the county.
3. To focus council flood risk management resources on those communities identified to be at the greatest risk of flooding both now and in the future.

Objective 1:

Climate resilient communities where resident's work with and are supported by RMAs and other stakeholders to actively engage with and manage their own flood risk.

Objective 1 Measures:

- Ensure those communities in East Sussex at the greatest risk of flooding are aware of those risks.
- Provide targeted support to those communities at the greatest risk of suffering negative impacts from flooding.
- Focus ESCC's resources on projects which benefit the largest number of people within at-risk communities.
- Ensure all flood risk management projects and flood investigations incorporate communities and citizen science throughout their lifecycles.

Objective 2:

Where cross-agency, cross-team collaboration and cooperation becomes business as usual and where relevant flood risk and project data is shared freely between agencies.

Objective 2 Measures:

- Encourage and facilitate multi-disciplinary project teams where members of multiple teams come together to undertake co-beneficial projects.
- Facilitate a central flood and development information hub accessible by all ESCC teams and select external stakeholders. To increase visibility of community scale developments/ projects where collaboration could bring multiple benefits.

Objective 3:

Where multiple stakeholders incorporate climate resilient design and partnership resourcing as standard.

Objective 3 Measures:

- Provide support for non-flood risk management teams and stakeholders on how to incorporate climate resilient flood risk management and/ or sustainable drainage into their projects.
- Facilitate regular and open stakeholder communication with the view of increasing the visibility of climate resilient design and encouraging the sharing of lessons learnt.

Objective 4:

Where opportunities to embed and enhance flood risk management and climate resilience in all development across the county is encouraged and supported by relevant planning policy and guidance.

Objective 4 Measures:

- Support and encourage all Planning Authorities in East Sussex to implement robust flood risk management and sustainable drainage policy and guidance.
- Ensure all planners understand sustainable drainage systems and flood mitigation measures, and their potential impacts on development.

9. Food Systems, Food Supply, Food Security and Public Health - Considerations, Opportunities and Action Steps

High Level Strategic Opportunity:

Promote Food Supply and Security: Promote a resilient, sustainable, and healthy local food system by investing in research and monitoring, empowering communities, expanding local food production and access, and strengthening connections across the local food economy.

Rationale:

Food systems, supply and security are a key focus for this HIA because they play a fundamental role in both population health and environmental sustainability. The food system influences the availability, affordability and nutritional quality of food, while also affecting biodiversity, natural resources and climate resilience. A changing climate is expected to increase the risk of droughts, extreme weather events and crop failures, which could affect food production and the reliability of food supplies. At the same time, poor diet remains a major contributor to preventable ill health, including obesity and other long-term conditions. Supporting a more sustainable, resilient and equitable food system can help improve access to healthy and nutritious food, reduce food waste, protect the natural environment, strengthen food security, and deliver wider health and wellbeing benefits for communities now and in the future.

Considerations, Opportunities and Action Steps

Opportunity 1. Develop Evidence & Policy Development

Action Steps:

- **Invest in research** to deepen understanding of food insecurity risks and inform effective policy responses.

- Collect, assess, and **continuously monitor data** on food insecurity levels.
- Develop a **climate-food-health resilience framework**, linking food security, local supply chains, sustainable diets, emergency planning and health inequalities

Opportunity 2. Foster and support Local Food Culture & Community Empowerment

Action Steps:

- Foster a long-term shift toward a local, sustainable, and healthy food culture.
- Support **bottom-up community development** to strengthen local food systems and empower residents.

Opportunity 3. Increase, promote and encourage Local Food Production & Access

Action Steps:

- Promote home-grown food and **communal gardening** (e.g. root gardens, allotments).
- **Increase spaces for food production** in urban planning and new developments.
- Encourage the use of surplus whole foods to address food insecurity.
- Mandate and promote locally produced, fresh, and sustainable food across supply chains.

Opportunity 4. Strengthen Local Food Economies

Action Steps:

- Build stronger connections between local suppliers and buyers.
- Encourage the buying, growing, and selling of local food to enhance food resilience and mental wellbeing.

Context and Impacts:

Firstly, what do we actually mean by the “food system”? The dictionary definition of a system is any set of things working together as a larger whole, towards some purpose or end. The railway system, for example, is made up of tracks, trains, stations, train drivers and so on, all combining to get us about.

The food system is the combination of all of the elements – natural and man-made – that combine to produce, process, market and sell the food we eat and the connections between them. It can be said to include everything from the sun and the soil to the till at the corner shop.

Use: National Food Strategy - Independent Review 2021.pdf

The food system we have today is both a miracle and a disaster. Defying Malthusian predictions of mass famine, modern intensive agriculture produces more than enough calories (albeit unevenly distributed) to feed 7.8 billion of us: the biggest global population in human history.

The food we eat – and the way we produce it – is doing terrible damage to our planet and to our health. Our diets 'cost the earth' and this in turn threatens our food security. The global food system is the single biggest contributor to biodiversity loss, deforestation, drought, freshwater pollution and the collapse of aquatic wildlife. It is the second-biggest contributor to a changing climate, after the energy industry. The next big shock to our food supply will almost certainly be caused by a changing climate in the form of extreme weather events and catastrophic harvest failures. Agriculture alone produces 10% of UK greenhouse gas emissions, despite constituting less than 1% of our GDP.

This makes the food system we have today both a miracle and a disaster. The food we eat – and the way we produce it is doing terrible damage to our planet and to our health. The global food system is the single biggest contributor to biodiversity loss, deforestation, drought, freshwater pollution and the collapse of aquatic wildlife. It is the second-biggest contributor to a changing climate, after the energy industry.

Cheap, highly processed food is also taking a toll on our bodies. Eighty per cent of processed food sold in the UK is unhealthy. There is a sound commercial reason for this: unhealthy food is more popular. The human appetite evolved in a world where calories were hard to come by. We are predisposed to pounce on any food that is high in fat and sugar. And once we start eating this kind of food, we are programmed to keep going: our hormones take longer to send out satiety signals (the feeling of fullness) than they do with lower-calorie foods.

Because there is a bigger market for unhealthy food, companies invest more into developing and marketing it. This in turn expands the market further still. The bigger the market, the greater the economies of scale. Highly processed foods – high in salt, refined carbohydrates, sugar and fats, and low in fibre – are on average three times cheaper per calorie than healthier foods. This is one reason why bad diet is a particularly acute problem among the least affluent.

The UK is now the third-fattest country in the G7, with almost three in ten of our adult population obese. The Institute for Health Metrics and Evaluation (IHME) does an

annual estimate of how many years of healthy life have been lost to avoidable illness, disability and death. Four out of the top five risk factors are diet related.

A changing climate is projected to bring more frequent and severe droughts, impacting water availability for irrigation and livestock, potentially leading to reduced crop yields and disruptions in food production. Declining crop yields effect increasing atmospheric carbon dioxide, reduced nutrient quality of crops, leading to increased malnutrition. Crop yields could decrease by 25–30% in central Asia and southern parts of Europe by the middle of the 21st century. While 300,000 species of plant have edible parts, just 20 species account for 90% of the world's food, and three – wheat, maize and rice – supply more than half. To be so heavily reliant on a tiny handful of crops puts humanity in a precarious position[14].

Our eating habits are destroying the environment. And this in turn threatens our food security. The next big shock to our food supply will almost certainly be caused by a changing climate in the form of extreme weather events and catastrophic harvest failures. Agriculture alone produces 10% of UK greenhouse gas emissions, despite constituting less than 1% of our GDP[15].

The food system – agriculture, food production, distribution and retail combined – releases more greenhouse gases than any other sector apart from energy. It is responsible for 25–30% of global emissions: a tally that dwarfs, say, the 3.5% contributed by air travel[16]. In the UK, the food system accounts for a fifth of domestic emissions – but that figure rises to around 30% if we factor in the emissions produced by all the food we import[17].

There are four major ways in which the food system contributes to a changing climate:

1. The damage done when wild areas are converted to farmland, or when farmland is prevented from reverting to forest.
2. The release of carbon from farmland soil – particularly peat soils.
3. The use of fossil fuels in every part of the food system.
4. The release of two potent greenhouse gases, methane and nitrous oxide, from agriculture – by far the largest factor in the UK.

The farming sector itself will have to become carbon neutral, something the National Farmers' Union has already committed to. But some areas of farmland will also have to be repurposed or adapted so that they actively sequester carbon, mopping up the emissions from those industries (such as air travel and heavy industry) that will still largely depend on fossil fuels for the foreseeable future; all this, while maintaining a steady supply of affordable food. We will have to produce more food from the

remaining land without resorting to the kind of intensive farming practices that have already done so much damage.

One way of freeing up enough land to meet our environmental targets is to tackle the vast amount of waste in the system. This isn't just the literal waste that first springs to mind: the excess lettuces ploughed back into the soil, the wonky carrots cast aside, the food we guiltily throw away at home because our eyes were bigger than our stomachs. It is systemic waste, which comes in three principal forms.

The first form of food waste is the vast amount of food waste in the system. Over a quarter of all the food grown in the UK is never eaten18. This wasted harvest accounts for between 6% and 7% of total UK greenhouse gas emissions[19]. Just under a third is wasted before it even leaves the farm gate because it doesn't meet specifications or because market fluctuations mean a crop suddenly becomes almost worthless. (Tomatoes, for example, are highly vulnerable to the vagaries of the British weather. A spell of hot weather will produce a glut of delicious ripe tomatoes. But if the skies suddenly cloud over, those tomatoes won't sell. People eat much less salad when it is cold.)

Beyond the farm gate, the biggest contributors to food waste are households (70%), followed by manufacturers (18%), the hospitality and food industry (10%) and then retailers (2%)[20].

Current International and National Response(s):

The response to a changing climate and health is increasingly moving from a narrow focus on food production towards a **whole food systems approach**. This recognises that food security is not only about producing enough food, but also about whether people can access affordable, nutritious, culturally appropriate and sustainable food in a changing climate.

UK National Response

In England, the 2025 UK Government Food Strategy sets out an ambition for a "healthier, more affordable, sustainable and resilient" food system. It explicitly links food policy to public health, environmental sustainability, climate resilience, economic growth and food security. The strategy recognises that the food system contributes to poor health, environmental degradation and vulnerability to shocks, including a changing climate, while also being central to the economy and national resilience.

The strategy highlights several key pressures: obesity and diet-related illness, food insecurity, food price inflation, low fruit and vegetable self-sufficiency, and climate-

related risks to domestic and international supply chains. It notes that UK food system emissions, including imports, are equivalent to a large share of UK greenhouse gas emissions, and that a changing climate, biodiversity loss and environmental degradation are chronic risks to food security.

The earlier **National Food Strategy: The Plan**, led by Henry Dimbleby, was more interventionist. It argued that the UK food system damages both health and the environment, and proposed stronger measures including healthier diets, reduced reliance on highly processed foods, support for lower-income households, sustainable land use, innovation, and improved food system data. Its central analysis was that the food system creates a "junk food cycle" and a damaging cycle in which food production contributes to a changing climate, which then threatens food supply.

The National Food Strategy: The Plan – July 2021 has four strategic objectives:

1. Escape the junk food cycle to protect the NHS
2. Reduce diet-related inequality
3. Make the best use of our land
4. Create a long-term shift in our food culture

Some farmers are introducing livestock back into traditional rotations, to improve the soil and reduce the need for fertilisers. Careful livestock farming can be a boon to the environment, but our current appetite for meat is unsustainable: 85% of total land that produces UK food is used to graze livestock or produce crops to feed to animals. We need some of that land back.

The UK has committed to **reducing food waste** to 50% of 2007 levels by 2030[21]. The anti-waste charity WRAP estimates that we have already achieved half of this target, putting us on a promising trajectory[22]. The Climate Change Committee also believes this target is feasible. It believes we could go further still – reaching 60% waste reduction by 2050 – by using policy levers such as increased household collection of food waste (which seems to make people more aware

of what they are wasting), improving the clarity of best before labels and removing them from fruit and vegetables, and incentivising food manufacturers to reduce portions sizes[23].

The benefits of cutting all this systemic waste are hard to overstate. To take a perfectly plausible scenario, if we were to reduce our food waste by 50%, increase our farm yields by 15%, and reduce meat consumption by 30%, we could produce the same amount of calories from 30% less land[24]. This scenario frees up enough land not just to achieve our climate goals but also to make space for nature, both in wilder areas and on our farms, without compromising our levels of food self-sufficiency.

Civil society organisations such as **Sustain** have broadly welcomed the recognition of food system transformation but have argued that government action needs to go further and faster, particularly on poverty, healthy food access, sustainable diets, public procurement and stronger local food systems. Sustainable Food Places has emphasised that national strategy must connect with place-based action, because food insecurity, local economies, community food networks and health inequalities are experienced locally.

Analysis: The UK response has improved in recognising the links between climate, food security and health, but there remains a gap between strategic ambition and implementation. Current policy recognises the need for healthier, more resilient and sustainable food systems, but the strongest levers—affordability of healthy food, sustainable public procurement, dietary change, land use, food poverty prevention and local supply resilience—require sustained cross-government action.

International response

Internationally, a changing climate and food security are now treated as deeply connected public health and development issues. The World Bank defines food security through four dimensions: **availability, access, utilisation and stability**. This framing is important because a changing climate affects all four: it can reduce yields, disrupt supply chains, increase prices, reduce diet quality and make access to food less reliable over time.

The World Food Programme describes food systems as everything involved in producing, processing, transporting, selling, consuming and disposing of food. It emphasises that food systems must become more resilient, equitable and sustainable to address hunger, malnutrition, conflict, climate shocks and economic instability.

The UN Food Systems agenda has shifted the international response from food production alone to **food systems transformation**. The 2025 UN Food Systems Transformation progress report describes growing global momentum since the 2021 UN Food Systems Summit, with countries integrating food systems into national development plans and aligning food policy with health, nutrition, climate, agriculture and biodiversity agendas.

The Global Centre on Adaptation highlights practical responses including climate-resilient agriculture, better early warning systems, stronger local supply chains, improved finance for adaptation, and support for smallholder farmers. These approaches are especially important because climate shocks affect food production, livelihoods and nutrition most severely in vulnerable populations and lower-income countries.

The UK Global Food Security programme also reflects this systems approach by bringing together research on food production, supply chains, nutrition, environment, resilience and policy.

Public health significance

Food systems are now central to climate-health policy because they influence:

- **Nutrition and diet-related disease:** unhealthy diets contribute to obesity, cardiovascular disease, diabetes and some cancers.
- **Food insecurity:** climate shocks, inflation and supply disruption increase the risk of hunger and poor diet quality.
- **Mental health:** food insecurity and rising food costs contribute to stress, anxiety and household strain.
- **Health inequalities:** low-income households are most exposed to food price rises and least able to afford healthy, sustainable diets.
- **Climate mitigation:** food production, land use, transport and waste contribute significantly to emissions.
- **Climate adaptation:** resilient supply chains, local food networks and sustainable agriculture reduce vulnerability to future shocks.

Overall assessment

The national and international response is moving in the right direction: from a food supply model focused mainly on production and trade towards a **health-promoting, climate-resilient food systems model**. However, implementation remains uneven. The key public health challenge is to ensure that food system transformation delivers practical benefits for communities: affordable healthy food, reduced food poverty, resilient local supply chains, sustainable diets, better procurement in schools and hospitals, and protection for vulnerable groups during climate and cost-of-living shocks.

Local East Sussex Response to Build From

East Sussex has begun to respond to the links between a changing climate, food systems, food security and public health through a combination of public health strategy, cost-of-living support, district-level food partnerships and community-led food networks.

The response is not yet presented as a single climate-food-health strategy, but several local initiatives already address key climate-health concerns: food poverty, healthy

diets, local food resilience, sustainable food systems, community growing, food waste, active communities and health inequalities.

East Sussex Whole-System Healthy Weight Plan

The East Sussex Whole-System Healthy Weight Plan 2021–2026 provides the strongest county-level public health framework linking food, health, environment and resilience. The plan recognises that healthy weight is shaped by wider systems, including food availability, affordability, local environments and physical activity. It also explicitly notes that the pandemic exposed the fragility of the food system and that East Sussex needs to strengthen food security while reducing environmental impact.

The plan identifies food as one of its priority action areas. It commits partners to improving diet and nutrition, creating environments where healthy food is the preferred choice, tackling food poverty, building food security, and supporting people with long-term conditions to improve diet and nutrition. It also includes an outcome measure that food partnerships should be established in every district and borough area with action plans in place.

This is important because it positions food security not only as an emergency welfare issue, but as part of a wider prevention, health inequalities and environmental sustainability agenda.

Cost-of-Living and Food Support

East Sussex County Council provides practical food-related cost-of-living support, signposting residents to food banks, community fridges, food partnerships, Healthy Start, free school meals, holiday food support and wider financial help.

This response is directly relevant to climate and health because households facing food insecurity are less able to adapt to climate shocks, food price rises, supply disruption or rising energy costs. The local food support offer therefore acts as both a public health intervention and a resilience measure.

District and Borough Food Partnerships

Local food partnerships bring together emergency food providers, sustainable food businesses and schemes to tackle food waste:

- Lewes District Food Partnership
- Hastings Food Network
- Rother Food Partnership

- Eastbourne Food Partnership
- Wealden Food Partnership

A major feature of the East Sussex response is the development of local food partnerships. These partnerships bring together councils, voluntary organisations, growers, food businesses, residents and community groups to improve food security and create healthier, more sustainable local food systems.

Lewes District Food Partnership describes its role as bringing people, communities and organisations together to create better food systems for everyone. It focuses on food security, community food work, sustainable food systems and local collaboration.

Hastings and Rother Food Network, hosted by Hastings Voluntary Action, works to support food access and strengthen local food activity across Hastings and Rother.

Eastbourne Food Partnership is supported by Lewes and Eastbourne Councils and aims to bring people together to tackle food insecurity, encourage local food action and develop a healthier, fairer local food system.

Wealden Food Partnership focuses on building a better local food system, supporting community food work and improving food resilience across a largely rural district.

County-Level Coordination

Sustainable Food Places identifies East Sussex as an example of county and district-level coordination. Although East Sussex does not have a single county-level food partnership, the county council supports district and borough food partnerships and combines short-term action on food insecurity with longer-term food system transformation.

This model is significant because climate-resilient food systems require both emergency food support and longer-term structural change, including local supply chains, sustainable procurement, food growing, healthier diets and reduced food waste.

Public Health Analysis

The East Sussex response has several strengths:

- It uses a **whole-system public health approach**, rather than treating food insecurity as only a crisis response.
- It recognises the links between food poverty, malnutrition, obesity, physical inactivity and health inequalities.

- It supports **place-based food partnerships**, allowing local areas to respond to different needs.
- It links food security with sustainability, environmental impact and local economic resilience.
- It creates opportunities for community participation, local growing, food education and healthier diets.

However, there are also **gaps** and **opportunities**:

- A changing climate, food supply and public health are not yet fully integrated into one clear countywide food resilience strategy.
- More could be done to assess climate risks to local food supply chains, food access and vulnerable households.
- Food partnerships could be more explicitly linked to emergency planning, extreme weather response and health protection.
- Monitoring could be strengthened through local indicators on food insecurity, healthy food access, food partnership activity, sustainable procurement, food waste and climate-related food disruption.

The local response in East Sussex is developing through public health leadership, cost-of-living food support, and a network of district and borough food partnerships. Together, these initiatives address food insecurity, healthy diets, community resilience and sustainable food systems. **The next step would be to strengthen these activities into a more explicit climate-food-health resilience framework, linking food security, local supply chains, sustainable diets, emergency planning and health inequalities**.

10. Infectious Diseases and Public Health - Considerations, Opportunities and Action Steps

High Level Strategic Opportunity:

Develop a climate-informed infectious disease prevention and preparedness system that shifts public health from reactive response to proactive risk management, while ensuring equity and environmental sustainability. This should include strengthening integrated surveillance and early warning systems that combine climate data, vector

monitoring, and epidemiological intelligence, supported by advanced analytics and AI-driven modelling to anticipate outbreaks of climate-sensitive diseases. At the same time, policies should prioritise equity and protection for vulnerable populations, addressing the social determinants of health, safeguarding precarious workers, and ensuring fair access to healthcare and public health interventions. All preparedness and response measures should also incorporate sustainable and environmentally responsible practices, ensuring that climate adaptation actions minimise ecological harm and support long-term public and planetary health.

Rationale:

Infectious diseases are a key focus for this HIA because a changing climate is altering the environmental conditions that influence how diseases emerge, spread and affect populations. Rising temperatures, changing rainfall patterns, flooding, extreme weather events and ecosystem changes can increase the risk of vector-borne, water-borne, food-borne and zoonotic diseases, while also creating conditions that support the survival and transmission of pathogens. Although the UK currently experiences a relatively low burden of many climate-sensitive infectious diseases, a changing climate is expected to increase future risks, including the potential for new and emerging infections. These changes can place additional pressure on healthcare services, disproportionately affect vulnerable populations, and contribute to wider social and economic impacts. Strengthening surveillance, preparedness and resilience to infectious disease threats is therefore an important part of protecting public health and adapting to a changing climate. A changing climate may also contribute to the growing challenge of antimicrobial resistance (AMR). Environmental changes, flooding, warmer temperatures and increased pressures on health and agricultural systems can influence the spread of antimicrobial-resistant organisms and may increase demand for antimicrobial treatments. As AMR is recognised as one of the most significant global public health threats, understanding its potential links with a changing climate will be increasingly important for future health protection and resilience planning.

Considerations, Opportunities and Action Steps

Opportunity 1. Further develop and invest in Climate-Informed Infectious Disease Prevention, Surveillance and Preparedness

Action Steps:

- Shift focus from reactive to proactive public health infrastructure for climate-sensitive infectious disease threats.
- Expand early warning systems that integrate climate data, vector tracking, and epidemiology.
- Use **AI-driven modelling to predict outbreaks** of climate-sensitive diseases (e.g., malaria, dengue, leptospirosis).

Opportunity 2. Create Equity & Protection for the most Vulnerable

Action Steps:

- Prioritize social determinants of health, protect precarious workers, and ensure equitable access to care and benefits.

Opportunity 3. Ensure Sustainability & Ecological Responsibility

Action Steps:

- Ensure climate solutions do not worsen environmental degradation or public health impacts (e.g., sustainable PPE).

Context and Impacts:

A changing climate is increasingly recognised as a significant driver of non-communicable and infectious diseases[25] risk and one of the major emerging threats to public health globally. There are complex ways in which climatic factors (like temperature, humidity, precipitation, extreme weather events, and sea-level rise) can directly or indirectly affect the prevalence of disease and alter the transmission, distribution and seasonality of many infectious diseases. Rising temperatures and changing weather patterns may increase the risk of food-borne and water-borne bacterial infections like salmonella, campylobacter, and Vibrio spp. Identification of communities and places vulnerable to these changes can help health departments assess and prevent associated adverse health impacts.

A changing climate can influence how pathogens, vectors, animal hosts and humans interact, creating conditions that facilitate the emergence, re-emergence or spread of infectious diseases.

The World Health Organization (WHO) highlights infectious diseases as a key pathway through which climate change affects human health. Rising temperatures and environmental changes can expand the geographic range of disease vectors such as

mosquitoes and ticks, increase food- and water-borne disease risks, and create conditions that favour the survival and transmission of pathogens. Globalisation, international travel, trade and changing land use patterns can further amplify these risks.

In the UK, the UK Health Security Agency (UKHSA) Health Effects of Climate Change (HECC) Report identifies infectious diseases as an important climate-sensitive health risk. While the UK currently experiences a relatively low burden of many climate-sensitive infectious diseases compared with some parts of the world, a changing climate is expected to increase the likelihood of emerging infectious disease threats, outbreaks and pressures on health protection systems over coming decades.

