

Policy Report

Building a Climate-Resilient Health System in the UK



UK Health Alliance
on Climate Change

June 2025

Contents

Acknowledgements	1
Foreword	2
Executive Summary	3
Recommendations	4
Policy Report	
The Impact of Climate Change on the Health Service	8
Assessment of the UK Health Service against the WHO Building Blocks for a Climate-Resilient Health System	17
Implementation Pathway	39
Appendix I	40
References	41

The UK Health Alliance on Climate Change represents health professionals across the UK who are concerned about the growing risks to health posed by the climate and nature crisis. A resilient health system is essential to protect lives and wellbeing in the face of rising temperatures, extreme weather, and worsening air quality. These challenges are already placing pressure on services and deepening existing health inequalities.

As health professionals, we have a responsibility to safeguard the communities we care for. This means not only preparing health services to withstand climate shocks but also addressing the root causes of climate change and environmental degradation. By building a climate resilient health system, we can protect health now and for future generations, ensuring that everyone, everywhere, can access care in a fairer, greener, and healthier society.

Acknowledgements

This policy report was produced by the UK Health Alliance on Climate Change in collaboration with the British Geriatrics Society, British Thoracic Society, Royal College of General Practitioners, Royal College of Nursing, Royal College of Physicians, Royal College of Paediatrics and Child Health, Royal College of Emergency Medicine, UK Kidney Association, and Royal College of Anaesthetists. With special thanks to Georgia Roden (Royal College of Physicians) for her valuable contributions.

Lead author: Anandita Pattnaik