A changing climate affects infectious disease transmission through several interconnected pathways:

- **Vector-Borne Diseases -** Warmer temperatures, milder winters and changing rainfall patterns can increase the survival and distribution of vectors such as mosquitoes and ticks. This may increase the risk of diseases including Lyme disease, tick-borne encephalitis, dengue, chikungunya, West Nile virus and other emerging infections.
- **Water-Borne Diseases -** Heavy rainfall, flooding and storm events can contaminate drinking water supplies, overwhelm sewage systems and increase exposure to pathogens. Warmer water temperatures may also support the growth of harmful microorganisms, increasing the risk of gastrointestinal infections and water-related disease outbreaks.
- **Food-Borne Diseases -** Rising temperatures can affect food production, storage and transport, increasing the risk of food contamination and food-borne illnesses. Climate-related disruptions to food systems may also create new food safety challenges and increase pressures on public health systems.
- **Zoonotic Diseases -** Many infectious diseases originate in animals before spreading to humans. A changing climate can alter wildlife habitats, migration patterns and interactions between animals, vectors and humans, increasing opportunities for zoonotic disease emergence. Environmental change, biodiversity loss and ecosystem disruption may further contribute to disease transmission risks.
- **Extreme Weather Events -** Floods, storms, droughts and heatwaves can disrupt healthcare services, sanitation infrastructure and public health systems. Population displacement, overcrowding, reduced access to clean water and interruptions to healthcare services can increase vulnerability to infectious disease outbreaks.

Health Impacts

Increased Disease Burden - The most direct impact of climate-sensitive infectious diseases is an increased risk of illness and outbreaks. Depending on the pathogen, infectious diseases can result in:

- Fever and acute illness.
- Gastrointestinal infections.
- Respiratory infections.
- Neurological complications.
- Chronic health conditions.
- Long-term disability.
- Increased mortality.

A changing climate may also increase the frequency and geographic spread of outbreaks, exposing populations that have previously had little or no experience of certain diseases.

Healthcare System Pressures - An increase in infectious disease risks can place additional demands on healthcare services through:

- Increased GP consultations.
- Increased diagnostic testing.
- Greater demand for infectious disease and microbiology services.
- Increased hospital admissions.
- Enhanced surveillance and outbreak response requirements.
- Greater pressure on public health protection teams.

Healthcare professionals may also require additional training to identify and manage diseases that have historically been uncommon in the UK.

Mental Health and Wellbeing - Emerging infectious disease threats can affect mental wellbeing and community resilience. Disease outbreaks may contribute to:

- Anxiety and fear.
- Public concern and uncertainty.
- Social disruption.
- Community stress.
- Reduced confidence in safety and security.

Communities experiencing repeated climate-related hazards and infectious disease events may experience cumulative psychological impacts that affect wellbeing and social cohesion.

Economic Impacts - Climate-sensitive infectious diseases can have wider economic consequences through:

- Reduced workforce productivity.
- Increased sickness absence.
- Higher healthcare costs.
- Impacts on tourism and recreation.
- Costs associated with surveillance, prevention and outbreak management.
- Disruption to local economies and critical services.

The economic burden may be particularly significant during large outbreaks or where healthcare systems are already under pressure.

Health Inequalities - The impacts of climate-sensitive infectious diseases are unlikely to be distributed equally across the population. Vulnerability is influenced by age, health status, housing, occupation, income and access to services.

Groups that may be disproportionately affected include:

- Older adults.
- Infants and young children.
- People with chronic health conditions.
- Immunocompromised individuals.
- Outdoor workers.
- Agricultural and land management workers.
- People experiencing homelessness.
- Travellers and migrant populations.
- Communities experiencing deprivation or poor housing conditions.

A changing climate therefore has the potential to widen existing health inequalities if prevention, adaptation and public health responses are not targeted towards those most at risk.

Public Health Implications

Addressing infectious disease risks is an increasingly important component of climate adaptation and health protection planning. Effective responses require strengthened surveillance systems, climate-informed early warning systems, resilient healthcare

services, environmental monitoring, public awareness and cross-sector collaboration. Integrating infectious disease preparedness into climate adaptation strategies will help reduce future health risks, protect vulnerable populations and strengthen community resilience.

As a changing climate continues to influence environmental conditions and disease transmission pathways, infectious diseases are likely to become an increasingly important consideration for public health planning, healthcare provision and climate resilience at local, national and international levels.

Current International and National Response(s):

Nationally and internationally, there is growing recognition that a changing climate is altering the distribution, transmission and emergence of infectious diseases, creating new risks for public health systems. The response has evolved from managing individual disease outbreaks towards building climate-resilient health systems that can anticipate, prevent and respond to a broader range of climate-sensitive infectious disease threats.

Increasingly, governments, public health agencies and international organisations are adopting a One Health approach, recognising the interconnected nature of human health, animal health and environmental change. This reflects growing evidence that a changing climate influences disease transmission through changes in temperature, rainfall, extreme weather events, ecosystems, biodiversity, food systems and global movement of people and goods.

The World Health Organization recognises infectious diseases as a major pathway through which a changing climate affects human health.

WHO's response focuses on:

- Strengthening climate-resilient health systems.
- Improving infectious disease surveillance and early warning systems.
- Enhancing outbreak preparedness and response.
- Supporting climate-informed public health planning.
- Strengthening laboratory and diagnostic capacity.
- Promoting research into climate-sensitive diseases.

WHO increasingly advocates a One Health approach, bringing together public health, veterinary, environmental and climate sectors to address the complex drivers of infectious disease emergence.

One Health Joint Plan of Action

International organisations including WHO, the Food and Agriculture Organization (FAO), the United Nations Environment Programme (UNEP) and the World Organisation for Animal Health (WOAH) have developed the One Health Joint Plan of Action.

The framework seeks to:

- Improve prevention of zoonotic diseases.
- Strengthen surveillance across human, animal and environmental systems.
- Address emerging disease risks linked to environmental degradation and a changing climate.
- Enhance global preparedness and response capabilities.

The approach recognises that many emerging infectious diseases originate in animals and are influenced by environmental changes that are being accelerated by a changing climate.

Climate Adaptation and Health

Under the Paris Agreement and United Nations climate frameworks, countries are increasingly encouraged to integrate health into climate adaptation planning.

Many National Adaptation Plans now include actions relating to:

- Infectious disease surveillance.
- Climate-sensitive disease modelling.
- Water and sanitation resilience.
- Vector control.
- Public health emergency preparedness.
- Community resilience.

There is increasing emphasis on preventing climate-related disease outbreaks rather than relying solely on reactive responses.

European Response

European Centre for Disease Prevention and Control (ECDC)

The ECDC has significantly expanded its work on climate-sensitive infectious diseases.

Priority areas include:

- Monitoring climate-related disease threats.
- Early warning systems.
- Cross-border surveillance.
- Risk assessments.
- Climate-informed modelling.
- Public health preparedness.

The ECDC identifies several climate-sensitive disease risks for Europe, including:

- Vector-borne diseases.
- Food-borne diseases.
- Water-borne diseases.
- Emerging zoonotic diseases.

The organisation increasingly uses climate data to forecast disease risks and support public health planning.

European Climate and Health Observatory

The European Climate and Health Observatory has been established to improve understanding of climate-related health risks, including infectious diseases.

The Observatory supports:

- Data sharing.
- Research collaboration.
- Climate-health monitoring.
- Knowledge exchange between countries.
- Evidence-based adaptation planning.

UK National Response

The UK Health Security Agency (UKHSA) leads the national response to infectious diseases and climate-sensitive health threats. The UKHSA Health Effects of Climate Change (HECC) Report identifies infectious diseases as an emerging climate-health priority and highlights several pathways through which a changing climate may increase disease risks in the UK.

Key concerns include:

- Vector-borne diseases.
- Water-borne diseases.

- Food-borne diseases.
- Zoonotic diseases.
- Antimicrobial resistance.
- Emerging infectious diseases.

The report concludes that climate change is likely to alter patterns of infectious disease transmission and increase pressure on surveillance and public health systems.

Climate-Sensitive Surveillance

A major component of the UK response is strengthening surveillance systems.

The UKHSA has expanded monitoring of:

- Emerging infectious diseases.
- Vector populations.
- Environmental hazards.
- Disease outbreaks.
- International health threats.

National surveillance programmes increasingly incorporate climate and environmental information to improve preparedness and early detection.

Health Protection and Preparedness

The UK has strengthened public health preparedness through:

- Enhanced disease surveillance.
- Emergency planning.
- Laboratory capacity.
- Health protection teams.
- Incident response systems.

A changing climate is increasingly incorporated into health security planning to ensure services can respond to future infectious disease threats.

Climate Change Risk Assessment (CCRA)

The UK Climate Change Risk Assessment identifies infectious diseases as an area requiring further adaptation action.

Key recommendations include:

- Improved surveillance.
- Better understanding of climate-disease interactions.
- Increased preparedness for emerging pathogens.
- Stronger integration between environmental and health systems.
- Enhanced research and modelling.

The assessment highlights the importance of moving from reactive responses towards proactive climate adaptation.

Emerging Areas of Best Practice

Nationally and internationally, several approaches are emerging as best practice.

Climate-Informed Early Warning Systems

Many countries are developing systems that combine:

- Meteorological data.
- Environmental monitoring.
- Disease surveillance.
- Predictive modelling.

These systems help identify periods of increased disease risk before outbreaks occur.

Integrated Surveillance

Increasingly, surveillance systems bring together:

- Human health data.
- Animal health data.
- Environmental monitoring.
- Climate information.

This improves the ability to detect emerging threats and identify climate-related disease risks.

Strengthening Water, Food and Sanitation Systems

Climate adaptation programmes increasingly focus on:

- Safe water supplies.

- Resilient sanitation infrastructure.
- Food safety.
- Environmental health protection.

These measures help reduce vulnerability to climate-sensitive infectious diseases.

Community Preparedness and Public Awareness

Many countries are investing in:

- Public education.
- Risk communication.
- Community resilience programmes.
- Behavioural interventions.

Improving public understanding of climate-sensitive health risks is increasingly recognised as a critical adaptation measure.

Challenges

Despite significant progress, several challenges remain:

- Uncertainty regarding future disease patterns.
- Increasing international travel and trade.
- Emerging pathogens and zoonotic diseases.
- Growing antimicrobial resistance.
- Limited surveillance capacity in some regions.
- Workforce shortages.
- Climate-related pressures on healthcare systems.

A changing climate may also increase the likelihood of multiple simultaneous health threats, such as infectious disease outbreaks occurring alongside heatwaves, flooding or food insecurity.

The national and international response to climate-sensitive infectious diseases is increasingly focused on prevention, preparedness and resilience. Organisations such as WHO, ECDC and UKHSA recognise that climate change is likely to increase the risk of infectious disease emergence, alter patterns of disease transmission and place additional pressures on health systems. As a result, surveillance, early warning systems, climate-informed public health planning, One Health approaches and resilient healthcare systems are becoming central components of adaptation

strategies. These measures aim not only to reduce the burden of infectious diseases but also to strengthen health system resilience and protect populations from the growing health impacts of a changing climate.

Local East Sussex Response to Build From:

East Sussex currently addresses climate-sensitive infectious disease risks primarily through established public health protection arrangements, environmental health services, climate adaptation planning, emergency preparedness and partnerships with the UK Health Security Agency (UKHSA). Unlike heat, flooding and severe weather, infectious diseases are not yet a major standalone focus within local climate adaptation programmes. However, the foundations for an effective response are in place through the East Sussex Climate Change Risk and Vulnerability Assessment, Climate Change Health Impact Assessment (CCHIA), emergency planning structures, environmental health functions and wider health protection systems.

The strongest existing activity relates to:

- Health protection and outbreak management through UKHSA and local authority partnerships.
- Surveillance and management of food-borne, water-borne and communicable diseases.
- Tick awareness and Lyme disease prevention.
- Environmental health monitoring and regulation.
- Emergency preparedness for flooding, severe weather and environmental incidents.
- Climate adaptation planning through the East Sussex Climate Change Risk and Vulnerability Assessment.
- Healthy Places and resilience planning which recognise emerging climate-health risks.

The East Sussex CCHIA identifies infectious diseases as an emerging climate-sensitive health risk linked to changing temperatures, altered ecosystems, flooding, food systems and vector-borne diseases.

Key Gaps

Limited Explicit Focus on Climate-Sensitive Infectious Diseases

Although infectious disease management is well established, a changing climate is not yet routinely integrated into infectious disease planning and surveillance at a local

level. Most systems remain focused on responding to current disease burdens rather than anticipating future climate-related risks.

Limited Local Climate-Health Intelligence

There is currently limited local analysis of:

- Climate-sensitive disease trends.
- Emerging vector-borne disease risks.
- Climate-related food-borne disease risks.
- Flood-related infectious disease risks.
- Vulnerable populations most likely to be affected.

This makes it difficult to assess future risks and target adaptation measures effectively.

Fragmented Data Systems

Data relating to climate hazards, environmental change, infectious diseases and population vulnerability are often held by different organisations and are not routinely integrated.

Opportunities exist to strengthen:

- Local surveillance.
- Environmental monitoring.
- Health intelligence.
- Early warning systems.

Limited Public Awareness

Public awareness of climate-sensitive infectious disease risks remains relatively low.

While Lyme disease awareness exists, there is less understanding of:

- Climate-related food safety risks.
- Water-borne disease risks.
- Emerging vector-borne diseases.
- Health impacts following flooding events.

Tensions

Balancing Immediate Pressures with Long-Term Risks

Health and local government services face significant operational pressures from existing healthcare demand, workforce shortages and financial constraints.

As a result, future climate-sensitive infectious disease risks may receive less attention than immediate priorities despite potentially increasing over time.

Competing Environmental Objectives

Some adaptation measures may create unintended consequences.

For example:

- Wetland restoration.
- Biodiversity enhancement.
- Green infrastructure projects.

may provide important climate and ecological benefits but could also increase suitable habitats for some vectors if not appropriately managed.

The challenge is to maximise environmental benefits while minimising public health risks.

Prevention Versus Response

Much of the current system is designed to respond to outbreaks once they occur.

Climate adaptation requires greater emphasis on:

- Prevention.
- Anticipation.
- Resilience-building.
- Early intervention.

This often requires investment before risks become visible.

Barriers

Resource Constraints

Public health, environmental health and local authority services face ongoing financial pressures.

This can limit:

- Surveillance capacity.
- Workforce development.
- Climate-health analysis.
- Preventative interventions.

Workforce Knowledge and Skills

Many professionals working in healthcare, planning, environmental management and public health have limited training on the links between a changing climate and infectious diseases.

Future climate-health risks may therefore be under-recognised.

Evidence and Uncertainty

Although evidence suggests a changing climate will increase infectious disease risks, there remains uncertainty regarding:

- Timing.
- Magnitude.
- Geographic distribution.

This can make prioritisation and investment decisions more difficult.

Partnership Complexity

Effective management requires collaboration between:

- NHS organisations.
- UKHSA.
- Local authorities.
- Environmental agencies.
- Planning departments.
- Academic institutions.
- Community organisations.

Coordinating action across these sectors can be challenging.

Opportunities

Strengthen Climate-Health Surveillance

East Sussex has an opportunity to develop a local climate-health intelligence function that integrates:

- Infectious disease surveillance.
- Environmental monitoring.
- Climate data.
- Vulnerability assessments.

This would improve preparedness and support evidence-based decision-making.

Embed Infectious Diseases Within Climate Adaptation Planning

Future iterations of the Climate Change Risk and Vulnerability Assessment and CCHIA could include more detailed consideration of:

- Vector-borne diseases.
- Food-borne diseases.
- Water-borne diseases.
- Emerging zoonotic diseases.

This would help mainstream infectious disease risks within adaptation planning.

Develop a One Health Approach

East Sussex is well placed to adopt a local One Health framework that brings together:

- Public health.
- Environmental health.
- Ecology.
- Veterinary expertise.
- Climate adaptation.
- Land management.

This would improve understanding of the relationships between environmental change and disease risks.

Improve Public Awareness and Community Resilience

Targeted communication campaigns could increase awareness of:

- Tick-borne diseases.
- Flood-related health risks.
- Food safety during extreme weather.
- Personal protective behaviours.
- Emerging infectious disease risks.

This would support prevention and community resilience.

Strengthen Workforce Capability

Training programmes could improve climate-health literacy among:

- Healthcare professionals.
- Environmental health officers.
- Planners.
- Emergency planners.
- Community organisations.

This would increase confidence and preparedness across the system.

Research and Academic Partnerships

Partnerships with universities and national agencies could support:

- Local modelling of disease risks.
- Climate-health research.
- Evaluation of interventions.
- Development of innovative surveillance approaches.

How the Response Could Be Improved

A more mature climate-health approach to infectious diseases in East Sussex could include:

Strategic Actions

- Explicitly include infectious diseases within climate adaptation strategies.

- Develop a local climate-sensitive infectious disease action plan.
- Establish governance arrangements linking climate adaptation and health protection.

Surveillance and Intelligence

- Integrate climate, environmental and health datasets.
- Develop local indicators for climate-sensitive infectious disease risks.
- Strengthen early warning and forecasting systems.

Prevention and Preparedness

- Expand public awareness campaigns.
- Increase climate-health training across sectors.
- Embed climate considerations within outbreak preparedness plans.

Equity and Inclusion

- Identify vulnerable populations most at risk.
- Target interventions in areas experiencing deprivation and environmental vulnerability.
- Ensure adaptation measures reduce rather than widen health inequalities.

Whole-System Partnership Working

- Strengthen collaboration between health, environmental, planning and climate sectors.
- Embed a One Health approach across local policy and practice.
- Align climate adaptation, public health and emergency planning programmes.

East Sussex has strong foundations for addressing climate-sensitive infectious diseases through its public health protection systems, climate adaptation work and emergency preparedness arrangements. However, **the current approach remains largely reactive** and focused on existing infectious disease risks. A changing climate presents an opportunity to move towards a more proactive, prevention-focused and intelligence-led model that integrates infectious disease preparedness into wider climate resilience planning. By strengthening surveillance, partnership working, workforce capability and community resilience, East Sussex can improve its ability to

anticipate, prevent and respond to future infectious disease threats while reducing health inequalities and protecting population health.

11. Climate-Driven Displacement and Migration and Public Health - Considerations, Opportunities and Action Steps

High Level Strategic Opportunity:

Plan for climate-driven displacement and migration by integrating domestic and international mobility scenarios into local strategies, assessing infrastructure and housing impacts, and fostering inclusive, resilient communities through coordinated planning, education, and migrant-led initiatives.

Rationale:

Climate-driven displacement and migration is included within this HIA because it is increasingly recognised as a significant pathway through which a changing climate can affect population health and wellbeing. Climate-related events such as flooding, drought, extreme heat and sea-level rise can contribute to both temporary and permanent population movements, although displacement and migration is typically driven by a combination of environmental, social and economic factors. Changes in population movement can influence the wider determinants of health by affecting community cohesion, social connectedness, housing, employment and access to services. Both high levels of in-migration and out-migration can increase the risk of social isolation and weaken community networks, with potential impacts on mental wellbeing and health outcomes. Climate-driven displacement and migration may also place additional pressures on housing, health and social care services, while creating challenges and opportunities for public health planning. Assessing migration therefore helps to understand how a changing climate may affect population health, health inequalities and community resilience both now and in the future.

The HIA has identified a focus through the following scoping points/'golden interactions' for climate-driven displacement and migration:

- Where there is a high degree of in-migration this is likely to adversely influence community cohesion and social isolation, affecting health outcomes.
- Where there is a high degree of out-migration this is likely to adversely influence community cohesion and social isolation, affecting health outcomes.
- In-migration from outside the UK may place pressure on local housing and services (including education, health and social care).
- Health protection services may also be placed under increased pressures as the profiles of infectious disease and herd immunity (linked to vaccination history) would be influenced.
- In-migration may provide a diverse pool of talent, boost innovation and alleviate pressure on health and social care staffing, as well as other industries such as hospitality and agriculture.
- In-migration may place pressure on local housing and services (including education, health and social care).

Considerations, Opportunities and Action Steps

Opportunity 1. Recognise & Plan for Climate-Driven Displacement and Migration (International + Domestic)

Action Steps:

- Investigate **climate displacement and migration scenarios** to inform preparation of Regional Development Strategies and East Sussex Local Plans. Collaborate with universities and migration experts to model:
- **Increased internal UK/East Sussex migration** from more flood- or heat-affected areas (e.g. parts of London, Kent, or the Midlands).
- **International arrivals** linked to climate breakdown (e.g. food insecurity, conflict, water stress).
- Identify and assess **local infrastructure and housing pressures** linked to potential population shifts.
- Launch a climate displacement and migration working group across Sussex.
- Begin a county-wide migration and displacement audit that includes housing, employment, and access barriers for both domestic and international movers.
- Fund and support migrant-led and anti-racist learning initiatives.
- Pilot an “Inclusive Communities for Climate Resilience” program in key towns, combining storytelling, public education, and service access.

📌 *Note*: East Sussex could see net in-migration due to perceived "climate refuge" status (cooler summers, rural landscapes, wine/agriculture opportunities).

Context and Impacts:

A changing climate is presently regarded as a more significant driver for migration than political and economic factors and there is a growing public interest on climate change as a driver of conflict and migration, but evidence is scarce.

"Migration" as an umbrella is a used term to refer to forced and voluntary forms of movement that can occur in the context of climate and environmental change. This terminology is aligned with the ongoing contribution of International Organisation for Migration (IOM), which has developed comprehensive working definitions of key terms relevant to the migration and climate-change nexus.

Migration is increasingly recognised as one of the most significant social and public health consequences of a changing climate. A changing climate affects where people can safely live, work and access essential resources, creating pressures that **can lead to temporary displacement**, internal migration, planned relocation or international migration. While a changing climate rarely acts as the sole cause of migration, it often interacts with existing social, economic, political and environmental factors to influence population movement.

The International Organization for Migration (IOM), the World Health Organization (WHO), the Intergovernmental Panel on Climate Change (IPCC) and the United Nations High Commissioner for Refugees (UNHCR) all recognise climate change as a major driver of human mobility.

Climate-related displacement and migration is expected to increase throughout the 21st century as the impacts of rising temperatures, sea-level rise, drought, flooding, food insecurity and extreme weather intensify.

Climate-driven displacement and migration is both a climate adaptation strategy and a potential source of health vulnerability. While migration can reduce exposure to environmental risks and improve access to opportunities, it can also create new challenges for health, wellbeing, social cohesion, housing, infrastructure and public services.

'Climate-driven displacement and migration' are subcategories of environmental displacement and **forced migration**; it defines a singular type of environmental displacement and or migration, where the change in the environment is due to a changing climate. Climate-driven displacement and migration in this context can be associated with greater vulnerability of affected people, particularly if it is forced.

However, migration can also be a form of adaptation to environmental stressors, helping to build resilience of affected individuals and communities.

These definitions are not normative, nor are they internationally agreed upon – they seek to provide a broad framing of the topic for working purposes. This is particularly useful when discussing migration in the context of slow-onset climate impacts, as such migration can take many forms and be linked to multiple drivers.

Establishing a clear and direct link between a changing climate and migration is not straightforward. As explained by the International Organization for Migration (IOM), there are "so many other social, economic and environmental factors at work" that it is difficult to establish a "linear, causative relationship between anthropogenic climate change and migration". A 2011 UK Government Office for Science report on the issue made a similar point, arguing that "migration is a multi-causal phenomenon and it is problematic to assign a proportion of the actual or predicted number of migrants as moving as a direct result of environmental change".

However, the UNHCR—the UN's refugee agency—does estimate the number of people who are "forcibly displaced" by "weather-related sudden-onset hazards" each year. In 2022 it estimated this to be 31.8 million people, with the displacements largely the result of floods (19.2 million), storms (10.0 million) and droughts (2.2 million), with wildfires, landslides and extreme temperatures forming the remainder. This figure varies significantly each year. For example, from 2008 to 2021 it fluctuated between 13.9 and 38.3 million. However, there is a consensus that a changing climate is increasing the frequency and intensity of the kind of extreme weather events which lead to forcible displacements.

Related to this, the latest report by the World Bank Group[26] concludes that if urgent measures are not taken in the fight against climate change and development, by 2050, the number of displaced persons as a result of this phenomenon could reach 140 million in three of the most densely populated developing regions in the world (South of the Sahara, South Asia and Latin America). The people of these lands would be forced to leave their lands as a result of water scarcity, poor harvests, rising sea levels and tsunamis.

On the other hand, recent studies have shown that climate change has been one of the contributing factors for the unleashing of armed conflicts such as the recent one in Syria[27] [28]. Climate change caused this country to suffer a major drought during the period 2007 to 2010, leading to a series of crop failures and the consequent displacement of millions of people from rural areas to cities, resulting in overcrowding, unemployment and major political unrest that eventually led to civil war[29].

In addition to sudden-onset hazards, a changing climate can also spur migration through 'slow-onset impacts'. The IOM summarised this process in their 2022 'World migration report':

"Ecosystems are increasingly endangered by slow-onset environmental events and processes. For instance, heat waves might lead to loss of agricultural land and decrease in productivity, while sea-level rise and saltwater intrusion might threaten freshwater resources. The depletion of ecosystem services due to slow-onset processes might impact human security directly, for example through the reduction of essential resources such as food and water; and indirectly, such as when conflicts erupt over scarce natural resources. Threats to human security might in turn drive people to migrate in search of alternative income and ways to meet their basic needs."

While there is no agreed upon way of reliably forecasting future flows of migration which result directly from a changing climate, the numbers are likely to be significant (in the absence of further mitigation of a changing climate and adaption to its impacts). For example, in 2021 the World Bank produced a scenario-based analysis which estimated that "as many as 216 million people could move within their own countries due to slow-onset climate change impacts by 2050".

Climate stressors, housing shortages, and migration pressures increase the risk of racism, social tension, and hostility, particularly in areas with limited experience of diversity. Racism is identified as a public health issue that intensifies during periods of stress, uncertainty, and competition for resources

A changing climate can influence migration through both sudden-onset and slow-onset events.

Drivers of Climate-Related Displacement and Migration

- **Sudden-onset events** such as flooding, coastal flooding, storms, wildfires and extreme heat can force people to leave their homes temporarily or permanently, often with little warning.
- **Slow-onset changes**, including sea-level rise, drought, water scarcity, desertification, ecosystem degradation and declining agricultural productivity, gradually erode livelihoods and increase migration over longer timescales. Under higher warming scenarios, the IPCC estimates that climate change could contribute to the displacement of hundreds of millions of people globally by 2050.

Global Context

Climate-related displacement and migration is already occurring across many regions of the world. Current examples include drought-driven migration in Sub-Saharan Africa, sea-level rise affecting Pacific Island nations, flood-related displacement in South Asia, agricultural decline in Central America and increasing heat stress affecting habitability in parts of the Middle East. The World Bank's *Groundswell Report* estimates that, without effective climate action and adaptation, more than 216 million people could become internal climate migrants across six world regions by 2050.

As a result, climate-related displacement and migration is increasingly recognised as a significant issue for public health, humanitarian response, sustainable development, national security and economic resilience.

Health Impacts of Climate-Related Displacement and Migration

Migration affects health before, during and after displacement through a range of physical, mental and social pathways.

Physical Health

Displaced populations are often exposed to unsafe shelter, extreme temperatures, poor sanitation, contaminated water and food insecurity. These conditions increase the risk of infectious diseases, malnutrition, dehydration and respiratory illness.

Migration may also interrupt access to essential healthcare services, including primary care, medications, vaccinations, maternal healthcare and mental health support. These disruptions can have particularly serious consequences for people living with long-term health conditions.

Mental Health and Wellbeing

The mental health impacts of climate-related displacement are often substantial. Experiences of anxiety, depression, grief and loss, trauma, post-traumatic stress disorder (PTSD), climate anxiety and eco-distress are all associated with displacement. The loss of homes, livelihoods, communities and cultural identity can have profound and lasting psychological consequences.

Social Determinants of Health

Climate-related displacement and migration also affects many of the wider determinants of health.

Housing insecurity is common, with displaced populations more likely to experience overcrowding, temporary accommodation and poor housing conditions. Migration may also affect employment opportunities, income security and occupational health risks, while children and young people can experience disruption to education, reduced educational attainment and social exclusion.

Migration may also weaken family networks, community cohesion and social support systems, all of which are important protective factors for both physical and mental health.

Health Inequalities and Vulnerability

The impacts of climate-related displacement and migration are not experienced equally. Populations already facing disadvantage are often the most vulnerable, including low-income communities, children and young people, older people, people with disabilities, Indigenous populations, individuals with existing health conditions, and marginalised ethnic and social groups.

A changing climate therefore has the potential to exacerbate existing health inequalities both within and between countries.

Migration and Health Systems

Refugees and asylum seekers frequently arrive with complex physical and mental health needs arising from trauma, displacement, loss of livelihoods and disrupted connections to land and community. Mental health impacts are particularly significant for individuals who previously depended on land-based livelihoods, such as farming, where the loss of environmental and cultural connection can result in profound psychological distress.

Population movement also creates important challenges for health and care systems. Receiving communities may experience increased demand for healthcare services, housing, social care, education and wider public health programmes. Migration can also influence health workforce availability, service planning and resource allocation.

As climate-related displacement becomes more common, health systems will increasingly need to incorporate population mobility, climate migration, emergency preparedness and community resilience into strategic planning and service delivery.

Current International and National Response(s):

International policy increasingly recognises human mobility as an integral component of climate adaptation. This includes strengthening resilience in vulnerable

communities, protecting displaced populations, supporting planned relocation where necessary and ensuring migration contributes positively to sustainable development.

The UK has participated in a number of international initiatives examining the relationship between a changing climate and migration, including the Global Forum on Migration and Development (GFMD), the International Dialogue on Migration (IDM) and the International Migration Review Forum (IMRF).

During France's chairmanship of the GFMD (2022–23), climate change and human mobility were identified as the central theme. Key recommendations included:

- Improving policy coherence between climate adaptation, labour markets and migration, recognising livelihoods and skills as common priorities;
- Strengthening protection for people displaced by climate change, including protection from exploitation, forced labour, trafficking and occupational risks such as climate-related heat stress
- Developing more permanent and inclusive migration pathways that promote family reunification, socioeconomic integration and long-term resilience rather than relying solely on temporary protection measures
- Strengthening social dialogue by involving governments, employers, trade unions, migrant communities and civil society in policy development, while recognising the important contribution of diaspora communities to climate action
- Addressing the underlying drivers of displacement by reducing inequalities, strengthening climate resilience and ensuring migration remains a choice rather than a necessity; and
- Integrating humanitarian assistance with long-term development, enabling displaced populations to rebuild livelihoods and contribute to sustainable economic and social development.

Similarly, the International Organization for Migration's **International Dialogue on Migration (2024)** highlighted the need for stronger evidence and foresight to understand future migration trends, greater innovation in developing regular migration pathways, enhanced international cooperation, and more accessible and inclusive migration systems that support skills mobility and economic participation while responding to climate-related displacement.

Collectively, these international initiatives recognise that climate-related displacement and migration is not solely a humanitarian issue but also one of public health, sustainable development, resilience and social justice.

National Response

Although the UK is not currently experiencing climate migration at the scale seen in many low- and middle-income countries, a changing climate is expected to influence population movement through both international and domestic pathways.

Internationally, increasing climate impacts overseas may contribute to greater migration pressures with indirect implications for the UK through humanitarian obligations, migration policy and health and social care planning.

Within the UK, a changing climate may increasingly influence internal migration through flood-related displacement, coastal retreat and managed realignment, housing pressures in areas at lower climate risk, and population movement following repeated extreme weather events. Sea-level rise and coastal erosion are expected to require adaptation and, in some locations, managed relocation over coming decades.

National climate adaptation policy is increasingly recognising the importance of building resilience within communities, protecting vulnerable populations, strengthening emergency preparedness and ensuring that health, housing and public services are able to respond to changing patterns of population movement. While there is currently no dedicated national policy on climate migrants, relevant actions are being delivered through climate adaptation, emergency planning, resilience, public health and asylum and migration systems.

Implications for Health

The international and national response increasingly recognises that climate-related displacement and migration is fundamentally a health issue. Displacement can affect physical health, mental wellbeing and the wider determinants of health through housing insecurity, disrupted healthcare, employment challenges and reduced social connectedness. Health systems therefore need to anticipate changing patterns of population movement, strengthen preparedness and ensure equitable access to healthcare and other essential services for displaced and receiving communities alike.

For East Sussex, although large-scale climate-related displacement and migration is not currently anticipated, the county may experience increasing pressures associated with internal displacement from flooding or coastal change, as well as wider demographic changes linked to national and international migration. Building resilient health and care systems, supporting community cohesion and embedding climate adaptation into local planning will therefore be important components of long-term climate resilience.

Local East Sussex Response to Build From:

East Sussex has not developed a specific strategy for climate-related displacement and migration; however, many of the building blocks needed to respond are already being delivered through work on climate adaptation, emergency planning, housing, public health, community resilience and support for refugees and asylum seekers.

One notable example is the **Refugee Buddy Project**, which connects newly arrived refugees with trained local volunteers to reduce social isolation, improve mental wellbeing and support integration into local communities. Evidence from lived experience suggests the programme benefits both refugees and volunteers through improved wellbeing, reduced stigma and stronger community cohesion. The project has also developed the **Safe Havens** initiative, working with local businesses and schools to create visibly safe spaces for people experiencing racism, discrimination or fear. Such initiatives are increasingly relevant as a changing climate and migration become more closely linked, helping to strengthen social cohesion and protect population mental health.

East Sussex is particularly relevant in relation to climate-related displacement and migration because of its exposure to coastal flooding, coastal erosion, sea-level rise and surface water flooding. Although large-scale climate displacement is not currently occurring within the county, future climate scenarios suggest that coastal change and repeated flooding could increasingly influence housing decisions, spatial planning, infrastructure investment and community resilience. The county may also experience indirect impacts through changing migration patterns, increased demand for services, housing pressures and greater population vulnerability, making climate-related migration an emerging consideration for local adaptation planning.

It is also important to recognise that migration can represent a positive adaptation strategy. Moving away from areas at high environmental risk may provide improved access to employment, healthcare, education and safer living conditions. The challenge for policymakers is therefore not to prevent migration, but to ensure that movement occurs safely, equitably and with dignity while supporting both those who move and the communities that receive them.

Gaps, Barriers and Tensions

Despite increasing recognition internationally, climate-related displacement and migration remain an emerging policy area within the UK and East Sussex. There is currently no dedicated local strategy that explicitly considers the health implications of climate-related migration or population displacement as part of climate adaptation planning.

Climate migration sits across multiple policy areas, including housing, planning, emergency management, public health, social care and immigration, creating challenges for coordinated leadership and governance. This fragmentation can make it difficult to identify responsibilities, develop shared objectives and plan proactively for future population movement.

There are also uncertainties regarding the scale and timing of climate-related migration, making long-term planning challenging. While East Sussex is unlikely to experience large numbers of international climate migrants in the near future, gradual coastal change, repeated flooding and wider demographic shifts may alter patterns of housing demand and service use over coming decades.

Existing pressures on affordable housing, primary care, mental health services and social care may also limit the capacity to respond to future increases in population movement. At the same time, there is a risk that public concern about migration could contribute to social tensions, discrimination and reduced community cohesion if climate migration is not communicated and managed effectively. Refugees, asylum seekers and displaced populations may experience additional barriers to healthcare, employment and social integration, increasing the risk of widening health inequalities.

Opportunities

Climate-related migration presents opportunities to strengthen both climate resilience and population health. Integrating migration considerations into climate adaptation strategies, local planning and Health Impact Assessments would enable East Sussex to prepare proactively for future demographic change rather than responding only after displacement occurs.

There is an opportunity to build on existing strengths, including community resilience programmes, emergency planning, refugee support services and initiatives such as the Refugee Buddy Project and Safe Havens, which demonstrate how social inclusion can improve health outcomes and strengthen community resilience.

Embedding climate migration within housing, health and resilience planning could help ensure that services remain accessible and responsive to changing population needs. This includes considering future housing requirements, maintaining equitable access to healthcare, supporting mental health and wellbeing, and strengthening partnerships between local authorities, health services, voluntary organisations and community groups.

Finally, recognising migration as a legitimate adaptation strategy rather than solely a humanitarian issue provides an opportunity to develop policies that support safe, planned and equitable mobility while protecting vulnerable populations. As a changing

climate progresses, preparing for both direct displacement from coastal and flood risks and indirect migration driven by climate impacts elsewhere will help East Sussex build healthier, more inclusive and climate-resilient communities.

12. Sun and Ultraviolet Rays and Public Health - Recommended Considerations, Opportunities and Action Steps

High Level Strategic Opportunity:

Enhance heat resilience and equity by integrating urban cooling design, ensuring universal access to safe shaded spaces, promoting UV risk awareness, and innovating with sustainable solar-powered shading solutions.

Rationale:

Sun and ultraviolet (UV) radiation is a key focus for this HIA because a changing climate is expected to increase opportunities for UV exposure through higher temperatures, more frequent heatwaves and longer periods of warm weather that encourage people to spend more time outdoors. While sunlight provides important health benefits, including supporting vitamin D production, mental wellbeing, physical activity and social connection, excessive exposure to UV radiation is the primary cause of most skin cancers and can also contribute to eye diseases and other health conditions. Certain groups, including outdoor workers, children and people who spend significant time outdoors, may be particularly vulnerable. As the climate changes, it is important to maximise the health and wellbeing benefits of outdoor environments while promoting safe sun behaviours, providing access to shade and incorporating UV protection into climate adaptation, healthy place-making and public health strategies.

Considerations, Opportunities and Action Steps

Opportunity 1: Develop and Expand Urban Cooling Through Design

Action Step:

- Redesign urban spaces to counter extreme heat and UV exposure using trees, water, and shade infrastructure.

Opportunity 2: Deliver Equity in Access to Cool, Safe Spaces, Infrastructure & Amenities

Action Step:

- Ensure all communities—especially the elderly, disabled, and low-income groups—have access to shaded, restful, and safe public spaces. Include access to drinking water in public spaces via the 'Refill Scheme'.

Opportunity 3: Promote Education & Behaviour Change

Action Step:

- Promote UV risk awareness through positive, targeted public messaging—especially for outdoor workers and vulnerable groups. Integrate considerations and impacts from UV in relevant risk assessments.

Opportunity 4: Make use of Sustainable Solar Integration - Low-Cost Shading Innovations

Action Step:

- Leverage solar power not just as a hazard but as a resource—while ensuring people remain safe from its harmful effects.

Context and Impacts:

Exposure to sunlight is essential for health and wellbeing, contributing to vitamin D production, mental wellbeing, physical activity and social participation. However, excessive exposure to ultraviolet (UV) radiation is a significant environmental health

risk and is the primary cause of most skin cancers. A changing climate is increasing concerns about UV-related health impacts through rising temperatures, more frequent heatwaves, longer warm seasons and changes in behaviour that result in people spending more time outdoors.

Although a changing climate does not directly increase the amount of UV radiation reaching the Earth's surface in the UK, warmer temperatures and longer periods of sunny weather can increase human exposure to UV radiation. As temperatures rise, people are more likely to spend time outdoors, wear lighter clothing and participate in outdoor recreation, work and physical activity, thereby increasing cumulative UV exposure and associated health risks.

The UK Health Security Agency (UKHSA) Health Effects of Climate Change (HECC) Report identifies sun exposure and UV radiation as an important climate-sensitive health risk. The report highlights that increasing temperatures and changes in behaviour are likely to increase exposure to harmful UV radiation and contribute to a growing burden of skin cancer and other UV-related health conditions.

Addressing the health impacts of a changing climate-induced UV radiation requires a multifaceted approach, including individual sun safety practices, educational initiatives, and adaptation strategies. To mitigate these risks, individuals should prioritize sun safety measures like seeking shade, wearing protective clothing, using broad-spectrum sunscreen, and avoiding artificial tanning devices.

Sunburn (i.e. skin reddening; or solar erythema) and tanning are the best-known human health effects of excessive ultraviolet (UV) exposure. Chronic exposure to UV radiation can cause degenerative changes in the cells, fibrous tissues and blood vessels, which over the course of a lifetime can lead to non-melanoma skin cancer. Periodic exposure to high doses of UV causing sunburn, in particular in childhood, is linked to (malignant) melanoma (more serious type of skin cancer, one of the causes of death from cancer), especially among those with skin types prone to burning.

Prolonged exposure to UV radiation plays a role in the development of cataracts and other eye diseases responsible for a large proportion of visual impairment world-wide. Abnormal skin reactions due to light-sensitivity, such as photodermatoses and phototoxic reactions to drugs can also occur (Lucas et al., 2019).

However, small amounts of UV radiation are essential in vitamin D synthesis required for bone health (SERC, n.d.) and immune function with benefits for skin diseases such as psoriasis (Lucas et al., 2019). Therefore, moderate exposure to sunlight is beneficial for health, especially in higher geographical latitudes. The WHO et al. (2002) "Global solar UV Index – A Practical Guide" summarises the health effects of exposure to UV radiation.

How A Changing Climate Influences UV Exposure

A changing climate influences UV-related health risks through several pathways.

More Frequent and Intense Heatwaves - As heatwaves become more frequent and prolonged, people spend more time outdoors in parks, beaches, gardens and public spaces. This can increase cumulative UV exposure, particularly during peak UV periods.

Longer Warm Seasons - Warmer spring and autumn temperatures are extending the periods during which outdoor activity is attractive and comfortable. This may increase the length of the annual UV exposure season and extend the period during which sun protection measures are required.

Increased Outdoor Recreation - A changing climate may encourage greater participation in outdoor leisure activities, tourism, sport and active travel. While these activities provide important health benefits, they can also increase exposure to UV radiation if appropriate protection is not used.

Occupational Exposure - Outdoor workers, including those employed in construction, agriculture, landscaping, transport and environmental management, may experience increasing exposure to UV radiation as warmer conditions extend the duration of outdoor working periods.

Interaction with Climate Adaptation Measures - Some climate adaptation measures encourage greater use of outdoor spaces and active travel. While these interventions deliver important health and environmental benefits, they should be designed to include shade, cooling infrastructure and UV protection measures to minimise unintended health risks.

Health Impacts
Skin Cancer
The most significant health impact of UV radiation is skin cancer.

Excessive UV exposure is associated with:

- Malignant melanoma.
- Basal cell carcinoma.
- Squamous cell carcinoma.

Skin cancer is one of the most common cancers in the UK and incidence rates have increased substantially over recent decades. A changing climate may contribute to further increases if exposure patterns continue to change.

Sunburn and Acute Health Effects

Short-term excessive exposure can result in:

- Sunburn.
- Skin damage.
- Pain and discomfort.
- Dehydration.
- Heat-related illness when combined with high temperatures.

Repeated sunburn, particularly during childhood and adolescence, significantly increases future skin cancer risk.

Eye Health

Exposure to UV radiation can damage the eyes and increase the risk of:

- Cataracts.
- Photokeratitis (sunburn of the eye).
- Age-related eye conditions.

Long-term cumulative exposure may contribute to visual impairment and reduced quality of life.

Immune System Effects

Excessive UV exposure can suppress aspects of immune function, potentially affecting the body’s ability to respond to infections and disease. While the effects are generally modest, they are recognised within the wider health impacts of UV exposure.

Heat and UV Interactions

During hot weather, individuals may be exposed simultaneously to:

- High temperatures.
- Intense sunlight.
- UV radiation.
- Air pollution.

These combined exposures can increase health risks, particularly for vulnerable populations and outdoor workers.

Mental Health and Wellbeing

Access to sunlight and outdoor environments can support mental wellbeing, reduce stress and encourage physical activity. Climate adaptation strategies that promote green spaces, active travel and outdoor recreation can therefore provide significant health benefits.

However, balancing these benefits with protection from excessive UV exposure is important. Public health messaging increasingly promotes a dual approach that encourages outdoor activity while supporting safe sun behaviours.

Economic Impacts

UV-related health conditions have economic consequences through:

- Healthcare costs associated with skin cancer diagnosis and treatment.
- Increased demand for dermatology services.
- Reduced workplace productivity.
- Sickness absence.
- Long-term treatment and follow-up requirements.

The economic burden of skin cancer is expected to increase as incidence rates continue to rise.

Health Inequalities

The impacts of UV exposure are not experienced equally across the population.

Groups at increased risk include:

- Outdoor workers.
- Children and young people.
- Older adults.
- People participating in outdoor recreation.
- Agricultural and construction workers.
- Coastal and tourism communities.
- Individuals with fair skin and increased susceptibility to UV damage.

Some vulnerable groups may have limited access to shaded environments, cooling facilities or sun protection resources.

Climate adaptation strategies should therefore consider equity in access to:

- Shaded public spaces.
- Cooling infrastructure.
- Sun protection information.
- Occupational health protections.

Public Health Implications

As a changing climate increases opportunities for outdoor exposure, UV-related health risks are expected to become more significant. Public health responses increasingly focus on integrating sun safety within wider climate adaptation and health protection strategies.

Key priorities include:

- Public awareness campaigns on safe sun behaviours.
- Increasing access to shade in public spaces.
- Climate-resilient urban design.
- Sun protection measures for outdoor workers.
- Integration of UV protection into active travel and healthy place-making initiatives.
- Monitoring trends in skin cancer and UV-related health outcomes.

A changing climate is likely to increase exposure to ultraviolet radiation indirectly through warmer temperatures, longer outdoor seasons and changes in behaviour. While access to outdoor environments provides important benefits for physical and mental health, increasing UV exposure presents a growing public health challenge. Without appropriate adaptation measures, a changing climate may contribute to rising rates of skin cancer, eye disease and other UV-related health conditions. Integrating sun safety into climate adaptation, healthy place-making and public health strategies will be important to maximise the benefits of outdoor living while minimising associated health risks.

Current International and National Response(s):

Internationally and nationally, there is growing recognition that a changing climate may increase health risks associated with ultraviolet (UV) radiation through rising temperatures, more frequent heatwaves, longer warm seasons and increased outdoor exposure. Although a changing climate does not directly increase UV radiation levels in the UK, warmer weather is expected to influence behaviour, leading to greater

cumulative UV exposure and increasing the burden of skin cancer and other UV-related health conditions.

The response has increasingly focused on prevention, public awareness, climate-sensitive urban planning, occupational protection, surveillance and adaptation measures that allow people to enjoy the health benefits of outdoor environments while reducing harmful exposure.

International Response

The World Health Organization recognises ultraviolet radiation as a major environmental health risk and identifies excessive UV exposure as the primary cause of skin cancers worldwide.

WHO's response focuses on:

- Public education and awareness campaigns.
- Skin cancer prevention.
- Occupational protection.
- Monitoring UV radiation exposure.
- Strengthening surveillance of skin cancer trends.
- Promoting sun-safe behaviours.

WHO promotes the Global Solar UV Index as a public health tool that helps individuals understand daily UV risk levels and adopt appropriate protective measures.

Increasingly, WHO recognises that climate change may influence UV-related health outcomes by encouraging greater outdoor exposure and increasing heat-related behavioural changes.

World Meteorological Organization (WMO)

The WMO works closely with WHO on global UV monitoring and forecasting.

Key activities include:

- Global UV Index forecasting.
- Monitoring changes in atmospheric conditions.
- Supporting early warning systems.
- Public communication of UV risks.

The WMO also contributes to research on the interactions between climate change, ozone recovery and UV radiation exposure.

United Nations Environment Programme (UNEP)

UNEP has played a significant role in addressing UV-related health risks through support for the Montreal Protocol, which successfully reduced ozone-depleting substances and helped prevent large increases in harmful UV radiation reaching the Earth's surface.

The Montreal Protocol is widely regarded as one of the most successful environmental public health interventions globally because it has significantly reduced future risks of skin cancer, cataracts and other UV-related health conditions.

International Agency for Research on Cancer (IARC)

The International Agency for Research on Cancer classifies solar ultraviolet radiation as a Group 1 carcinogen and supports international efforts to reduce skin cancer through:

- Public awareness.
- Research.
- Prevention strategies.
- Monitoring of cancer incidence.

Skin cancer prevention remains a major international public health priority.

European Response

Across Europe, climate adaptation strategies increasingly recognise the interaction between:

- Heat exposure.
- UV radiation.
- Outdoor recreation.
- Active travel.
- Healthy place-making.

The European Climate and Health Observatory highlights the importance of designing climate-resilient urban environments that provide:

- Shade.
- Cooling infrastructure.
- Green spaces.

- Protection from excessive UV exposure.

European public health agencies increasingly promote integrated approaches that support physical activity and active travel while minimising sun-related health risks.

UK National Response

UK Health Security Agency (UKHSA)

The UKHSA leads national efforts to reduce the health impacts of UV radiation and climate-sensitive sun exposure.

The UKHSA Health Effects of Climate Change (HECC) Report identifies ultraviolet radiation and sun exposure as an important climate-health pathway. The report concludes that increasing temperatures and behavioural changes may increase UV exposure and contribute to higher rates of skin cancer and other UV-related health impacts.

The HECC Report highlights:

- Increased outdoor activity during warmer weather.
- Longer periods of UV exposure.
- Increased occupational exposure.
- Interactions between heat and UV risks.
- The need for adaptation measures in public spaces and workplaces.

The report recommends integrating sun protection into wider climate adaptation planning.

SunSmart Programme

The UK's most prominent response is the national SunSmart campaign led by the UK charity Cancer Research UK.

SunSmart aims to reduce skin cancer through public education and behaviour change. Key messages include:

- Spending time in the shade during peak UV hours.
- Wearing protective clothing.
- Using sunscreen appropriately.
- Protecting children from excessive sun exposure.
- Checking skin regularly for signs of cancer.

Increasingly, SunSmart messaging is relevant within the context of climate adaptation because of rising temperatures and greater outdoor exposure.

National Health Service (NHS)

The NHS supports prevention through:

- Public health campaigns.
- Skin cancer awareness.
- Early detection initiatives.
- Dermatology services.
- Occupational health advice.

The NHS also monitors trends in skin cancer incidence, which continues to rise across the UK.

Workplace Health and Safety

The UK Health and Safety Executive (HSE) increasingly recognises solar radiation as an occupational hazard.

Guidance supports:

- Risk assessments for outdoor workers.
- Provision of shade.
- Flexible working arrangements.
- Protective clothing.
- Worker education.

This is particularly relevant as a changing climate may increase exposure among workers in construction, agriculture, landscaping, highways, environmental management and other outdoor occupations.

Climate Adaptation Planning

The UK Climate Change Risk Assessment (CCRA) and National Adaptation Programme increasingly recognise the importance of:

- Healthy place-making.
- Urban cooling.
- Green infrastructure.

- Shade provision.
- Climate-resilient public spaces.

While much of this work focuses on reducing heat-related illness, there is growing recognition that adaptation measures should simultaneously address UV exposure.

Emerging Areas of Best Practice

Nationally and internationally, several adaptation approaches are emerging.

Climate-Resilient Urban Design

Cities are increasingly incorporating:

- Tree canopy cover.
- Shaded streets.
- Cooling corridors.
- Covered public spaces.
- UV-conscious design.

These measures help reduce both heat and UV exposure.

Sun-Safe Schools

Many countries are introducing:

- Shade policies.
- Outdoor learning adaptations.
- Sun protection education.
- Protective uniform policies.

Children are a priority group because childhood sunburn significantly increases future skin cancer risk.

Climate-Adaptive Public Spaces

Parks, transport hubs, active travel routes and community spaces are increasingly designed to provide:

- Shade.
- Cooling.

- Water access.
- UV protection.

This supports healthy lifestyles while reducing exposure risks.

Occupational Protection

Employers are increasingly adopting:

- Flexible working hours.
- Shade structures.
- UV risk assessments.
- Workforce training.

These approaches are expected to become increasingly important as temperatures continue to rise.

Challenges

Despite significant progress, several challenges remain:

- Public awareness remains inconsistent.
- Skin cancer rates continue to rise.
- Many public spaces lack adequate shade.
- Outdoor workers remain at increased risk.
- Climate adaptation plans often focus on heat but give less attention to UV exposure.
- Monitoring of climate-related behavioural changes remains limited.

There is also a need to balance the health benefits of outdoor activity, active travel and access to green spaces with the risks associated with excessive UV exposure.

The national and international response increasingly recognises ultraviolet radiation as a climate-sensitive health issue. While a changing climate is not expected to substantially increase UV radiation levels in the UK, it is likely to increase human exposure through warmer temperatures, longer outdoor seasons and behavioural changes. The response has therefore focused on prevention, public awareness, surveillance, climate-resilient design and occupational protection. Increasingly, adaptation strategies seek to maximise the physical and mental health benefits of outdoor environments while reducing the growing risks associated with excessive UV exposure, skin cancer and other sun-related health impacts.

Local East Sussex Response to Build From:

East Sussex's response to the health impacts of sun exposure and ultraviolet (UV) radiation is delivered through a combination of public health prevention, climate adaptation, healthy place-making, green infrastructure planning, active travel, workplace health and community resilience initiatives. While UV radiation has not traditionally been considered a a changing climate issue, increasing temperatures, longer periods of warm weather and greater use of outdoor spaces mean that sun exposure is becoming increasingly relevant within climate-health planning.

The Environment, Climate and Health – A Systemwide Health Impact Assessment for East Sussex (ECH-HIA) recognises that climate adaptation measures should maximise the health benefits of outdoor environments while minimising unintended risks associated with heat and UV exposure. This is particularly important in a county with an ageing population, a significant visitor economy, extensive coastline, outdoor recreational opportunities and a large number of people participating in outdoor work and leisure activities.

Healthy Places and Climate-Resilient Design

The strongest local response can be seen through East Sussex's Healthy and Sustainable Places Framework and climate adaptation work, which promote the creation of healthier, greener and more climate-resilient environments.

The framework encourages:

- Increased tree canopy and green infrastructure.
- Climate-resilient public spaces.
- Active travel routes.
- Accessible parks and open spaces.
- Urban cooling measures.
- Biodiversity and nature recovery.

These interventions provide multiple co-benefits, including reducing urban heat exposure, improving mental wellbeing, supporting physical activity and increasing resilience to a changing climate. They also provide opportunities to reduce UV exposure through natural shade and better-designed public spaces.

Increasingly, there is recognition that climate-adaptive public spaces should provide both cooling and protection from excessive sunlight through:

- Tree planting.

- Shaded seating areas.
- Covered community spaces.
- Climate-resilient school grounds.
- Shaded walking and cycling routes.

Heat-Health and Public Health Protection

East Sussex participates in national heat-health preparedness arrangements led by the UK Health Security Agency (UKHSA).

Local responses include:

- Heat-health communications.
- Public awareness campaigns.
- Targeted support for vulnerable populations.
- Partnership working through health and social care systems.
- Community resilience planning during periods of extreme heat.

Although heat-health plans primarily focus on preventing heat-related illness, many of the same interventions help reduce UV-related risks by encouraging:

- Use of shade.
- Safe outdoor activity.
- Behaviour change during periods of high environmental exposure.

Active Travel and Outdoor Recreation

East Sussex promotes walking, cycling and access to natural environments through transport, public health and recreation strategies.

These activities provide significant health benefits, including:

- Increased physical activity.
- Improved cardiovascular health.
- Better mental wellbeing.
- Reduced carbon emissions.

However, a changing climate means that increasing participation in outdoor activities must be accompanied by measures that support sun safety. Opportunities include:

- Shaded active travel routes.

- Drinking water access.
- Public information on UV exposure.
- Integration of sun safety into outdoor events and recreation programmes.

Coastal Communities and Visitor Economy

East Sussex's coastline, beaches, parks and visitor attractions mean that large numbers of residents and visitors are exposed to sunlight during the spring and summer months.

Coastal locations such as:

- Eastbourne
- Bexhill
- Hastings
- Rye

Experience high levels of seasonal outdoor activity, increasing the importance of public awareness around:

- Sun protection.
- Skin cancer prevention.
- Safe use of outdoor spaces during hot weather.

As a changing climate increases the frequency of hot and sunny days, these risks may become more significant.

Occupational Health

Many East Sussex residents work in outdoor occupations, including:

- Construction.
- Agriculture.
- Horticulture.
- Forestry.
- Highways maintenance.
- Environmental management.
- Tourism and leisure.

These workers may experience prolonged exposure to both heat and UV radiation.

While occupational sun safety is largely addressed through national Health and Safety Executive (HSE) guidance, there is growing recognition that a changing climate may increase exposure risks and require greater emphasis on:

- Employer awareness.
- Provision of shade.
- Flexible working arrangements.
- Workforce education.
- Access to protective equipment.

Gaps and Opportunities

Although East Sussex has strong foundations through climate adaptation and healthy place-making, several opportunities exist to strengthen the local response.

Strategic Opportunities

- Explicitly recognise UV exposure within climate adaptation planning.
- Incorporate sun safety into future A changing climate Health Impact Assessments.
- Integrate UV considerations into healthy place-making guidance.

Public Space Design

- Increase provision of shade in parks, schools and community spaces.
- Design active travel routes with climate and UV resilience in mind.
- Expand tree canopy coverage in urban areas.

Public Awareness

- Strengthen local sun safety campaigns.
- Integrate UV messages into heat-health communications.
- Target awareness towards outdoor workers, children, older adults and visitors.

Monitoring and Evaluation

- Monitor skin cancer incidence and trends.
- Assess access to shaded public spaces.
- Develop indicators relating to climate-resilient public realm design.

East Sussex is already taking action that indirectly reduces UV-related health risks through climate adaptation, healthy place-making, green infrastructure, active travel and heat-health planning. However, ultraviolet radiation is not yet a major focus of local climate-health policy. As a changing climate increases outdoor exposure opportunities through warmer temperatures and longer summers, there is an opportunity to strengthen the local response by incorporating sun safety, shade provision and UV resilience more explicitly into planning, public health and climate adaptation strategies. This would help maximise the health benefits of outdoor environments while reducing future risks of skin cancer, eye disease and other UV-related health impacts.

13. Temperatures and Extreme Temperatures and Public Health - Considerations, Opportunities and Action Steps

High Level Strategic Opportunity:

Advance climate resilience and public wellbeing by expanding climate-smart urban greening, regenerating public spaces for year-round use, and promoting climate-adaptive housing and neighbourhood design.

Rationale:

Temperature is a key focus for this HIA because it is one of the most direct and significant ways that a changing climate affects human health. The UK is already experiencing a warmer climate, with more frequent, intense and prolonged periods of extreme heat, alongside changing seasonal weather patterns. Rising temperatures can increase heat-related illness, hospital admissions and premature deaths, particularly among older people, those with long-term health conditions, young children, pregnant women and socially vulnerable groups. Heat can also affect mental wellbeing, disrupt health and care services, and place additional pressure on buildings and infrastructure that were not designed for hotter conditions. While warmer winters may reduce some cold-related health risks, cold weather will remain an important public health concern. Understanding the health impacts of both extreme heat and cold is therefore essential for climate adaptation, protecting vulnerable populations,

reducing health inequalities, and building resilient communities and services for the future.

Considerations, Opportunities and Action Steps

Opportunity 1. Increase and diversify Climate-Smart Urban Greening

Action Steps:

- Reduce urban heat and protect against extreme temperatures.
- **Expand street tree planting**, especially near vulnerable populations.
- Rapidly replace diseased trees with climate-resilient, native species.
- Diversify tree species to improve disease resilience and ecological health.
- **Provide strategic shading** in high pedestrian areas, parks, and transit stops.

Opportunity 2. Design and develop Regeneration of Public Spaces for All Seasons

Action Steps:

- Create flexible outdoor spaces that support health year-round.
- **Design multi-use recreation areas** adaptable for summer and winter use.
- **Install seasonal infrastructure** (e.g., misting poles, heated benches, shade sails).
- Develop blue/nature-based play spaces near high-density housing.
- Include work to promote green/ blue spaces and overcoming barriers to accessing these spaces even when on the doorstep.
- Ensure green/blue spaces are within a 10-minute walk for all residents and are inclusively designed.

Opportunity 3. Incentivise Climate-Adaptive Housing and Neighbourhood Design

Action Steps:

- Integrate thermal health into housing policy and urban design.
- Encourage mid-rise, medium-density housing with passive cooling features.
- **Avoid dense developments** lacking greenspace or airflow.

- Incentivise **passive design strategies** in new construction (e.g., shading, ventilation, green roofs).
- Retrofit public buildings as cooling centres during heatwaves.
- Support home upgrades for insulation, reflective roofs, and PV-powered A/C for vulnerable populations.

Context and Impacts:

Temperature is one of the most significant pathways through which a changing climate affects health. The UK climate is already becoming warmer, wetter and sunnier than was typical during the twentieth century, with clear evidence that both average temperatures and extreme heat events are increasing. According to the *State of the UK Climate 2024* report, all seasons have warmed substantially since the late twentieth century, continuing a long-term trend that has accelerated in recent decades. While year-to-year variability remains, the trajectory is unequivocal: the UK is experiencing a progressively warmer climate, with increasing frequency, intensity and duration of extreme temperature events.

The evidence indicates that extreme weather events are occurring more frequently due to warming global temperatures. These include recent severe flooding (Australia, Brazil, China, western Europe, Malaysia, Pakistan, South Africa, and South Sudan), wildfires (Canada, USA, Greece, Algeria, Italy, Spain, and Türkiye) and record temperatures (Australia, Canada, India, Italy, Oman, Türkiye, Pakistan, and the UK). Regardless of progress on global decarbonisation, temperatures will continue to rise because of the effects of greenhouse gases that have already been emitted. Under optimistic scenarios of low warming, temperatures will likely peak mid- to late-century, coinciding with the working age years of a child born today. The decisions made today will determine the severity and extent of climate impacts inherited by today's young people and their children.

A changing climate is projected to increase the number of days with high heat stress, while also altering rainfall patterns, increasing drought risk, and changing seasonal weather characteristics. Winters are expected to become warmer and wetter, summers hotter and drier, and heavy rainfall events more intense. These changes have profound implications for population health, health services, infrastructure, communities and the wider economy.

A Warming Climate: An Emerging Public Health Emergency

The evidence is clear that warming temperatures are already contributing to more frequent and severe climate-related events globally, including floods, droughts, wildfires and record-breaking heatwaves. Recent years have seen unprecedented

temperatures recorded across Europe, North America, Asia and the UK. Even under the most ambitious global decarbonisation scenarios, temperatures will continue to rise for several decades because of greenhouse gases already present in the atmosphere.

The concept that **“warming is inevitable, severity is optional”** is increasingly recognised within climate science and public health. While some further warming is unavoidable, the extent of future impacts will depend on actions taken today to reduce emissions and accelerate adaptation. The international goal established through the United Nations Framework Convention on Climate Change (UNFCCC) seeks to limit warming to 1.5°C above pre-industrial levels, recognising that beyond this threshold many natural and human systems face unacceptable or irreversible risks.

Current trajectories suggest global warming is likely to exceed 1.5°C within the next decade and could reach between 2°C and 3°C under existing policies. Higher warming scenarios would significantly increase risks to health, healthcare systems and population resilience.

Heat and Health

Heat is now recognised as one of the most significant climate-related risks to health in the UK. A changing climate is projected to increase the frequency, intensity and duration of heatwaves, exposing larger numbers of people to dangerous temperatures more often and for longer periods.

Heat-related mortality is already increasing. During the summer of 2022, England recorded more than 3,000 excess deaths associated with extreme heat. Evidence also suggests increasing pressure on emergency services, healthcare systems and social care providers during periods of extreme heat, including longer response times, increased demand and service disruption.

Unlike floods, storms or wildfires, heatwaves often leave little visible evidence of destruction. Their impacts are frequently described as a “silent emergency” because deaths and illnesses often occur in homes, hospitals and care settings, away from public view. However, the consequences can be substantial. Research indicates that relatively small increases in temperature—often just 2–3°C above normal conditions—can significantly increase mortality among vulnerable populations.

Vulnerable Populations

The health impacts of heat are not experienced equally across the population.

Older people are particularly vulnerable, accounting for approximately 88% of climate-related heat deaths. Other groups at increased risk include:

- People with cardiovascular, respiratory or renal disease.
- Individuals with mental health conditions.
- Infants and young children.
- Pregnant women.
- People with disabilities.
- Socially isolated individuals.
- Those living in poor-quality or overcrowded housing.
- Outdoor workers and those exposed to occupational heat.
- People experiencing homelessness.

Heat exposure can worsen existing health conditions, increase hospital admissions and contribute to premature mortality. Extreme temperatures can also affect the effectiveness of medications used to manage both physical and mental health conditions, further increasing vulnerability.

Mental Health and Wellbeing

The impacts of increasing temperatures extend beyond physical health. Emerging evidence links heat exposure to:

- Increased psychological distress.
- Anxiety and depression.
- Sleep disruption.
- Reduced cognitive performance.
- Increased risk of mental health crises.

Higher temperatures have been associated with poorer sleep quality, which in turn contributes to adverse mental health outcomes, reduced wellbeing and diminished productivity. As heatwaves become more common, the mental health burden associated with extreme temperatures is expected to increase.

Buildings, Infrastructure and Adaptation

A major challenge facing the UK is that much of the existing building stock was designed to retain heat during winter rather than manage overheating during summer. As a result:

- Homes, hospitals and care facilities are increasingly susceptible to overheating.
- Indoor temperatures can remain dangerously high during prolonged heat events.
- Vulnerable individuals receiving care at home may face increased risks.

Adaptation measures are therefore essential and include:

- Passive cooling measures.
- Improved building design standards.
- Increased shading and urban greening.
- Enhanced ventilation systems.
- Heat-resilient healthcare and social care facilities.

Without adaptation, rising temperatures are expected to place increasing pressure on health and care systems.

Warming is inevitable, severity is optional. The severity of climate impacts will be highly dependent on how much warming occurs. The United Nations Framework Convention on Climate Change (UNFCCC) established the goal of limiting warming to below 1.5°C (no higher than 2°C) above the historic average. Beyond these temperatures, many ecological and human systems are expected to pass thresholds for unacceptable or irreversible impacts. The global average temperature passed 1°C above the pre-industrial average around 2017, with 1.5°C widely expected to be surpassed in the next 5 to 10 years. Current global actions and policies to reduce or remove greenhouse gases emitted into the atmosphere (termed 'decarbonisation') put us on a collective trajectory closer to 2°C to 3°C warming, with projections of over 4°C considered a plausible worst-case scenario.

A changing climate is projected to increase the number of days with high heat stress levels. The frequency, intensity and duration of heatwaves will increase further, seriously impacting public health. Heat-related deaths over the summer of 2022 reached over 3000 (ONS, 2023), and greater service disruption and longer emergency response times have also been reported (Howarth et al., 2024).

Older people have the highest mortality with 88% of the climate-driven deaths in people over the age of 65. Extreme heat is an "underappreciated" threat as most victims die out of public view in homes and hospitals, and with little media coverage. Heatwaves don't leave a trail of destruction like wildfires or storms; their impacts are mostly invisible but quietly devastating. A change of just 2 or 3C can mean the difference between life and death for thousands of people[30].

Vulnerable groups are exposed to high temperatures in hospitals and care homes, and while receiving home-based care. Extreme heat affects both physical and mental health, including by reducing the efficacy of certain medications designed to treat physical and mental health conditions. The building stock is not prepared to deal with the impacts of overheating, having been designed historically with a view to warmth in winter. Adaptation measures are required here, alongside decarbonisation efforts, to mitigate the risks of increased heat. Although warmer winters may reduce the

burden on services from cold-related health conditions to some extent, even under future climate change, associated deaths are projected to remain high. Preparations for cold weather therefore remain vital.

In the UK, winters will become warmer and wetter, summers will become drier, and sea levels will continue to rise. Although summers in the UK will become drier, the rain that does fall is more likely to occur in heavy rainfall events. There will still be cold snaps and cool summers or winters as weather varies between years and geographically, but these will be less common as a changing climate progresses. These trends are already underway: the current UK climate is warmer, wetter and sunnier than was typical during the 20th century.

On the upside, warmer winters will reduce health risks due to extreme cold (though risks from moderate cold remain) and there may be some benefits to agricultural production for certain crops. The extent to which health benefits can be gained from a changing climate will largely depend on if, how, and how fast the UK and its health and care systems adapt to changing temperatures.

Cold and Extreme Cold Weather

While a changing climate is increasing temperatures overall, cold weather remains a significant public health risk and will continue to do so for many decades.

There is strong evidence linking cold weather to:

- Cardiovascular disease
- Stroke
- Respiratory illness
- Influenza and other infections
- Falls and injuries
- Hypothermia

There is an equally strong evidence base on the risk to health from cold weather, again with older people (people of 65 and over) and those with some long-term medical conditions facing the greatest risk.

Importantly, health effects occur not only during extreme cold events but also at relatively moderate temperatures. Studies suggest that adverse health impacts begin to increase when average outdoor temperatures fall between 4°C and 8°C.

The effects of cold weather are particularly acute among:

- Older people.
- People with long-term health conditions.

- Individuals living in fuel poverty.
- People living in poor-quality housing.

The onset of cold weather leads to an almost immediate increase in weather-related deaths which can remain raised for up to four weeks after. Deaths from cardiovascular conditions peak first, followed by stroke and then respiratory conditions. Negative health effects start at relatively moderate outdoor mean temperatures of 4 to 8°C.

These increasing, negative health effects of climate impacts fall unevenly across the UK and risk exacerbating existing social inequalities (UKHSA, 2023; Marmot et al, 2010). Those least able to protect themselves, including people with disabilities, the homeless, and those living in areas with high levels of deprivation, risk being rendered even more disadvantaged than they currently are. The idea that tackling social inequalities in health and tackling a changing climate must go together is increasingly established in UK policy discourse (Marmot et al, 2010; Munro et al, 2020).

Although warmer winters may reduce some cold-related mortality, projections suggest that deaths associated with cold weather will remain substantial. Consequently, preparations for cold weather will remain a critical component of climate adaptation and public health planning.

Current International and National Response(s):

Temperature represents one of the clearest examples of how a changing climate affects health today and will increasingly shape health outcomes in the future. While mitigation efforts to reduce greenhouse gas emissions remain essential, adaptation is equally critical.

Temperature-related health impacts are closely linked to social and economic inequalities. A changing climate risks are not distributed evenly and frequently exacerbate existing disadvantages. Those least able to protect themselves from temperature extremes—including people living in deprived communities, people with disabilities, the homeless and those experiencing fuel poverty—face disproportionately greater risks.

This reinforces the growing recognition that climate action and health equity must be pursued together. Addressing the social determinants of health is increasingly viewed as essential to climate adaptation, resilience and public health protection.

The extent to which society benefits from warmer winters and avoids the worst consequences of hotter summers will depend largely on how effectively governments, health systems and communities prepare for a changing climate.

The evidence suggests that future resilience will depend on:

- Strengthening climate-health preparedness.
- Designing heat-resilient homes and communities.
- Protecting vulnerable populations.
- Reducing health inequalities.
- Embedding climate and health considerations across all policies and sectors.

It's important to reinforce that the harm to health associated with adverse weather is not inevitable. There are things we can do all year round, and during periods of adverse weather, to minimise the impact.

An important role for the UK Health Security Agency (UKHSA) is to monitor the health effects of adverse weather, and our changing climate more generally, and provide advice and guidance on how we can adapt to meet these challenges head on.

Key national responses include:

- The UKHSA Adverse Weather and Health Plan.
- Heat-health and cold-weather alert systems.
- Adverse Weather Action Cards for NHS and social care organisations.
- Public guidance and awareness campaigns.
- Climate adaptation planning through the National Adaptation Programme.

These measures recognise that many temperature-related health impacts are preventable through effective planning, preparedness and adaptation.

The UKHSA has published an Adverse Weather and Health Plan as part of our commitment under the second National Adaption Programme for the UK to bring together and improve existing guidance on weather and health.

The UKHSA have also published a series of 'action cards' advising the NHS, social care organisations and professionals about the actions they should take to keep the public healthy and safe under different levels of alert.

Their guidance also includes advice that the public can act on to stay safe and as always, our most important call to action during adverse weather is to look out for people who might struggle to cope, particularly older people, young children and people with long term health conditions.

Local Authority Risk and Adaptation Toolkit: Heat Edition (LARA)

In addition, the UKHSA has developed the Local Authority Risk and Adaptation Toolkit: Heat Edition (LARA) it is designed to help councils understand and respond to the health risks posed by hot temperatures. It provides a simple, structured way to:

- assess preparedness for heat-related health risks, including current areas of strength
- identify gaps and areas for improvement in local plans and services
- a baseline against which you can benchmark future activity and demonstrate progress
- assess approaches to protect at risk groups such as older people, children, and those with health conditions
- plan practical actions guided by national guidance and good practice
- monitor your progress using our dashboard of visualisations

The tool includes sections on the following:

1. Leadership.
2. Local authority wide action and communications.
3. Care settings: risk groups (for example, people aged 65 and over, the disabled, and those with underlying health conditions) living in care settings (such as care and nursing homes).
4. Home and domiciliary settings: risk groups (for example, people aged 65 and over, the disabled, and those with underlying health conditions) living in their own home or domiciliary settings.
5. Young people.
6. Children and Young Peoples Settings: Schools, Education and Care.
7. 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.
8. Settings: Homes.
9. Planning.
10. Vulnerability due to occupation.
11. Infrastructure.
12. Adverse Weather and Health Plan cross-cutting actions.

The LARA Toolkit encourages collaboration across local authority departments and wider partners, helping to recognise local capabilities and establishes practice, alongside opportunities to build resilience and reduce preventable harm from high temperatures, hot weather and heatwaves.

Local East Sussex Response to Build From:

Based on current East Sussex policy, planning, climate adaptation and public health work, the local response to **heat, cold weather, extreme temperatures and climate-related health impacts** is developing across three interconnected areas: **adaptation**

and resilience planning, health protection and emergency preparedness, and healthy places/planning policy.

East Sussex recognises extreme temperatures as one of the most significant climate-related health risks facing the county. The county has an older-than-average population and lies within one of the warmest regions of the UK, making residents particularly vulnerable to heat-related illness, mortality and service disruption. Local evidence identifies increasing risks from heatwaves, overheating buildings, fuel poverty, extreme cold, drought, wildfire, air quality deterioration and emerging vector-borne diseases.

The East Sussex Climate Change Risk and Vulnerability Assessment (2024) was commissioned to identify the county's climate risks and assess future impacts under different climate scenarios, providing the evidence base for future adaptation planning.

East Sussex promotes national e-learning training for social care teams on caring for individuals during extreme heat periods, has its own heat alert service for members of the public to subscribe to and to receive alerts by SMS text or voice call, and linking with hot weather emergency protocols to support preparedness and response.

East Sussex also has a national cold weather alert system which triggers local actions, including the Keep Warm and Well programme, including support, advice and emergency heating measures. Actions around seasonal vaccinations are included as part of the response to extreme cold. There is an acute response associated with cold weather periods, particularly around emergency services, national guidance followed as per threat level. The authority has a homelessness protocol to address the needs of vulnerable populations during extreme cold. Whilst a longer-term piece of public health work involves retrofitting homes to ensure they support health and well-being by maintaining comfortable temperatures.

Public Health and Health Protection Response

The local public health response aligns with national guidance from the UK Health Security Agency (UKHSA), including:

- Heat-Health Alerts
- Cold Weather Alerts
- Adverse Weather and Health Plans
- NHS and social care action cards
- Community preparedness and resilience measures

Local priorities focus on protecting:

- Older people
- People with long-term conditions
- Care home residents
- People receiving home care
- Children and young people
- Vulnerable and socially isolated populations

The emphasis is increasingly on prevention, preparedness and adaptation rather than solely emergency response. This includes understanding local vulnerability, strengthening resilience and reducing future health impacts from temperature extremes.

Planning for Health and Healthy Sustainable Places

One of the most advanced areas of work in East Sussex is the development of the Planning for Health, Wellbeing and Sustainability Framework and Toolkit, which explicitly incorporates climate change adaptation and extreme temperatures as determinants of health.

The framework recognises that planning has a critical role in reducing exposure to extreme heat and cold through:

Heat Adaptation Measures

- Designing buildings to reduce overheating
- Passive cooling measures
- Natural ventilation
- Building orientation and shading
- Green roofs and green walls
- Tree planting and urban greening
- Provision of cool spaces and shaded public areas
- Water fountains and heat-resilient public realm design

Cold Weather Adaptation Measures

- Improving housing quality and insulation
- Reducing fuel poverty
- Improving thermal efficiency
- Designing healthy homes that remain warm in winter and cool in summer

Climate-Resilient Communities

- Flood-resilient design
- Sustainable drainage systems
- Drought-resistant landscaping
- Wildfire risk mitigation
- Climate-adapted public spaces

These measures are embedded within the East Sussex's Planning for Health, Wellbeing and Sustainability Framework and Health Impact Assessment (HIA) Toolkit to ensure climate-health considerations are integrated into planning policy and development management decisions.

Climate Adaptation Through Healthy Places

East Sussex has adopted a broader "Healthy and Sustainable Places" approach, recognising that a changing climate, health and place are interconnected. Current work includes:

Green and Blue Infrastructure

- Increasing access to green spaces
- Tree canopy expansion
- Nature-based solutions
- Biodiversity enhancement

Housing and Place

- Addressing overheating risks
- Improving thermal comfort
- Supporting active travel
- Designing walkable communities

Climate and Health Evidence

- Development of Healthy Places Data Profiles
- Climate and health needs assessments
- Local vulnerability assessments
- Integration of climate-health evidence into Local Plans

This approach seeks to create environments that protect health during both heatwaves and cold weather while delivering wider wellbeing and sustainability benefits.

Partnership and System Leadership

East Sussex has increasingly recognised a changing climate as a public health issue requiring a whole-system response.

Current partnership arrangements include:

- East Sussex Energy Partnership
- Public Health-led Healthy and Sustainable Places work via the Public Health Healthy and Sustainable Places Team
- Collaboration with Local Planning Authorities
- NHS and Integrated Care System partners
- Emergency planning and resilience partnerships

Emerging proposals include the consideration and need to establish a East Sussex Healthy Places Partnership to strengthen the integration of health, climate, planning, transport, housing and economic development within new Strategic Authority and devolution arrangements. This would provide a stronger mechanism for influencing climate-health priorities across Sussex.

Cold Weather and Fuel Poverty

Although much attention is focused on heat, East Sussex recognises that cold weather remains a major health risk.

Local responses include:

- Fuel poverty reduction programmes
- Warm Homes initiatives
- Housing improvement programmes
- Support through the East Sussex Energy Partnership
- Winter preparedness and excess winter deaths monitoring

The county recognises that while warmer winters may reduce some cold-related impacts, moderate cold temperatures will continue to contribute significantly to cardiovascular and respiratory disease, particularly among vulnerable populations.

Strategic Direction

The direction of travel in East Sussex is moving from a traditional emergency planning approach towards a broader climate-resilient health system and healthy places model, which aims to:

Prevent - Reduce exposure to extreme temperatures through planning, housing and infrastructure.

Prepare - Improve system readiness through surveillance, adaptation planning and workforce awareness.

Protect - Target support towards vulnerable populations and communities.

Adapt - Create climate-resilient homes, services, communities and health systems.

Integrate - Embed climate and health considerations across planning, transport, housing, economic development and service delivery.

East Sussex is increasingly positioning a changing climate as a health issue rather than solely an environmental issue. The local response combines climate adaptation, healthy places, planning policy, health protection and partnership working to reduce the health impacts of both extreme heat and cold while building long-term community resilience.

14. Transitioning and Adapting Infrastructure and Public Health - Considerations, Opportunities and Action Steps

High Level Strategic Opportunity:

Deliver an integrated, inclusive and equitable net zero transition by aligning climate adaptation, infrastructure investment, public health, and economic resilience through community engagement, workforce development, healthy housing, clean energy reform, and transparent communication.

Rationale:

Transitioning and adapting infrastructure is a key focus for this HIA because adapting infrastructure is essential for limiting the health impacts of a changing climate while also delivering significant immediate health benefits. Many of the actions needed to achieve improve home energy efficiency, increasing active travel, transitioning to cleaner energy sources, promoting sustainable diets, and expanding green infrastructure—can improve air quality, reduce cardiovascular and respiratory disease, support physical and mental wellbeing, reduce cold-related illness, and create healthier environments.

Considerations, Opportunities and Action Steps

Opportunity 1. Actively use and promote Community Engagement & Education

Action Steps:

- Actively engage local communities to **build awareness** of adaptation links to a changing climate, health, and economic prosperity.
- Educate young people, public officials, and residents on **climate responsibility**, health impacts, and mitigation strategies.
- Promote understanding of **adaptation and transitioning** across society.

Opportunity 2. Invest and develop Skills, Workforce & Economic Transition

Action Steps:

- Prepare for industrial shifts and job losses by developing resilience and offering support during transitions.
- Invest in developing green skills and creating sustainable jobs.
- Ensure a stable, skilled workforce to support the need to adapt and transition infrastructure as part of a rollout.

Opportunity 3. Invest, accelerate and adapt Housing & Infrastructure

Action Steps:

- Prioritise development that delivers positive environmental and health outcomes.
- **Accelerate retrofitting** of existing buildings, focusing on insulation, solar panels, and heat pumps.
- **Provide incentives** for landlords to make climate-resilient adaptations.
- Invest in innovation and adaptation infrastructure to future-proof development, homes and communities.

Opportunity 4. Build and shift Communication & Trust

Action Steps:

- **Build trust** through clear, accessible communication and reliable advice on climate initiatives and retrofitting options.
- **Shift public narratives** to centre the experiences of vulnerable groups most affected by climate change.

Opportunity 5. Collaborate and support Policy, Energy & Market Reform

Action Steps:

- Collaborate to advocate for reform of the national energy market.
- Aim for **renewable energy access** (e.g., solar, water mills) to ensure affordable and sustainable power for all.
- Support **the adaptation and transitioning of all buildings** and leverage infrastructure (e.g., water supply systems) for clean energy generation.

Context and Impacts:

The UK has committed to reaching net zero greenhouse gas (GHG) emissions by 2050. However, the UK is not on course to reach global targets to reduce greenhouse gas emissions by 45% by 2030 and reach net zero by 2050.

The UK Climate Change Act (2008)[31] was passed in 2008, setting out a pathway of actions across government to reduce emissions. This includes the need to:

- Take-up of low-carbon solutions (low-carbon transport, boiler replacement, industry shift to renewable)
- Expansion of low-carbon energy supplies (zero-carbon electricity production, scale up of wind power and hydrogen to replace natural gas, carbon capture and storage)
- Reducing demand for carbon-intensive activities (reduced heating demand by improving building energy efficiency, reduce consumption of high-GHG emission meat and dairy, fewer car-miles driven and slowing demand for flights)
- land and GHG removals (agricultural transformation, planting of new mixed woodlands, producing energy crops for biofuel, peatland restoration)

The **burning of fossil fuels** contributes to global warming through the release of GHG and significantly impacts our health, primarily through its contribution to air pollution, via the release of ultra-fine and fine particulate matter. These pollutants contribute to cardiovascular and respiratory morbidity and mortality along with other illnesses and are thought to contribute to one in 6 deaths worldwide[32]. Currently, 78% of UK energy comes from fossil fuels across multiple sectors, including, transport, industry and energy for heating and electricity[33].The UK Climate Change Committee states that fossil fuel supply emissions will need to reduce from 2018 levels by 75% by 2035[34].There will be 2 main ways of reducing fossil fuel use to reach net zero: reducing the overall demand for energy and switching to low-carbon energy sources.

Transport is currently the largest contributing sector to UK GHG emissions and is therefore a key focus for actions. The transport sector contributes significantly to air pollution, with pollutants coming from engine exhaust (tailpipe) emissions, and non-exhaust emissions. Engine exhaust emissions include particulate matter (PM), as well as carbon monoxide (CO), nitrogen dioxide (NO2) and hydrocarbons (HCs), which are also ozone (O3) precursors. Non-exhaust emissions include PM from tyre- and brake-wear and resuspended road dust. A compressive systematic review conducted by the Health Effects Institute concluded a moderate-to-high or high level of confidence in the association between long-term exposure to traffic-related air pollution (TRAP) and a range of adverse health outcomes including lung cancer, asthma onset in children, ischaemic heart disease and acute lower respiratory infections in children, as well as all-cause mortality[35].

The UK **housing stock** is relatively poorly insulated compared to other countries in northern Europe, and improvements in thermal efficiency and airtightness could substantially reduce heating demand and GHG emissions which make these key actions for adaptation. Recognising this, the UK government has adopted a ‘fabric first’ approach that will prioritise improvements in existing homes that fall below its energy performance standard, while all new homes are expected to be built to a high level of energy efficiency[36]. In addition, improved insulation could help reduce cold

related mortality and morbidity. Insulation improvements should be accompanied by adequate ventilation to avoid increasing build-up of indoor air pollutants or summertime overheating. Upgrades to the UK housing stock that are carefully designed and implemented to integrate multiple health considerations represent one of the greatest opportunities for health co-benefits from adaptation and transitioning infrastructure.

The **food sector** currently contributes approximately one third of global GHG emissions with emissions released at multiple points in the food system during production, processing, distributing and waste management[37].

It is estimated that by 2050, due to population growth and changes in consumer demand, food-related emissions may increase by 30% to 40% if no action is taken[38]. Global food production also contributes to 80% of deforestation, 70% of water use and is a major contributor to biodiversity loss[39]. To reach net zero by 2050, global food systems need to reduce their emissions by 3.3% annually, with greatest reductions needed in high-income countries[40 41].

The food and drink sector contributed to 35% of the total UK territorial emissions (emissions that occur within UK borders) and 21% of the UK's total carbon emissions in 2019[42].

Agricultural emissions mainly comprise more potent gases such as nitrous oxide (N2O) and methane (CH4), and only a small percentage of CO2. Across total emissions from this sector, 34% were attributable to UK agriculture, 32% were from food supply imports, and the remainder were produced through the lifecycle of foods[43].

Although total GHG emissions from the UK food system declined, between 2015 and 2019 primarily due to decarbonisation of the electricity grid[44], agricultural emissions have remained static, and the rate of reduction in emissions is not sufficient to meet 2050 net zero targets. The focus areas for net zero actions in the UK's agri-food system can be grouped as follows[45]:

- Changing farming practices
- Land use changes
- Consumer behaviour change

Transitioning farming practices through innovation and technology will be a key contributor to reducing emissions.

While actions to reduce emissions will ultimately benefit health by reducing climate change itself and thus the negative associated health impacts, different types of emission-reduction actions and interventions will also have effects on health themselves.

Current International and National Response(s):

Reducing energy demand can take the form of increasing energy efficiency and reducing energy-intensive activities (for example, changing how we travel and reducing air travel). Such changes may require considerable shifts in behaviour and in policy to develop extensive infrastructure to help facilitate these. **Increasing energy efficiency** will include measures such as home energy efficiency and increasing efficiencies in transport and industry.

Behaviour change at home can contribute to adaptation measures largely through a reduction in energy use and the shifting of energy demand. For example, reduced use of lighting and electrical appliances, turning the thermostat down, zonal heating where only occupied rooms are heated, and the use of low-flow shower heads are all examples of reducing energy demand through behaviour change. Such actions may be supported using smart meters that can provide real-time data on energy use and savings. Shifting demand where possible, in the form of pre-heating homes or using energy-intensive appliances such as dishwashers and washing machines during non-peak hours can help smooth overall demand. Actions taken by occupants to reduce or shift energy demand are unlikely to have health implications, provided they are in line with advice on the safe operation of appliances and on maintaining a healthy indoor environment. For example, maintaining an indoor temperature of 18°C poses minimal health risks[46], and can potentially reduce heating demand; though 18°C is recommended, there needs to be more research on vulnerable groups and their adaptive nature to cold.

Reducing energy consumption generally will benefit health through reduced air pollution currently associated with fossil fuel combustion; however, this will be dependent upon equity of access to affordable energy. Uptake of such solutions may therefore require significant support from policies and schemes as it will only happen if consumers have access to the right technologies via increased affordability and enhanced infrastructure and are aware of the benefits.

Low-carbon energy sources include renewables (such as wind, solar, and hydroelectric power), alongside nuclear power. Low-carbon fuels may include bioenergy (for example, biogas or crops grown for biofuels) and hydrogen. A major health benefit of switching to renewable energy sources will be potential improvements in air quality from reduced fossil fuel burning, though biofuels (such as crops grown for bioethanol or biomass burning) may still emit air pollution; adverse effects of wood burners on air pollution are being increasingly recognised

Actions to shift from vehicles towards **active travel** by walking, wheeling and cycling as a journey and include trips made by wheelchair, mobility scooters, adapted cycles, electric cycles (e-cycles) and scooters for example, have major health co-benefits[47].

As well as reducing carbon emissions, active travel can reduce ambient air pollution and improve physical and mental health. Where vehicles are used, shifting from fossil fuels to electric vehicles (which are included in decarbonisation plans due to their zero tailpipe emissions). Electric vehicles can benefit health by reducing exposure to vehicle exhaust air pollution, though they will still produce some particulate matter emissions from tyre and brake wear.

Additionally, a Public Health England (PHE) report[48] concluded that EV benefits through reducing air pollutants depends on:

- Type of EV
- Source of energy generation
- Driving conditions
- Charging patterns
- Availability of charging infrastructure
- Government policies
- Climate of regions

Reducing intake of foods with a high emission 'footprint' and increasing intake of plant-based foods will help reduce emissions and can be associated with nutritional health benefits.

Nature-based solutions such as expanding or creating new forests, protecting marine environments and building green roofs or walls, can help reduce temperatures and can have positive impacts on ecosystems, biodiversity and human health and well-being. Urban greenspace can provide a local cooling effect, with trees providing shade and improving thermal comfort, as well as positively impacting health and well-being, particularly mental health.

The health sector is making an important contribution to decarbonisation. They are already switching to electric without impacting the delivery of care, although there are some operational challenges for vehicles such as ambulances that need to be operational at all times. Anaesthetic gases and inhalers are an important source of health sector emissions due to their widespread use and the types of gases used. Action to switch to low-carbon alternatives and reducing inappropriate prescribing and waste can also help reduce emissions.

Local East Sussex Response to Build From:

The Public Health team coordinates the **East Sussex Energy Partnership** which provides a forum where partners can work together to ensure a consistent and co-ordinated approach to the delivery of interventions to tackle health and wellbeing

issues related to cold homes, particularly for vulnerable groups. The scope of the group is:

- Partnership approaches to reducing fuel poverty in East Sussex, which seek to secure an equitable and fair transition
- Cold related health issues in the home (including interventions that contribute to the prevention of excess winter deaths and morbidity, and the health risks associated with cold homes)

Housing and Health & Safety Key elements of the programme, drawn from the NICE guidance, are to:

1. Train health, housing and social care professionals and voluntary and community sector workers to help people whose homes maybe too cold for their health and wellbeing
2. Raise awareness among professionals and the public about how to keep warm at home
3. Identify vulnerable people who live in a cold home and refer for help
4. Provide vulnerable people with information and advice in order to maximise income, and
5. Provide an affordable warmth scheme (Warm Home Check service) for eligible vulnerable people which includes a home assessment, advice and small energy efficiency works/interventions (including boiler repairs for vulnerable people)

The Public Health team commissions a single-point-of-contact affordable warmth service – the East Sussex Warm Home Check service – which delivers advice and support to help people to stay warm and well at home. Households eligible for Warm Home Check visits are those in private tenures in receipt of selected benefits or on a low income and living with a long-term condition or disability.

Retrofit Strategy Development Programme

This programme is developing a place-based housing retrofit strategy for East Sussex. This will identify and secure suitable future pathways to retrofit by building capacity, improving joint working and establishing readiness for funding opportunities. The programme development has been agreed with the East Sussex Housing Partnership Board.

The key outcomes to achieve include:

- A sustainable, multi-agency partnership which provides ongoing strategic leadership for a retrofit programme

- A jointly owned, place-based retrofit strategy and targets
- Robust data about housing stock and retrofit requirements in East Sussex
- Pipeline of future projects and grant-funding opportunities, co-ordinated through the partnership

Enhanced capacity and skills within the local workforce, and ongoing development programmes co-ordinated through the partnership.

In October 2019, East Sussex County Council declared a Climate Emergency and committed to getting to net zero as soon as possible, and by 2050 at the latest. In 2020, it adopted a Climate Emergency Plan, which was updated in 2023.

The new Climate Emergency Plan covers the five years between 2025/26 to 2029/30 and continues from where the last Plan ended in March 2025.The new plan:

- Reiterates the Council's aim to become net zero as soon as possible, and by 2050 at the latest.
- Sets out an Action Plan for 2025/26.
- Explains the governance, monitoring and reporting systems in place.
- Assesses the main risks to delivering the Action Plan.

This new Climate Emergency Plan has been developed in consultation with:

- The Climate Emergency Board, which includes representatives from all Council departments.
- A cross-party working group of elected Members on the Place Scrutiny Committee.

Key actions being taken include:

- Aligning council decision-making with our plans.
- Rolling out a programme of carbon literacy training, workshops and e-learning for staff and Members
- Adapt and transition our buildings with the health effects of a changing climate in mind: replacing gas boilers with heat pumps in schools and other Council buildings, installing low energy lighting and installing solar PV.
- Installing electric vehicle charge points at key sites.
- Working with suppliers and contractors to cut their emissions (96% of our emissions are from supply chain partners delivering goods and services, e.g. waste services).
- Working with schools to reduce their emissions, including delivering energy saving workshops for school site managers.

- Helping residents and businesses to identify areas where they can take action, through support programmes such as our warm home service, and Solar Together Sussex.
- Integrating decarbonisation into our transport policies.
- Exploring opportunities to invest in high-quality local carbon offsets, in line with our Carbon Offset Framework.

From a **procurement** perspective East Sussex County Council have an:

- Environmentally Sustainable Procurement Policy which sets out the Councils requirements from the suppliers we do business with. Orbis Environmentally Sustainable Procurement Policy | East Sussex County Council
- Supplier Code of Conduct, aimed at all levels of business with relevant requirements for Net Zero and environmental sustainability: How to tender for business with us | East Sussex County Council
- PPN 006: Taking account of Carbon Reduction Plans in the procurement of major government contracts - GOV.UK- required from all high impact suppliers in the procurement process.

They are also working directly with local small and medium business enterprises (SMEs) which are interested in doing business with the Council and to support them in taking steps to decarbonise and align with the Councils Climate Emergency Plan. Recent examples include with the local construction sector.

Case Study:

East Sussex's Procurement Policy Team is working collaboratively with officers and their suppliers to drive better environmentally sustainable outcomes in East Sussex.

Delivery of planned maintenance projects across East Sussex County Council's corporate and school estate is a critical part of Property Services activities. The programme is enabled by using a number of suppliers such as electrical, mechanical, roofing and building contractors via a Framework Agreement consisting of approximately 30 businesses, the vast majority of whom are SMEs local to the East Sussex or Brighton area. Before they started this project only one framework contractor had a Carbon Reduction Plan.

Whilst individually projects are not a significant contributor to ESCC's supply chain carbon emissions, collectively the annual programme is estimated to represent c.3% of annual Scope 3 emissions.

The Procurement Team's specific objectives for this project are to:

- Increase the number of framework contractors
- Test and refine our supplier engagement programme for supply chain decarbonisation
- Improve local SME's ability to meet our and other clients' needs for carbon reduction
- Engage our supply chain in taking positive action to address climate change in their business.

A framework contractor provided the following feedback:

"Sometimes it can be a bit overwhelming when you haven't done this before but we found the support that the Council provided to be very useful. We were able to seek help on exactly what information was required to get our total emissions for each scope and obtain the necessary details of how and where to get these. With your help, we have now been able to showcase our plans and objectives are in-line with other companies' sustainability commitments which has meant we are now able to achieve our renewable goals."

Case Study:

They are also working directly with local small and medium business enterprises (SMEs)

In terms of addressing **transport and active travel** the fourth East Sussex Local Transport Plan 2024 – 2050 (also known as LTP4) was adopted at Full Council on 8 October 2024. LTP4 sets out how East Sussex County Council and partners will plan and provide transport for residents, businesses and visitors in East Sussex now and for future generations; to help connect them with the places they need to go on a daily basis. It sets out how the County Council and partners plan to:

- Enable safer and more accessible journeys
- Develop healthy places to enable people to live well
- Decarbonise transport to help achieve net zero targets by 2050 at the latest
- Maintain and strengthen transport networks so that they are resilient
- Support a more equitable, inclusive, and sustainable economy within coastal towns, market towns and villages in more rural areas

The LTP4 includes wider assessments and includes a health impact assessment (HIA) of its own:

- Health Impact Assessment
- Habitats Regulation Assessment
- Equalities Impact Assessment

It also includes supporting documents and supporting modal strategies, focusing on specific modes of transport, that support the Local Transport Plan:

- Stage 1 (Scoping) Consultation Report
- Stage 2 (Development) Consultation Report
- Local Transport Plan 3 Review

In terms of the food sector multiple food partnerships are commissioned across the county. See Food | East Sussex County Council. Local food partnerships bring together emergency food providers, sustainable food businesses and schemes to tackle food waste:

- Lewes District Food Partnership
- Hastings and Rother Food Network
- Eastbourne Food Partnership
- Wealden Food Partnership

Because a changing climate is driven by cumulative global emissions, local emissions reduction efforts alone cannot prevent all future climate-related health impacts. Adaptation is therefore essential to protect health, strengthen community resilience and ensure health and care systems remain able to respond to increasing climate risks.

15. Vector-Borne Diseases and Public Health - Considerations, Opportunities and Action Steps

High Level Strategic Opportunity:

Strengthen vector-borne disease resilience through localised risk assessment, cross-sector workforce collaboration, community engagement, sustainable environmental design, and the strategic use of innovation, technology, and governance.

Rationale:

Vector-borne diseases are a key focus of the Addressing Environment, Climate and Health – A Systemwide Health Impact Assessment for East Sussex (ECH-HIA) because a changing climate is increasing the likelihood that disease-carrying vectors, such as ticks and mosquitoes, can survive, reproduce and spread into new areas. Rising temperatures, changing rainfall patterns, milder winters and environmental changes can create more favourable conditions for vectors and increase opportunities for disease transmission. Although the UK currently experiences relatively low levels of vector-borne disease, risks are growing due to a changing climate, international travel, global trade and changing ecosystems. This can increase the potential for diseases such as Lyme disease, tick-borne encephalitis, West Nile fever and other emerging infections. Focusing on vector-borne diseases supports public health preparedness through improved surveillance, early warning systems, public awareness and climate adaptation planning, helping to protect communities and strengthen resilience to future climate-related health risks.

Considerations, Opportunities and Action Steps

Opportunity 1. Further develop Localised Risk Assessment and Surveillance

Action Steps:

- Conduct comprehensive vector control needs assessments.
- **Map ecological risk factors** using GIS and remote sensing.
- **Strengthen surveillance systems** and integrate with health and climate data.
- **Develop early warning systems** using predictive modelling and real-time reporting.

Opportunity 2. Increase Workforce Capacity and Cross-Sector Collaboration

Action Steps:

- Train public and environmental health professionals in entomology and outbreak response.
- Establish a **multisectoral taskforce** and regional training networks.
- Promote knowledge sharing through online hubs and academic partnerships.

Opportunity 3. Co-produce, involve and ensure Community Engagement and Equity-Focused Action

Action Steps:

- Co-produce culturally relevant education and prevention campaigns.
- **Involve communities in surveillance**, habitat control, and seasonal awareness efforts.
- Ensure interventions reach vulnerable and digitally excluded populations.

Opportunity 4. Make better use of Sustainable Development and Environmental Design

Action Steps:

- Consider and encourage **vector control into planning, building codes**, and environmental assessments.
- Promote green infrastructure that reduces vector habitats while supporting biodiversity.
- Collaborate with **developers and landlords** to implement vector-reducing features.

Opportunity 5. Align Innovation, Technology, and Governance

Action Steps:

- Pilot novel vector control tools (e.g., biocontrol, IoT sensors, AI modelling).
- Align local governance with national strategies and emergency preparedness.
- Set clear targets and accountability mechanisms through a dedicated taskforce.

Context and Impacts:

Vector-borne diseases are illnesses transmitted to humans by living organisms such as mosquitoes, ticks, sandflies, fleas, lice and other arthropods. They account for more than 17% of all infectious diseases globally and cause over 700,000 deaths each year. Major vector-borne diseases include malaria, dengue, chikungunya, Zika, West Nile fever, yellow fever, Lyme disease, leishmaniasis and tick-borne encephalitis.

The following table is a non-exhaustive list of vector-borne disease, ordered according to the vector by which it is transmitted. The list also illustrates the type of

pathogen that causes the disease in humans. Source adapted from: World Health Organisation Vector-borne diseases.

Vector	Disease Caused	Type of Pathogen
Aedes mosquito	Chikungunya	Virus
Aedes mosquito	Dengue	Virus
Aedes mosquito	Lymphatic filariasis	Parasite
Aedes mosquito	Rift Valley fever	Virus
Aedes mosquito	Yellow fever	Virus
Aedes mosquito	Zika	Virus
Anopheles mosquito	Lymphatic filariasis	Parasite
Anopheles mosquito	Malaria	Parasite
Culex mosquito	O'nyong'nyong virus	Virus
Culex mosquito	Japanese encephalitis	Virus
Culex mosquito	Lymphatic filariasis	Parasite
Culex mosquito	West Nile fever	Virus
Aquatic snails	Schistosomiasis (bilharziasis)	Parasite
Culicoides flies	Oropouche fever	Virus
Blackflies	Onchocerciasis (river blindness)	Parasite
Fleas	Plague (transmitted from rats to humans)	Bacteria
Fleas	Tungiasis	Ectoparasite

Vector	Disease Caused	Type of Pathogen
Lice	Typhus	Bacteria
Lice	Louse-borne relapsing fever	Bacteria
Sandflies	Leishmaniasis	Parasite
Sandflies	Sandfly fever (phlebotomus fever)	Virus
Ticks	Crimean-Congo haemorrhagic fever	Virus
Ticks	Lyme disease	Bacteria
Ticks	Relapsing fever (borreliosis)	Bacteria
Ticks	Rickettsial diseases (e.g. spotted fever and Q fever)	Bacteria
Ticks	Tick-borne encephalitis	Virus
Ticks	Tularaemia	Bacteria
Triatome bugs	Chagas disease (American trypanosomiasis)	Parasite
Tsetse flies	Sleeping sickness (African trypanosomiasis)	Parasite

Source adapted from: World Health Organisation Vector-borne diseases

Historically, many vector-borne diseases have been concentrated in tropical and subtropical regions. However, a changing climate, globalisation, environmental change, international travel and trade are altering the distribution of disease vectors and increasing opportunities for disease transmission. As a result, diseases once considered geographically restricted are increasingly appearing in temperate regions, including parts of Europe and the UK.

A changing climate is recognised by both the World Health Organization (WHO) and the UK Health Security Agency (UKHSA) as a major driver of future vector-borne disease risk. Rising temperatures, changing rainfall patterns, milder winters, wetter conditions, flooding and changing ecosystems can create more favourable

environments for vectors to survive, reproduce and expand into new geographical areas.

The UK currently experiences relatively low levels of vector-borne disease compared with many parts of the world. However, the risk is increasing due to factors like growing global travel and trade, changes in land use and a changing climate. Disease vectors are reaching our borders as mosquitoes with the potential to transmit infectious disease can make their way to our shores in a number of ways.

Similarly, ticks not commonly found in the UK can attach themselves to pets migratory birds and holidaymakers in search of a blood meal and be imported into the UK. The HECC Report identifies tick-borne diseases as one of the most immediate climate-sensitive vector-borne threats to the UK population.

International travel and trade bring humans into more frequent contact with vectors, while climate and other environmental changes fuel their spread worldwide. In recent years, vector-borne diseases have moved into new territory: many diseases once

limited to tropical and subtropical zones are now increasingly seen in temperate areas.

Vector-borne diseases cause ongoing disease or outbreaks across all WHO regions[49].

The UKHSA HECC Report identifies vector-borne diseases as an emerging climate-sensitive health risk requiring enhanced surveillance and preparedness.

Several factors are contributing to increasing risk which include:

International Travel - Growing international travel increases opportunities for:

- Imported infections.
- Introduction of pathogens.
- Exposure of UK residents to overseas diseases.

Travellers may return infected and, under suitable environmental conditions, contribute to local transmission.

Global Trade - Global trade can facilitate the movement of vectors through:

- Used tyres.
- Plants and horticultural products.
- Freight transport.
- Shipping containers.

Mosquito species capable of transmitting disease have repeatedly been detected in imported goods and transport systems.

Tick Expansion - Ticks already present in the UK are expanding into new habitats.

This has implications for:

- Lyme disease.
- Tick-borne encephalitis.

A changing climate affects vector-borne diseases through several interconnected pathways.

Rising Temperatures - Temperature is one of the most important factors influencing vector survival and disease transmission.

Warmer temperatures can:

- Increase mosquito and tick survival rates.
- Extend breeding seasons.
- Accelerate reproduction cycles.
- Increase biting frequency.
- Speed up pathogen development within vectors.
- Allow vectors to survive in previously unsuitable regions.

The UKHSA Health Effects of Climate Change (HECC) Report identifies temperature increases as a key factor likely to increase the suitability of parts of the UK for invasive mosquito species and other disease vectors.

As temperatures rise, mosquito and tick species that are currently unable to establish sustainable populations in the UK may find environmental conditions increasingly favourable. This raises concerns about diseases such as:

- West Nile fever
- Chikungunya
- Dengue
- Zika virus
- Tick-borne encephalitis

Changing Rainfall Patterns - A changing climate is altering rainfall patterns across many regions.

Heavy rainfall and flooding can:

- Create standing water habitats suitable for mosquito breeding.
- Expand vector habitats.

- Disrupt sanitation infrastructure.
- Increase human exposure to vectors.

Conversely, drought conditions can sometimes increase vector risks where people store water in containers that provide breeding sites for mosquitoes.

Milder Winters - Milder winters can improve vector survival rates and increase the likelihood of year-round persistence.

Historically, cold winters have helped limit the establishment of some mosquito and tick species in the UK. Warmer winters may reduce this natural control mechanism and allow vectors to expand their range.

Changes in Ecosystems and Wildlife

A changing climate is altering habitats, biodiversity and wildlife movement patterns.

Changes in:

- bird migration,
- mammal distribution,
- vegetation,
- land use,

can influence the movement of vectors and reservoirs of infection.

Migratory birds, for example, can transport ticks and mosquito-borne pathogens across international borders.

Extreme Weather Events - Flooding, storms, heatwaves and environmental disruption can alter vector populations and increase opportunities for disease emergence.

Climate-related disasters may:

- Displace populations.
- Disrupt healthcare services.
- Increase human-vector contact.
- Create new breeding habitats.
- Compromise disease surveillance systems.

Considering and monitoring the impact of climate and other environmental change in relation to vector-borne diseases through surveillance systems is vital to safeguard future generations from the increasing threat from diseases such as tick-borne encephalitis, or chikungunya from invasive mosquitoes.

There are Multiple interconnected **challenges impede progress against vector-borne diseases**. Threats to effective and impactful vector control can be grouped as systemic, structural, informational, environmental, human movement, political and financial, and ethical.

1. **Systemic** - Capacity for vector surveillance and control is insufficient. With a few notable exceptions worldwide, vector-borne disease prevention programmes at national and subnational levels have limited public health entomology capacity and poor infrastructure. This restricts the ability to perform basic functions beyond vector control implementation, such as surveillance, monitoring and evaluation. Technical specialists and technicians within the health system are absent or weak. Attrition of trained individuals is a major issue for a number of reasons related to retirement, the pull of the private sector and agricultural sector for example.
2. **Informational** - The evidence base to support effective vector control is limited for most vector-borne diseases due to lack of research support. Vector surveillance remains weak in many countries despite insecticide resistance and changes in vector behaviour threatening the efficacy of current interventions. Basic and applied research is limited in many settings, restricting the availability of such evidence to inform environmentally sound and effective deployment, combination, and scale up of interventions – especially for new tools, technologies and approaches. Entomological, epidemiological and intervention data are often managed separately without linkage, resulting in insufficient information on the impact of vector control interventions on entomological parameters and pathogen transmission.
3. **Structural** - Disease-specific programmes and strategies do not optimally leverage synergies and sometimes compete for resources.
4. **Movement of humans and goods** - Increased global human population movement due to normal travel patterns, migration for employment or displacement resulting from humanitarian crises as well as increased global trade are likely to accelerate the introduction of invasive species or exotic pathogens into receptive areas and expose non-immune populations to new infections and disease. These factors further complicate the delivery of effective vector control and can undermine access to early diagnosis and treatment.
5. **Political and financial** - Substantial financial support has been provided for the scale up of insecticide-treated nets and indoor residual spraying against malaria vectors since 2000. However, there has been limited focus on other vector control interventions and other vector-borne diseases, especially in the absence of either large epidemics or high mortality rates. Investments in vector surveillance have remained minimal in general, and vector control monitoring and evaluation is often limited. Funds committed to the development of medicines, diagnostic tools

and vaccines far exceed those for vector control. Expansion of domestic and global funding is urgently required to combat other diseases, especially those that are Aedes-borne.

6. **Ethical** - Vector control methods and their implementation, including novel interventions, raise several ethical challenges and concerns. Countries require support to identify and address ethical issues and to put in place relevant ethics advisory bodies particularly as vector control measures are scaled up and as new interventions become available for use.

How Public Health will increasingly need to respond

Public health responses will increasingly need to focus on:

- Enhanced vector surveillance.
- Climate-sensitive disease monitoring.
- Early warning systems.
- Public awareness and education.
- Environmental management.
- Workforce training.
- Cross-border collaboration.
- Climate adaptation planning.

Addressing vector-borne diseases should therefore be considered an important component of climate resilience and health protection planning. As the climate continues to change, preventing the establishment and spread of vector-borne diseases will become an increasingly important public health priority.

New vector-control technologies, including genetic approaches and novel biological controls, raise important ethical, regulatory and community engagement considerations that will require robust governance.

Current International and National Response(s):

Vector-borne diseases are increasingly recognised as an emerging climate-sensitive health risk. A changing climate is altering the distribution, abundance, seasonality and transmission potential of disease vectors such as mosquitoes and ticks, creating new challenges for public health systems worldwide. In response, national governments, international organisations and public health agencies have moved towards a more proactive approach focused on surveillance, preparedness, early warning systems, vector control, research and climate adaptation.

The response has evolved from managing individual diseases to adopting a broader One Health and **climate resilience** approach that recognises the interconnectedness of human health, animal health, ecosystems and environmental change.

The WHO Global Vector Control Response (GVCR) 2017–2030 provides the principal international framework for action. It aims to reduce mortality and disease burden through:

- Strengthening vector surveillance systems.
- Improving disease monitoring and early warning systems.
- Integrated vector management.
- Community engagement and public awareness.
- Improved diagnostics and treatment.
- Strengthened emergency preparedness.
- Research and innovation.

A key principle of the WHO approach is Integrated Vector Management (IVM), which combines environmental management, biological control, chemical control, surveillance and public participation.

The WHO also promotes climate-informed surveillance systems that incorporate:

- Meteorological data.
- Environmental monitoring.
- Disease surveillance.
- Predictive modelling.

These systems help anticipate disease outbreaks before they occur.

One Health Approach

WHO increasingly advocates a One Health approach to climate-sensitive infectious diseases.

This recognises that:

- Human health,
- Animal health,
- Environmental health,

are interconnected.

Many vector-borne diseases involve animal reservoirs and are influenced by environmental conditions. As a result, collaboration between public health agencies, veterinary services, environmental organisations and climate scientists is increasingly viewed as essential.

United Nations and International Climate Policy

Vector-borne diseases have become an important component of global climate adaptation planning.

Under the:

- United Nations Framework Convention on Climate Change (UNFCCC),
- Paris Agreement,
- Sustainable Development Goals (SDGs),

countries are encouraged to strengthen climate-resilient health systems and improve preparedness for climate-sensitive diseases.

Increasingly, National Adaptation Plans (NAPs) include:

- Disease surveillance.
- Health system resilience.
- Vector monitoring.
- Climate-informed public health planning.

European Response

European Centre for Disease Prevention and Control (ECDC) - The ECDC has significantly expanded its focus on climate-sensitive infectious diseases.

Key activities include:

Vector Surveillance - monitoring the spread of:

- Aedes albopictus (Asian tiger mosquito).
- Aedes aegypti.
- Tick populations.
- Emerging vectors.

Risk Mapping - Climate suitability models are used to identify areas at increasing risk of vector establishment.

Early Warning Systems - The ECDC works with member states to:

- Monitor disease outbreaks.
- Share intelligence.
- Strengthen preparedness.

Recent ECDC reports have identified climate change as a major factor driving the expansion of mosquito-borne diseases across Europe, including:

- Dengue.
- Chikungunya.
- West Nile fever.

Research and Climate Intelligence - European programmes increasingly combine:

- Climate projections.
- Ecological modelling.
- Disease surveillance.

to anticipate future risks and guide adaptation planning.

UK National Response - UK Health Security Agency (UKHSA)

The UKHSA leads the UK's response to vector-borne diseases and climate-sensitive infectious disease threats. The UKHSA Health Effects of Climate Change (HECC) Report identifies vector-borne diseases as an emerging climate-health risk that is likely to increase as temperatures rise and environmental conditions change.

The UK has developed one of the most comprehensive vector surveillance systems in Europe.

The UKHSA operates **mosquito surveillance** which monitors:

- Ports.
- Airports.
- Transport hubs.
- Wetland habitats.

to identify invasive mosquito species before they become established.

Tick Surveillance Scheme - the Tick Surveillance Scheme monitors:

- Tick distribution.
- Tick abundance.
- Emerging pathogens.

This programme helps identify changes in vector populations linked to a changing climate.

Medical Entomology Capacity - the UK has invested in specialist expertise in:

- Vector biology.
- Surveillance.
- Risk assessment.
- Climate-health modelling.

This enables rapid response to emerging threats.

UK Climate Adaptation Planning - Vector-borne diseases are now included within:

- UK Climate Change Risk Assessments (CCRA).
- National Adaptation Programmes (NAP).
- Health resilience planning.

The Third UK Climate Change Risk Assessment identifies infectious diseases as an area requiring increased adaptation effort.

Priority actions include:

- Enhanced surveillance.
- Improved outbreak preparedness.
- Better understanding of climate-disease relationships.
- Increased public awareness.
- Cross-sector collaboration.

Nationally and internationally, several approaches are emerging as best practice. This includes **climate-informed early warning systems** which combine:

- Weather forecasts.
- Climate data.
- Vector surveillance.
- Disease monitoring.

to predict periods of increased risk.

Examples already exist for:

- Malaria.
- Dengue.

- West Nile virus.

and are increasingly being adopted globally.

Integrated Vector Management - Rather than relying solely on insecticides, modern approaches combine:

- Habitat management.
- Water management.
- Urban planning.
- Community engagement.
- Surveillance.
- Biological control.

This reduces environmental impacts while improving effectiveness.

Community Engagement - public participation is increasingly recognised as essential. Examples include:

- Tick awareness campaigns.
- Mosquito breeding site reduction.
- Personal protective measures.
- Reporting invasive species.
- Outdoor safety education.

Communities are increasingly viewed as partners in prevention rather than passive recipients of information.

Research and Innovation - many countries are investing in:

- Climate-health modelling.
- Disease forecasting.
- Genomic surveillance.
- Novel vector-control technologies.
- Vaccine development.

Research is increasingly focused on understanding how a changing climate will influence disease transmission over coming decades.

Despite significant progress, important worldwide **challenges** remain which restricts the ability to detect and respond to emerging threats effectively. These challenges include:

- **Surveillance and Monitoring Infrastructure Gaps -** many countries still lack comprehensive vector monitoring systems.
- Emerging Insecticide Resistance
- Poor Integration of Epidemiological and Entomological Data.
- **Climate Uncertainty -** predicting future vector distributions remains complex.
- **Globalisation -** international travel and trade continue to increase opportunities for disease spread.
- **Workforce Capacity -** there is a shortage of specialist entomologists, epidemiologists and climate-health experts.
- **Funding Constraints -** long-term investment is often insufficient despite growing risks. Historically, funding has focused heavily on malaria.

Investment in:

- Vector surveillance.
- Emerging vector-borne diseases.
- Climate adaptation.
- Prevention infrastructure

has often been limited. Recent reductions in international development assistance by some donor countries, including reductions in portions of UK and US overseas aid budgets, have raised concerns among public health experts regarding future capacity to monitor and control emerging vector-borne diseases globally. Reduced investment may weaken surveillance systems and increase vulnerability to outbreaks in low- and middle-income countries, which can subsequently affect global health security.

Overall Assessment

The national and international response has shifted from reactive disease control towards **anticipatory climate adaptation and resilience planning**. The WHO, ECDC, UKHSA and other organisations increasingly recognise that a changing climate is likely to increase the risk of vector-borne diseases through expanding vector habitats, longer transmission seasons and greater opportunities for disease emergence.

The most effective responses combine surveillance, climate intelligence, early warning systems, integrated vector management, One Health approaches, public engagement and climate-resilient health systems. Increasingly, success is being measured not only by controlling outbreaks when they occur, but by preventing the establishment and spread of vectors and pathogens before they become significant public health threats.

For example, the current response undertaken by the UK Health Security Agency is to monitor whether vehicles are bringing in invasive mosquitoes at transport hubs to detect and eradicate them before they are disseminated more widely.

Collaborating with local authorities, mosquito traps (such as those in Newhaven in East Sussex) targeting invasive species are run at high-risk sites across England. Left unchecked the consequences of not controlling these species can lead to the establishment of this invasive vector and therefore potential for new diseases that we have not seen in the UK.

Local authorities and communities are being encouraged to step into action in these instances and clear out sources of standing and stagnant water such as blocked gutters and drains, and ensure rainwater in litter, tarpaulin, open buckets, bins and discarded items are cleared away or arranged in a way that they drain away.

When surveillance systems identify an invasive species aggressive interventions are put in place to eradicate any health threat. These mosquito control efforts may include reducing mosquito breeding sites, using insecticides, and promoting personal protective measures like wearing long-sleeved clothing, using mosquito repellents to the public and alerting local healthcare settings to the signs of illness to look out for.

Local East Sussex Response to Build From:

East Sussex has not yet developed a standalone vector-borne disease strategy. However, the county has increasingly recognised vector-borne diseases as an emerging climate-related health risk through its climate adaptation, public health, environmental management and healthy places work. The local response currently focuses on **risk recognition, climate adaptation planning, surveillance support, public awareness, and prevention**, particularly regarding tick-borne diseases such as Lyme disease.

Recognition within Climate Adaptation Planning

A significant development has been the inclusion of vector-borne diseases within East Sussex's climate adaptation and resilience planning.

The East Sussex Climate Change Risk and Vulnerability Assessment (2024), commissioned by East Sussex County Council, identifies climate-related health risks and is being used to strengthen the resilience of local services and communities. Although the assessment focuses primarily on heat, flooding and extreme weather, it provides the framework through which emerging health risks such as vector-borne diseases can be considered.

The East Sussex Healthy Places Framework goes further by explicitly identifying vector-borne diseases as a potential climate-health risk. It notes that rising temperatures may increase the likelihood of invasive mosquito species, including *Aedes albopictus* (Asian tiger mosquito), becoming established and potentially transmitting disease. The framework also recognises that East Sussex's relatively warm climate and ageing population may increase vulnerability to climate-related health impacts, including vector-borne diseases.

Lyme Disease Awareness and Tick Prevention

The most established local response relates to ticks and Lyme disease.

East Sussex County Council provides public health information and prevention advice because the county is recognised as one of the areas in southern England where Lyme disease is more commonly reported. The council highlights that ticks are found throughout the countryside, including the South Downs and other green spaces across East Sussex. Public information campaigns promote:

- Tick awareness.
- Safe outdoor recreation.
- Tick checks following outdoor activities.
- Appropriate tick removal.
- Early recognition of Lyme disease symptoms.
- Prompt access to healthcare where symptoms occur.

This approach reflects national UKHSA guidance and supports individual adaptation to increasing environmental exposure risks.

Surveillance and National Partnerships

Although East Sussex does not operate its own vector surveillance programme, the county benefits from national surveillance systems coordinated by the UK Health Security Agency (UKHSA).

These include:

- The UK Tick Surveillance Scheme.
- Mosquito monitoring at transport hubs and high-risk sites.
- Surveillance for invasive mosquito species.
- Monitoring of emerging pathogens.

Local authorities and environmental health teams contribute indirectly through reporting, environmental monitoring, and partnership working with UKHSA and other agencies.

Environmental and Land Management Approaches

East Sussex's response is also embedded within wider environmental management and healthy place-making policies.

The county's Healthy Places Framework promotes:

- Biodiversity.
- Sustainable green and blue spaces.
- Climate adaptation.
- Environmental resilience.

These measures help build climate resilience but also create opportunities to incorporate vector-aware land management practices, particularly in relation to:

- Wetland management.
- Habitat creation.
- Public access to green spaces.
- Visitor information in higher-risk locations.

Future planning will need to balance biodiversity enhancement with management of emerging vector-related risks.

Public Health Preparedness

Current public health preparedness focuses primarily on:

- Early recognition of Lyme disease.
- Public awareness campaigns.
- GP and healthcare professional awareness.
- Access to diagnosis and treatment.

At present there is limited evidence of widespread local transmission of mosquito-borne diseases in East Sussex. However, climate adaptation planning increasingly acknowledges that warmer temperatures may create conditions more favourable to invasive mosquito species in future. This aligns with UKHSA HECC findings regarding the potential future risks of dengue, West Nile virus, chikungunya and other mosquito-borne diseases in England.

Local responses to vector-borne diseases (VBDs) in East Sussex focus on preventing bites and reducing vector populations. This includes measures like mosquito repellent use, eliminating standing water, and awareness campaigns about common VBDs in the area.

Strengths of the Current Response

East Sussex has several strengths:

- Recognition of vector-borne diseases within healthy places and climate adaptation frameworks.
- Established public awareness activity on Lyme disease.
- Access to national UKHSA surveillance systems.
- Strong climate adaptation governance through the Climate Change Risk and Vulnerability Assessment.
- Integration of climate resilience within environmental and planning policies.

Gaps and Opportunities

As a changing climate progresses, opportunities exist to strengthen the local response:

Surveillance and Intelligence

- Incorporate vector-borne disease risks explicitly into future Climate Risk and Vulnerability Assessments.
- Improve local monitoring of tick-borne disease trends.
- Strengthen links between environmental monitoring and public health surveillance.

Public Awareness

- Expand climate-health messaging on ticks, mosquitoes and vector-borne diseases.
- Increase awareness among outdoor workers, farmers, land managers and recreational users of green spaces.

Healthcare Preparedness

- Increase climate-health training for healthcare professionals.
- Strengthen awareness of emerging vector-borne diseases that have historically been uncommon in the UK.

- Incorporate vector considerations into climate adaptation planning.
- Consider vector risks in wetland restoration, biodiversity projects and green infrastructure design.
- Link vector-borne disease preparedness to flood resilience and climate adaptation programmes.

The East Sussex response to vector-borne diseases is currently focused on **awareness, prevention and adaptation**, particularly regarding Lyme disease and tick exposure. The county has begun to recognise vector-borne diseases as an emerging climate-health risk through its Climate Change Risk and Vulnerability Assessment and East Sussex Planning for Health, Wellbeing and Sustainability Framework. While current risks remain relatively low compared with many parts of Europe, a changing climate is expected to increase the suitability of the local environment for disease vectors over time. Building climate resilience will therefore require stronger integration of surveillance, public health, environmental management and climate adaptation planning to ensure East Sussex remains prepared for future vector-borne disease threats.

16. Wildfires and Public Health - considerations, Opportunities and Action Steps

High Level Strategic Opportunity:

Build wildfire resilience through integrated land-use planning, proactive vegetation management, community preparedness, strengthened emergency response, ongoing research and innovation, and continuous learning from past wildfire events.

Rationale:

Wildfires are a key focus for this HIA because a changing climate is increasing the likelihood of hotter, drier conditions that can raise wildfire risk and extend the wildfire season. While wildfires can directly threaten life, property and infrastructure, they also have significant public health impacts through smoke exposure, poorer air quality, disruption to essential services, displacement, and

adverse effects on mental health and wellbeing. These impacts are often felt most strongly by vulnerable populations, including older people, those with existing health conditions, people experiencing homelessness and low-income households. As wildfire risk is expected to increase over time, understanding and planning for these risks is essential to protecting public health, strengthening community resilience, and supporting effective emergency preparedness and response across the system.

Considerations, Opportunities and Action Steps

Opportunity 1. Integrate Regulation and Risk-Based Land Management, Use and Emergency Planning

Action Steps:

- **Ban high-risk fire sources** like disposable barbecues in vulnerable areas.
- **Designate safe fire zones** with proper infrastructure and risk assessments.
- **Integrate wildfire risk into planning policies**, restricting development in high-risk zones and mandating fire-resilient construction.

Opportunity 2. Create and Manage Prevention Through Landscape and Vegetation Management

Action Steps:

- **Create defensible spaces** around communities by clearing flammable vegetation.
- • Plan and develop landscapes to reduce fuel load, e.g. develop projects that re-wet landscapes.
- **Manage derelict land** and promote natural firebreaks to limit fire spread.

Opportunity 3. Develop and Promote Community Preparedness and Public Engagement

Action Steps:

- **Educate the public** on wildfire risks, home protection, and evacuation readiness.
- **Develop community action plans** and train local volunteers (e.g., Fire Watch teams).
- **Promote citizen science** to monitor fire risk indicators like vegetation dryness.

Opportunity 4. Invest, strengthen and establish Emergency Response and Recovery Systems

Action Steps:

- **Invest in early detection and firefighting infrastructure**, including rural water access and wildfire-specific equipment.
- **Strengthen inter-agency coordination** for evacuation, response, and public alerts.
- **Establish post-fire recovery protocols**, including mental health support and ecosystem rehabilitation.

Opportunity 5. Research Data, Insurance, and Innovation for Long-Term Resilience

Action Steps:

- **Map wildfire risk zones** and collaborate with insurers to promote fire-smart development.
- **Fund research and innovation**, including drone surveillance and predictive modelling.
- **Embed wildfire resilience** into climate adaptation, public health, and insurance strategies.

Opportunity 6. Investigate and use Learning from Past Wildfire Events

Action Steps:

- Review Local Authority Fire Incidents, **conduct in-depth reviews of recent and historic wildfire incidents within East Sussex** to identify key risk factors, vulnerabilities, and response gaps.
- Use these findings to **update emergency response protocols**, community evacuation plans, and inter-agency coordination procedures.
- Engage with the fire service, landowners, environmental agencies, and local communities to **ensure lessons learned** are integrated into land management and emergency planning.

Context and Impacts:

A changing climate is increasing the frequency, intensity and duration of weather conditions that favour wildfires. Hotter, drier summers, prolonged heatwaves and changing rainfall patterns are creating conditions in which wildfires are more likely to occur and spread rapidly. The risk is no longer confined to traditionally fire-prone regions; temperate countries such as the UK are also expected to experience more frequent and severe wildfire events.

Climate projections indicate that, if global temperatures rise by 2°C, the number of days with a high risk of wildfire in the UK could double, with the wildfire season extending beyond spring and early summer into late summer and autumn. This represents a significant shift in the UK's climate risk profile and has important implications for public health, emergency planning and land management.

A wildfire is defined as any uncontrolled vegetation fire requiring suppression action, involving an area of at least one hectare or exhibiting a sustained flame length greater than 1.5 metres.

Wildfires pose both direct and indirect risks to health. Immediate impacts include fatalities, burn injuries, evacuations, displacement, damage to homes, infrastructure and ecosystems, and disruption to transport and essential services. Indirect impacts arise through smoke exposure, reduced air quality, mental health consequences associated with evacuation and loss, and disruption to healthcare and other community services.

Although wildfire is not a new phenomenon, a changing climate and changing land use are increasing both the likelihood and severity of wildfire events globally. In the UK, weather conditions conducive to wildfire are projected to become more common, with potential consequences for biodiversity, carbon storage and progress towards national climate and nature recovery goals.

Almost all wildfires in the UK are started through human activity, either accidentally or deliberately. Public awareness of wildfire risk remains relatively low, and a changing climate may increase behavioural risks, including the use of disposable barbecues, outdoor fires, unsafe heating and cooking methods, and poorly installed domestic energy systems. Strengthening public awareness, risk communication and community engagement therefore represents an important opportunity to reduce preventable wildfire incidents.

Wildfire risk varies considerably across landscapes and habitat types, but its impacts are strongly influenced by social vulnerability as well as physical geography. The greatest health impacts are often experienced by those least able to prepare for, respond to or recover from wildfire events.

Vulnerable Populations

Wildfire and associated climate hazards disproportionately affect vulnerable populations, including older people, people living with frailty, those with long-term health conditions, and individuals who were previously identified as clinically vulnerable. Homeless people and those living in temporary accommodation may face greater exposure to wildfire and flood hazards and may be more likely to rely on unsafe heating or cooking practices, increasing the risk of fire and carbon monoxide exposure.

Low-income households often have fewer resources to insure their property, retrofit homes, relocate or recover following wildfire or flood events, increasing the risk of long-term health and socioeconomic impacts. Coastal and riverside communities also face increasing vulnerability through the combined effects of flooding, erosion and environmental change.

These patterns demonstrate that wildfire and flood risks are closely linked to social inequalities and existing health vulnerabilities rather than simply geographical exposure.

Escalating and Interconnected Risks

Evidence from the East Sussex Climate and Health Conversation highlights that flooding and wildfires should no longer be regarded as rare or exceptional events. Instead, they are increasingly viewed as recurring climate hazards that are expected to increase in both frequency and severity. Flooding is becoming less predictable, with multiple events occurring throughout the year, including during summer months, while prolonged periods of hot, dry weather are increasing wildfire risk and placing sustained pressure on emergency response services.

Wildfires and floods also create cascading and compounding impacts that extend well beyond the initial event. Flooding can interrupt water supplies, healthcare access and other critical services, while causing displacement, damp housing and long-term mental health impacts. Wildfires result not only in direct injuries and property damage but also in prolonged smoke exposure, degraded air quality and increased respiratory and cardiovascular illness. In some cases, climate mitigation and adaptation measures, such as poorly installed solar panels or unsafe cooling and heating practices, may inadvertently increase fire risks if not appropriately managed.

These hazards therefore act as risk multipliers, amplifying existing deprivation, chronic illness, frailty, housing insecurity and health inequalities.

Future Outlook and Strategic Implications

Across emergency services and partner organisations there is growing recognition that increasing wildfire and flood risk should be regarded as a planning certainty rather than a future possibility. The focus is shifting from responding to isolated emergencies towards preparing for sustained increases in demand and greater interdependence between emergency services, health and care systems, local authorities and community organisations.

This changing risk profile reinforces the need to strengthen prevention, public education and community resilience alongside emergency response. It also provides a strong rationale for adapting workforce training, resource planning, partnership working and health protection measures to ensure services remain resilient as wildfire risks continue to increase.

Current International and National Response(s):

Wildfires can present distinct challenges for Fire and Rescue Services, which are typically focused on responding to fires in buildings. Wildfire response is managed and resourced variably between services.

Stakeholders agree that wildfire risk should be incorporated into land management planning but disagree about the merits and drawbacks of different approaches, such as managing vegetation and rewilding.

The Home Office is committed to scoping a Wildfire Action Plan by mid-2024. Challenges include fire hazard assessment, Fire and Rescue Service response, and managing land to mitigate wildfire risks.

Local East Sussex Response to Build From

The East Sussex Fire and Rescue Service (ESFRS) is already responding to many of the health impacts associated with a changing climate through its prevention, protection, response and resilience functions. As climate-related risks such as wildfires, flooding, extreme heat and severe weather continue to increase, the role of Fire and Rescue Services is evolving beyond emergency response towards supporting community resilience, prevention and public health.

ESFRS is recognised as a key partner within the county's climate adaptation system because of its trusted relationships with communities, extensive reach into vulnerable households and considerable experience of responding to climate-related emergencies. Through existing prevention activities, including Safe and Well visits, the Service already delivers a range of public health interventions, addressing fire

safety, carbon monoxide awareness, cold homes, energy safety and the identification of socially isolated or otherwise vulnerable individuals.

The HIA identified significant opportunities to build upon these existing programmes by progressively integrating climate-related health risks into routine prevention activities. Safe and Well visits could increasingly include advice and assessment relating to overheating, heat-health protection, flood preparedness, coastal risks, power outages, wildfire awareness and wider climate resilience. Rather than creating entirely new programmes, climate adaptation can be embedded within existing service delivery, enabling a proportionate and sustainable approach despite increasing financial and workforce pressures.

Partnership working is central to this approach. Existing information-sharing arrangements between ESFRS, general practice and partner agencies already enable vulnerable individuals to be identified for targeted preventative home visits. Participants highlighted that safeguarding and protecting vulnerable people provides an effective basis for responsible data sharing, with opportunities to make greater use of GP-held vulnerability data, resilience planning information and other intelligence to identify households at greatest risk from climate-related hazards. Examples were also provided of effective use of shared data during water shortages to identify residents with critical healthcare needs, such as people requiring home dialysis.

This HIA also recognised that climate adaptation measures can have unintended consequences if health and safety considerations are not fully integrated into planning and implementation. For example, the increasing installation of rooftop solar photovoltaic systems has introduced new operational fire risks, reinforcing the need for climate mitigation and adaptation measures to be designed with consideration of their wider health, safety and resilience implications.

Community resilience was identified as one of East Sussex's greatest, yet currently under-utilised, assets. Local resilience groups, community volunteers and local emergency plans already exist across many communities, but opportunities remain to strengthen their integration with countywide emergency planning, public health and climate adaptation arrangements. Better coordination between grassroots community resilience and formal emergency planning could significantly enhance preparedness, response and recovery during future climate-related events.

The HIA also identified strong alignment between the ambitions of this HIA and the work of the Sussex Resilience Forum (SRF). Both recognise that climate risks increasingly transcend organisational and administrative boundaries, requiring coordinated planning and response across East Sussex, West Sussex and Brighton & Hove. Strengthening collaboration between the SW-ECHIIA programme and the SRF offers an opportunity to align strategic priorities, share intelligence, reduce

duplication and develop a more integrated approach to climate resilience across Sussex.

East Sussex is well placed to become a national leader in integrating climate, health and emergency preparedness. As one of the first areas in England to undertake a comprehensive Systemwide Environment, Climate and Health Integrated Impact Assessment, the county is developing approaches that have the potential to inform regional, national and international practice. The evolving role of the Fire and Rescue Service demonstrates how existing emergency services can become increasingly important partners in delivering climate adaptation, protecting vulnerable populations and strengthening whole-system resilience in the face of a changing climate.

Gaps

Although East Sussex has well-established emergency response arrangements, wildfire remains a relatively underdeveloped area within local climate adaptation planning compared with flooding and coastal change. Current planning is largely focused on emergency response, with fewer mechanisms for anticipating the wider health impacts of increasingly frequent wildfires, including smoke exposure, mental health impacts, displacement and disruption to health and care services.

Wildfire risk also remains insufficiently integrated into wider land use planning, environmental management, public health programmes and Health Impact Assessments. Opportunities exist to strengthen surveillance of wildfire-related health impacts, improve local evidence on vulnerable populations, and better understand how wildfire risk intersects with deprivation, housing quality, air quality and existing health inequalities.

While climate adaptation is increasingly recognised across organisations, there remains limited integration of climate-related health advice into routine prevention activities across the wider health and care system.

Barriers

Several barriers may limit East Sussex's ability to respond effectively to increasing wildfire risk. The East Sussex Fire and Rescue Service (ESFRS), like many Fire and Rescue Services nationally, has traditionally been configured to respond to structural fires rather than prolonged landscape fires, requiring different equipment, training, operational planning and resource deployment.

Financial pressures, workforce capacity and increasing demand from multiple climate-related emergencies may constrain the ability to expand prevention and resilience

activities. At the same time, public awareness of wildfire risk remains relatively low, despite almost all UK wildfires resulting from human activity.

Information sharing also presents challenges. Although existing partnership arrangements enable targeted support for vulnerable households, further work is needed to improve the routine use of shared vulnerability data across health, local government, emergency services and community organisations while maintaining appropriate governance and safeguarding arrangements.

Tensions

Several strategic tensions will need to be managed as wildfire risk increases. One of the most significant concerns is balancing environmental objectives with wildfire risk reduction. While there is broad agreement that wildfire risk should be considered within land management, there remains debate regarding the most appropriate approaches, including vegetation management, habitat restoration and rewilding. Achieving biodiversity recovery while reducing fuel loads will require careful, evidence-based decision making.

There is also an emerging tension between climate mitigation, climate adaptation and operational safety. Measures intended to support decarbonisation or climate resilience, such as rooftop solar photovoltaic systems or alternative heating technologies, can introduce additional operational risks if health and safety considerations are not fully integrated into their design, installation and maintenance.

A further challenge lies in balancing reactive emergency response with investment in prevention. As climate hazards become more frequent, emergency services face increasing pressure to respond to incidents while simultaneously expanding their role in prevention, public education and community resilience.

Opportunities

East Sussex is well positioned to strengthen its approach to wildfire resilience by building upon existing partnerships, prevention programmes and community networks. The ESFRS already has trusted relationships with residents through Safe and Well visits, offering a practical mechanism for embedding climate-related advice on overheating, wildfire awareness, smoke exposure, power outages, evacuation planning and household resilience within established prevention programmes.

The county also has an opportunity to strengthen partnership working through greater collaboration between ESFRS, the NHS, local authorities, public health teams, voluntary organisations and community resilience groups. Better use of shared

intelligence and vulnerability mapping could support earlier identification of households at greatest risk, enabling more targeted preventative interventions before emergencies occur.

There is significant potential to strengthen links between the East Sussex Systemwide Environment, Climate and Health Impact Assessment and the Sussex Resilience Forum, aligning strategic planning, intelligence sharing and emergency preparedness across Sussex. This would support a more coordinated, whole-system approach to climate resilience that recognises the interconnected nature of health, emergency planning, environmental management and community resilience.

Finally, East Sussex has an opportunity to become a national exemplar for integrating climate adaptation, public health and emergency preparedness. By embedding health considerations within wildfire planning, strengthening prevention, improving public awareness and supporting community resilience, the county can demonstrate how Fire and Rescue Services can evolve from primarily emergency responders to key partners in protecting health and building climate-resilient communities.

17. Wind and Extreme Winds and Public Health - Considerations, Opportunities and Action Steps

High Level Strategic Opportunity:

Increase resilience to extreme wind events by strengthening buildings and infrastructure, protecting vulnerable residents, integrating wind risks into emergency planning, investing in nature-based defences, ensuring power continuity, and delivering inclusive public health and safety communications.

Rationale:

Extreme winds are included within this HIA because they represent a significant climate-sensitive hazard with both direct and indirect consequences for public health. Although future changes in UK storm frequency remain uncertain, evidence suggests that a changing climate is likely to increase the severity of some winter storms, particularly when strong winds occur alongside heavy rainfall, flooding and coastal surges. These compound events can cause injuries and fatalities through falling debris, structural damage and transport accidents, while also disrupting electricity,

transport, healthcare and water infrastructure that communities rely upon. Wind-related power outages, service disruption and displacement can have substantial impacts on physical and mental health, particularly for vulnerable populations such as older people, people with disabilities and those dependent on medical equipment. As a changing climate increases the risk of more severe and interconnected storm impacts, understanding and planning for extreme wind events is essential to building community resilience, protecting critical infrastructure and maintaining health system continuity.

Considerations, Opportunities and Action Steps

Opportunity 1. Strengthen Building & Infrastructure Resilience

Action Steps:

- Update building codes for wind-resistant features (roofing, cladding, anchoring).
- Offer retrofitting grants for vulnerable older homes.
- Co-benefit: Reduces storm damage costs and improves safety.

Opportunity 2. Protect the Most Vulnerable Residents

Action Steps:

- Identify high-risk groups (e.g., those in mobile homes, reliant on electricity, rural elderly).
- Create response protocols: welfare checks, power banks, backup shelters.
- Equity focus: Prioritise isolated and marginalised communities.

Opportunity 3. Develop Local Emergency Plans for Wind Events

Action Steps:

- Integrate extreme wind risks into official emergency plans.
- Train multi-agency responders for incidents like outages and evacuations.
- Promote neighbourhood resilience (e.g., storm buddy systems).

Opportunity 4. Invest in Nature-Based Wind Protection

Action Steps:

- Plant windbreaks (trees, hedgerows); restore coastal/upland vegetation.
- Strategically plant urban trees to reduce wind tunnelling.
- Encourage wind risk assessments for new developments.

Co-benefits: Boosts biodiversity, reduces erosion, provides summer shade.

Opportunity 5. Plan for Power Loss & Service Continuity

Action Steps:

- Collaborate with utilities to bury power lines and upgrade grids.
- Ensure resilient backup power for critical facilities (e.g., hospitals, care homes).
- Equip community hubs with solar + battery storage.

Opportunity 6. Public Health & Communications

Action Steps:

- Deliver multilingual, inclusive storm safety messaging.
- Cover topics: securing property, travel advice, hazard reporting, pet and mental health support.

Special focus: Post-storm mental health support, especially for vulnerable groups.

Context and Impacts:

By comparison, heatwaves currently receive greater attention within climate-health planning, whilst severe storms and extreme winds remain major climate hazards capable of causing substantial health impacts through injury, displacement, infrastructure disruption, mental health effects and cascading failures across critical systems.

Increasingly, resilience planning is shifting towards understanding and managing compound risks, where windstorms interact with flooding, coastal change, power outages and healthcare disruption. Adaptation measures therefore need to focus not only on storm protection but also on strengthening community resilience, critical infrastructure, emergency preparedness and health system adaptability.

Storms are very complex systems that play an important role in the transport of heat and energy across the world. Therefore, they can be affected by small changes in regional and global patterns. Some influences on storm activity that are likely to be affected by a changing climate are:

1. Sea surface temperatures
2. Extent of sea ice, mainly in regions close to the poles
3. Position and strength of global jet streams, including the polar jet stream which influences UK weather
4. Climate patterns, such as the El Nino Southern Oscillation or Indian Ocean Dipole

Under a changing climate some of these influences will strengthen storms and others weaken them, as well as potentially change the parts of the world that storms affect.

Because storms and the influences behind them are so complex, it is very important to be able to model all these variables, and any expected changes in them due to human influence, as accurately as possible.

A changing climate will cause an increase in extreme winter storms combining strong winds and heavy rainfall over the UK and Ireland. The co-occurrence of wind and rainfall extremes can yield larger impacts than when either hazard occurs in isolation. This interaction, termed a compound event (Zscheischler et al., 2018), can occur across varying time and spatial scales (Tilloy et al., 2022; Bloomfield et al., 2023) such as temporal clustering of windstorms in a single season bringing widespread impacts combined with regional flooding (Kendon and McCarthy, 2015), leading to large aggregate losses as seen for the rail sector in the UK (Hillier et al., 2015, 2020).

In a single storm, coastal flooding can be enhanced through the combination of heavy rainfall over a river basin and a wind-driven storm surge (Bevacqua et al., 2017; Ward et al., 2018; Couasnon et al., 2020), emergency service resources may be stretched by the simultaneous occurrence of extremes in separate locations, while horizontally-blown rainfall in the presence of strong winds elevates the risk of moisture related deterioration in buildings nicely illustrate the spatiotemporal compounding nature of wind and rainfall hazards over the UK in terms of their footprints, the area affected by individual extremes, and the degree to which their footprints may overlap[50].

Researcher led by experts at Newcastle University and the Met Office analysed data from climate simulations covering historical (1981-2000) and future (2060-2081) periods, to assess potential changes in these extreme storms. Their findings show that, as the climate warms, these events are likely to become more severe, with stronger winds and heavier rainfall happening together. These changes are mainly driven by increased rainfall, a thermodynamic response to rising temperatures. Additional contributing factors include a strengthened jet stream and its southward

displacement that brings storms through warmer areas leading to further increases in rainfall. Publishing their findings in the journal *Weather and Climate Extremes,* the scientists show that the increase in intensity could lead to more frequent windstorms coinciding with extreme rainfall and floods, posing challenges to coastal areas susceptible to compound flooding as well as emergency response resources due to larger aggregation of separate impacts to infrastructure such as electricity networks and rail transport networks. This research sets the stage for further investigation into the mechanisms driving compound wind-rain extremes

Extreme winds are a significant climate-sensitive hazard with important implications for population health, critical infrastructure, healthcare systems, housing, transport networks and community resilience. While the relationship between a changing climate and windstorms is more complex and less certain than for heatwaves or heavy rainfall, there is increasing evidence that a changing climate is influencing the severity and impacts of storms, particularly when strong winds occur alongside other hazards such as heavy rainfall, flooding and coastal inundation.

Historically, windstorms have been one of the costliest natural hazards affecting the UK and Europe. A changing climate is expected to alter atmospheric circulation patterns, sea surface temperatures and storm tracks, potentially increasing the intensity of some extreme wind events and amplifying their associated impacts. Recent research suggests that the greatest future risk may arise not from wind alone but from **compound events**, where extreme winds coincide with heavy rainfall, flooding, coastal storm surges and infrastructure failures.

Global Observations

Some of the most powerful storms on the planet develop in tropical regions, known as tropical cyclones. The IPCC Sixth Assessment Report concluded that confidence remains low for detecting any long-term changes in tropical cyclone activity.

It is likely (over 66% probability) that the frequency and intensity of the strongest tropical cyclones have increased over the last few decades. It is very likely (over 90% probability) that tropical cyclones are strengthening further north in the western North Pacific Ocean region. Over the United States, tropical cyclones (known locally as Hurricanes) progress slower over the country compared the early 20th century.

The mechanics of tropical cyclones and how they interact with our changing climate is extremely complex. While there is no clear evidence that a changing climate is increasing or decreasing the overall frequency of these storms, there is strong evidence that increasing sea temperatures intensify tropical storms when they develop.

Major storms outside of tropical regions are called extra-tropical cyclones. There is high confidence that damage to the ozone layer has resulted in a poleward shift of storms in the southern hemisphere. However, there is currently low confidence in attributing any changes to the number or position of storms in the Northern Hemisphere, including those affecting the UK.

Global Projections

It is likely that the global frequency of tropical cyclones will either decrease or remain unchanged. At the same time, globally there are very likely to be increases in the maximum wind speeds, proportion of Category 4 and 5 storms, and rates of precipitation for tropical cyclones.

UK Projections

In future, most climate projections indicate that winter windstorms will increase slightly in number and intensity over the UK i.e. more winter storms, including disproportionately more severe storms, are projected to cross the UK. However, this has medium confidence because a few climate models indicate differently.

Warming water in the North Atlantic could potentially increase the risk of more ex-tropical storms being directed across the UK during the autumn season. However, similar to winter, there are other factors that influence autumn storms and the number across the UK varies significantly from year to year due to natural influences.

Coastal flooding from storms is expected to increase under a changing climate due to rising sea levels, worsening the impacts of storm surges. Without adaptation, there is a risk weaker storms could lead to coastal flooding where they wouldn't have in the past.

The UK State of the Climate report states that there are no compelling trends in storminess when considering maximum gust speeds over the last four decades. More comprehensive studies across the North Atlantic region have reached similar conclusions.

Trends in windstorm numbers are difficult to detect, due to how these naturally vary year-to-year and decade-to-decade. As with rainfall, detecting trends in windstorms is difficult where observations are also sparse and short. Even if data was available, the year-to-year variability in windstorms is large and the impacts of storms vary greatly on location, thus point-based trend detection would remain very difficult.

Due to the lack of any observed trends, there haven't been any studies so far which provide a link between changes in UK storminess and a changing climate. For

example, the all-time record number of storms over the British Isles in winter 2013/14 couldn't be linked to human-induced warming.

Windstorms are influenced by a range of climatic factors including:

- Atmospheric temperature gradients.
- Sea surface temperatures.
- Polar and Arctic warming.
- Jet stream position and strength.
- Large-scale climate oscillations.

The Met Office notes that storms are highly complex systems and a changing climate may strengthen some processes while weakening others, creating uncertainty around future storm frequency. However, there is growing evidence that the most intense storms and their impacts may become more severe as the climate warms.

Recent UK climate research undertaken by Newcastle University and the Met Office found that future winter storms affecting the UK and Ireland are likely to produce stronger combinations of high winds and heavy rainfall. These compound events are projected to become more intense as temperatures rise, primarily because warmer air holds more moisture, increasing rainfall intensity during storms.

The IPCC Sixth Assessment Report concludes that climate change is increasing the likelihood and intensity of many extreme weather events globally and highlights increasing confidence that compound and cascading climate hazards will become more significant risks to societies and health systems.

Direct Health Impacts

Injury and Mortality

Extreme wind events can result in:

- Falling trees and debris.
- Structural collapse of buildings.
- Transport accidents.
- Coastal storm impacts.
- Electrocution from damaged power infrastructure.

High winds can cause injuries ranging from minor trauma to severe injury and death, particularly during major storms.

The greatest risks often occur during and immediately after storm events when people are exposed to damaged infrastructure, hazardous debris and unsafe travel conditions.

Respiratory and Physical Health Impacts

Windstorms can contribute to:

- Increased exposure to airborne particulates.
- Dust and soil mobilisation.
- Pollen transport.
- Smoke dispersion from wildfires.

Strong winds may worsen respiratory conditions such as:

- Asthma.
- Chronic obstructive pulmonary disease (COPD).
- Allergic respiratory disease.

Where windstorms occur alongside wildfires, substantial air quality deterioration can occur over large geographic areas.

Mental Health and Wellbeing

The psychological impacts of severe storms are increasingly recognised.

Impacts include:

- Anxiety and distress.
- Post-traumatic stress disorder (PTSD).
- Sleep disturbance.
- Fear of future events.
- Community stress following repeated storms.

Mental health impacts may persist long after physical recovery and are often compounded where storms cause property damage, displacement or prolonged power outages.

Communities experiencing repeated storm events can suffer cumulative psychological impacts and reduced resilience.

Indirect Health Impacts

Power Outages and Infrastructure Failure

One of the most significant health risks associated with extreme winds is disruption to critical infrastructure.

Storms can damage:

- Electricity networks.
- Telecommunications.
- Water infrastructure.
- Transport systems.
- Healthcare facilities.

Health consequences may include:

- Loss of heating or cooling.
- Reduced access to healthcare.
- Interruption of medical equipment.
- Communication failures.
- Delayed emergency response.

Newcastle University research highlights concerns that future compound wind-rain events could place increasing pressure on electricity networks, rail systems and emergency services simultaneously.

Healthcare System Impacts

Windstorms can affect healthcare delivery through:

- Staff travel disruption.
- Damage to facilities.
- Increased emergency admissions.
- Reduced service accessibility.

Healthcare systems increasingly need to consider storm resilience as part of climate adaptation planning.

Compound Hazards: The Emerging Risk

The most significant future climate-health threat associated with extreme winds may be their interaction with other climate hazards.

Research indicates increasing risks from:

Wind + Heavy Rainfall - Leading to:

- Flooding.
- Infrastructure damage.
- Transport disruption.

Wind + Coastal Storm Surge - Leading to:

- Coastal flooding.
- Coastal erosion.
- Community displacement.

Wind + Heat - Leading to:

- Wildfire spread.
- Increased air pollution.

Wind + Power Failure - Leading to:

- Healthcare disruption.
- Increased vulnerability among at-risk populations.

Climate scientists increasingly emphasise the importance of understanding these compound events because their combined impacts can exceed the effects of any individual hazard.

Vulnerable Populations

Certain groups are disproportionately affected by severe wind events:

- Older people.
- Children.
- People with disabilities.
- Individuals requiring home-based medical care.
- People experiencing homelessness.

- Coastal communities.
- Rural populations.

Those dependent on electricity-powered medical devices are particularly vulnerable during prolonged

Current International and National Response(s):

Unlike heatwaves and flooding, there are currently relatively few policies specifically targeted at the health impacts of extreme winds. Instead, responses are typically embedded within broader frameworks for **climate adaptation, disaster risk reduction, infrastructure resilience, emergency preparedness, public health protection and climate-resilient development**.

The international and national response increasingly recognises that the greatest future risk from windstorms may arise from **compound and cascading events**, where high winds occur alongside heavy rainfall, coastal flooding, power outages, transport disruption and healthcare system pressures. As a result, policy is increasingly moving towards **whole-system resilience approaches** rather than focusing on wind hazards alone.

Both international and UK policy are increasingly moving from:

Storm Response → Storm Resilience

and from:

Single Hazard Planning → Multi-Hazard and Systems Planning

There is growing recognition that future health impacts will often result from:

- Wind + flooding.
- Wind + coastal flooding.
- Wind + power outages.
- Wind + healthcare disruption.
- Wind + transport failures.

rather than wind alone.

Key Strategic Themes include:

- **Prevent -** Reduce climate impacts and future hazard escalation.
- **Prepare -** Improve forecasting, early warning and emergency planning.
- **Protect -** Safeguard vulnerable populations and critical services.
- **Adapt -** Strengthen infrastructure, healthcare and community resilience.

- **Transform -** Develop climate-resilient systems capable of managing increasingly complex

International Response

Intergovernmental Panel on Climate Change (IPCC)

The IPCC identifies storms, extreme winds and compound weather events as important climate risks.

Key recommendations include:

Climate Adaptation

- Strengthening critical infrastructure resilience.
- Climate-proofing transport, energy and communications networks.
- Improving urban resilience.
- Increasing ecosystem-based adaptation.

Health Protection

- Strengthening climate-resilient health systems.
- Developing early warning systems.
- Improving emergency preparedness.
- Protecting vulnerable populations.

Compound Risk Management

A major focus of the IPCC's Sixth Assessment Report is managing compound and cascading climate risks where windstorms interact with:

- Flooding.
- Coastal flooding.
- Heatwaves.
- Wildfires.
- Infrastructure failures.

The IPCC stresses that future adaptation planning must move beyond single-hazard approaches.

World Health Organization (WHO)

The WHO recognises storms and extreme weather as important climate-sensitive health hazards.

Current priorities include:

Climate-Resilient Health Systems

- Resilient healthcare infrastructure.
- Emergency planning.
- Continuity of healthcare delivery.
- Protection of essential services.

Early Warning Systems

The WHO supports development of:

- Multi-hazard early warning systems.
- Health alert systems.
- Community preparedness programmes.

Vulnerable Population Protection

Special focus is placed on:

- Older people.
- Children.
- People with disabilities.
- Socially isolated populations.

United Nations Office for Disaster Risk Reduction (UNDRR)

The UNDRR's **Sendai Framework for Disaster Risk Reduction 2015–2030** is one of the primary international frameworks addressing storm and wind hazards.

The framework promotes:

Understanding Risk

- Hazard mapping.
- Vulnerability assessments.

- Climate risk modelling.

Strengthening Governance

- Whole-of-government approaches.
- Multi-sector coordination.

Investing in Resilience

- Infrastructure resilience.
- Community preparedness.
- Nature-based solutions.

Enhancing Preparedness

- Early warning systems.
- Emergency planning.
- Recovery planning.

World Meteorological Organization (WMO)

The WMO leads global efforts to improve:

Forecasting

- Storm prediction.
- Severe weather monitoring.
- Climate modelling.

Early Warnings for All Initiative

The UN-backed initiative aims to ensure that every person on Earth is protected by multi-hazard early warning systems by 2027.

This includes warnings for:

- Windstorms.
- Tropical cyclones.
- Storm surges.
- Severe weather events.

Nature-Based Solutions

Internationally there is increasing investment in:

Coastal Protection

- Saltmarsh restoration.
- Mangrove restoration.
- Dune systems.

Catchment Resilience

- Woodland creation.
- Natural flood management.
- Ecosystem restoration.

These measures help reduce:

- Wind damage.
- Coastal erosion.
- Storm surge impacts.

while simultaneously delivering health and biodiversity benefits.
National Response (UK)
National Adaptation Programme (NAP3)

The Third National Adaptation Programme recognises storms and severe weather as important climate risks.

Key actions include:

Infrastructure Resilience

Protecting:

- Energy networks.
- Transport systems.
- Communications infrastructure.
- Water systems.

Community Resilience

- Local adaptation planning.
- Emergency preparedness.
- Climate risk assessment.

Health Protection

Ensuring health systems can continue functioning during severe weather events.

UK Climate Change Risk Assessment (CCRA)

The CCRA identifies several storm-related risks:

Risks to Infrastructure

- Power outages.
- Transport disruption.
- Communications failures.

Risks to Health

- Injury and mortality.
- Healthcare disruption.
- Mental health impacts.

Risks from Compound Events

The latest CCRA increasingly highlights:

- Storm-flood interactions.
- Coastal storm surges.
- Cascading system failures.

Met Office and Early Warning Systems

The Met Office operates one of the world's most advanced severe weather forecasting systems.

National Severe Weather Warning Service

Provides warnings for:

- Wind.
- Rain.
- Snow.
- Ice.
- Thunderstorms.

The system supports:

- Emergency responders.
- Local authorities.
- NHS organisations.
- Infrastructure providers.

Climate Services

The Met Office also provides:

- Climate projections.
- Storm modelling.
- Adaptation evidence.

UK Health Security Agency (UKHSA)

The UKHSA increasingly addresses severe weather through:

Adverse Weather and Health Plan

This plan provides guidance for:

- NHS organisations.
- Social care providers.
- Local authorities.
- Emergency planners.

Key priorities include:

- Protecting vulnerable populations.
- Maintaining healthcare access.
- Emergency preparedness.

Health Surveillance

Monitoring health impacts associated with:

- Severe weather.
- Power outages.
- Infrastructure disruption.

NHS Response

The NHS Green Plan and adaptation programmes focus on:

Climate Resilience

- Flood and storm preparedness.
- Infrastructure resilience.

Emergency planning. **Service Continuity** Ensuring healthcare delivery can continue during:

- Power failures.
- Transport disruption.
- Severe weather events.

Hospitals and healthcare facilities are increasingly required to assess climate risks and adaptation needs.

Infrastructure Resilience

The UK Government has increased investment in resilience across:

Energy Systems

- Grid resilience.
- Backup power systems.

Transport Networks

- Storm-resistant infrastructure.
- Network adaptation.

Telecommunications

- Emergency communications systems.
- Resilient digital infrastructure.

Growing recognition exists that health impacts often arise through disruption of these systems rather than direct exposure to wind itself.

Coastal Adaptation

Because many severe wind events affect coastal areas, national programmes increasingly integrate:

- Shoreline Management Plans.
- Coastal adaptation planning.
- Flood and Coastal Erosion Risk Management Strategy.

These programmes seek to reduce:

- Storm surge risks.
- Coastal erosion.
- Community vulnerability.

Local East Sussex Response to Build From:

East Sussex is exposed to several wind-related climate risks due to its coastal location.

Key vulnerabilities include:

Coastal Exposure

The Sussex coastline is vulnerable to:

- Strong Atlantic storm systems.
- Coastal storm surges.
- Wind-driven flooding.
- Coastal erosion.

Infrastructure Disruption

Potential impacts include:

- Power outages.
- Transport disruption.
- Damage to public infrastructure.
- Emergency service pressures.

Compound Events

East Sussex is particularly vulnerable to:

- Wind-driven coastal flooding.
- Wind and heavy rainfall events.
- Storm-related infrastructure failures.

Future climate projections suggest these compound hazards may become increasingly important for local resilience planning.

Health Inequalities

As with many climate impacts, extreme winds do not affect all populations equally.

Higher-risk groups include:

- Low-income households.
- Poor-quality housing occupants.
- Socially isolated individuals.
- Coastal communities.
- People with pre-existing health conditions.

A changing climate therefore risks widening existing health inequalities if adaptation measures are not targeted appropriately.

Extreme winds are a significant climate-related health hazard whose impacts extend beyond immediate injury and damage. A changing climate is expected to increase the severity of compound storm events involving high winds, heavy rainfall and flooding, creating growing risks for health, infrastructure and community resilience. Effective adaptation requires a whole-system approach that strengthens infrastructure, protects vulnerable populations and improves preparedness for increasingly complex and interconnected climate hazards.

For **extreme winds, storms, a changing climate and health**, the gaps, tensions, barriers and opportunities can be framed through a climate-health adaptation lens. A key finding from both the academic literature and policy landscape is that wind-related risks are often overshadowed by flooding and heatwaves, despite their

potential to trigger significant health, infrastructure and societal impacts, particularly when occurring as part of compound events.

Gaps, Tensions, Barriers and Opportunities

Theme	Key Issues	Implications
Evidence Gaps	Limited understanding of future changes in UK storm frequency and intensity; greater focus on flooding and heat than wind-related health impacts; limited health-specific research on windstorms; limited local vulnerability assessments.	Makes long-term planning and prioritisation difficult; health impacts may be underestimated.
Health Evidence Gaps	Insufficient evidence on mental health impacts, healthcare disruption, vulnerable populations and long-term community impacts following severe storms.	Limits development of targeted public health interventions and adaptation measures.
Compound Event Knowledge Gaps	Limited understanding of combined wind, rainfall, flooding, power outage and infrastructure failure scenarios.	Risks are likely underestimated because multiple hazards can amplify each other.
Governance Tensions	Responsibility is spread across multiple organisations including local authorities, Environment Agency, NHS, utility providers, emergency planning and infrastructure operators.	Fragmented ownership can hinder coordinated adaptation and preparedness.
Adaptation vs Response Tension	Policy and investment often focus on emergency response and recovery rather than prevention and long-term adaptation.	Opportunities to reduce future risks and costs may be missed.
Climate Uncertainty	Uncertainty around future storm patterns creates challenges for infrastructure planning and investment decisions.	Can delay adaptation action and reduce political prioritisation.

Theme	Key Issues	Implications
Infrastructure Barriers	Ageing energy, transport, communication and healthcare infrastructure may not be designed for future storm conditions.	Increases vulnerability to service disruption and cascading failures.
Funding Barriers	Adaptation funding often prioritises flooding, while wind resilience receives less attention.	Storm resilience measures may remain underdeveloped.
Health System Barriers	Limited integration of climate adaptation into health service planning; insufficient focus on power outages, transport disruption and service continuity.	Increased risk of healthcare disruption during extreme weather events.
Community Resilience Barriers	Limited public awareness of storm-related health risks and preparedness measures.	Vulnerable groups may be less able to respond effectively.

Given East Sussex's coastal location and exposure to Atlantic weather systems, opportunities include:

1. Coastal and Storm Resilience

- Integrate wind risks into coastal adaptation plans.
- Assess interactions between storm surge, coastal flooding and infrastructure.

2. Healthy Places and Planning

- Include wind resilience within Planning for Health tools.
- Promote resilient building design and green infrastructure.

3. Climate and Health Assessments

- Assess impacts on health services, care homes and vulnerable populations.
- Include power outage and infrastructure failure scenarios.

5. Healthy Places Partnership

A future East Sussex Healthy Places Partnership could provide governance across:

- Public Health.
- Emergency Planning.
- Environment Agency.
- NHS.
- Utilities.
- Local authorities.

to address compound climate risks more effectively.

6. Shift Towards Compound Risk Planning

Recent research suggests the greatest future risk comes not from wind alone but from combined:

- Wind + heavy rainfall.
- Wind + flooding.
- Wind + coastal storm surge.
- Wind + power outages.
- Wind + wildfire risk.

Opportunity: Move from single-hazard planning to multi-hazard climate resilience planning.

7. Strengthen Climate-Resilient Infrastructure

   Future infrastructure investment can incorporate:

- Storm-resilient energy systems.
- Underground power networks where feasible.
- Resilient communications infrastructure.
- Climate-proofed healthcare facilities.
- Nature-based solutions to reduce cascading impacts.

Opportunity: Reduce future economic losses and health impacts.

8. Integrate Health into Storm Adaptation Planning

   Historically, storm planning has focused on:

- Infrastructure.
- Transport.
- Emergency management.

Less attention has been paid to:

- Mental health.
- Healthcare continuity.
- Vulnerable populations.
- Community wellbeing.

Opportunity: Apply a Health in All Policies (HiAP) approach to storm resilience.

9. Strengthen Early Warning Systems

   The UN, WMO and WHO increasingly advocate:

- Multi-hazard early warning systems.
- Vulnerability mapping.
- Community alert systems.

Opportunity: Develop integrated warning systems linking:

- Weather forecasts.
- Health alerts.
- Care services.
- Community resilience networks.

10. Protect Vulnerable Populations

    Target support for:

- Older people.
- People dependent on medical equipment.
- Care homes.
- Social housing residents.
- Rural communities.
- Coastal populations.

Opportunity: Embed vulnerability assessments within adaptation planning.

11. Build Community Resilience

    Evidence from disaster resilience research consistently shows that communities with:

- Strong social networks.
- Effective local leadership.
- Community preparedness plans.

recover more effectively from extreme weather events.

Opportunity: Invest in social infrastructure and community resilience programmes alongside physical infrastructure.

12. Strengthen Local Climate and Health Assessments

Most climate adaptation plans currently focus on:

- Flood risk.
- Heatwaves.
- Infrastructure.

Opportunity: Include assessment of:

- Extreme wind risks.
- Compound weather events.
- Health service disruption.
- Mental health impacts.
- Infrastructure interdependencies.

18. Cumulative Interactions between a Climate change Impacts

An analysis of the 14 Climate Change Impacts discussed above is set out in Appendix I. This identifies 37 key interactions that provide further opportunities for joined-up planning, adaptation measures and cross-sector action. Many of the climate impacts do not occur in isolation; rather, they can interact to create compound, cascading and cumulative risks that amplify adverse health, social, environmental and infrastructure impacts.

Consideration should be given to **extreme events**, including both gradual “slow-burn” pressures and acute shocks to the system, which can act across multiple climate impact pathways simultaneously. Examples include combinations of heatwaves and drought, drought and wildfire, or severe windstorms occurring alongside heavy rainfall, flooding and coastal storm surges. The health and societal consequences of

these compound events are often greater than the sum of their individual impacts. For example, prolonged hot and dry conditions can increase wildfire risk, worsen air quality, place pressure on water resources and exacerbate health inequalities, whilst severe winter storms can trigger power outages, transport disruption, flooding, healthcare access issues and mental health impacts at the same time.

The interaction between climate hazards can also create cascading failures across critical infrastructure systems. Damage to electricity, telecommunications, transport or water networks can reduce community resilience and hinder emergency response, particularly during periods of heightened demand on health and care services. Such interactions may disproportionately affect vulnerable populations, including older people, young children, people with disabilities, those with underlying health conditions and communities already experiencing deprivation.

Understanding these interdependencies is therefore essential to ensuring that adaptation actions deliver multiple benefits, avoid unintended consequences and strengthen resilience across sectors. A systems-based approach can help identify opportunities where interventions addressing one climate impact may also reduce risks associated with others, supporting more effective and integrated public health adaptation planning.

19. 3A Section Conclusion

PART 3A translates the evidence, engagement findings and systems thinking presented in Parts 1 and 2 of this Health Impact Assessment into a practical framework for action. Rather than simply describing the health effects of a changing climate, this section identifies the strategic considerations, opportunities and action steps that can be taken across the East Sussex system to reduce climate-related health risks, strengthen resilience and maximise opportunities for improving population and planetary health.

By examining each of the principal environmental hazards individually—including aeroallergens, air quality, chemicals, drought, flooding, food systems, infectious diseases, migration, extreme temperatures, vector-borne disease, wildfires, wind and infrastructure resilience—this section demonstrates that a changing climate affects health through multiple, interconnected pathways. Although each hazard presents distinct risks, common themes emerge throughout: the importance of prevention, early intervention, adaptation, partnership working, reducing health inequalities and embedding health within environmental and climate decision-making.

The section also demonstrates that many of the proposed actions deliver multiple co-benefits. Measures designed to improve air quality, restore natural environments,

increase climate resilience, improve water management, strengthen food systems or enhance biodiversity frequently produce simultaneous benefits for physical health, mental wellbeing, community resilience, environmental sustainability and economic prosperity. This reinforces the value of adopting a whole-system approach that recognises the interconnected nature of climate, environment and health rather than addressing individual hazards in isolation.

Importantly, PART 3A moves beyond identifying problems to defining opportunities. The recommendations have been intentionally developed to be ambitious, evidence-informed and adaptable, providing organisations with a shared strategic direction while allowing implementation to reflect local responsibilities, resources and governance arrangements. Collectively, they establish a common framework through which partners can coordinate action, reduce duplication and deliver greater impact across the East Sussex system.

The overarching conclusion from Part 3A is that addressing the health effects of a changing climate requires a shift from reactive responses towards prevention, preparedness and long-term resilience. Climate adaptation should not be viewed solely as protecting communities from environmental hazards, but as an opportunity to create healthier places, reduce inequalities, strengthen ecosystems and deliver sustainable development. By embedding climate and health considerations into policy, planning, investment and service delivery, East Sussex can move beyond managing climate risks towards creating environments that actively improve health and wellbeing for current and future generations.

The following sections build on this environmental hazard framework by considering how the wider determinants of health (PART 3B), system-wide sectors and services (PART 3C), vulnerable population groups (PART 3D) and vulnerable settings (PART 3E) can collectively contribute to delivering a coordinated, whole-system response to the health effects of a changing climate. Together, these sections demonstrate that effective climate action extends beyond environmental management alone and requires action across every part of the East Sussex system.

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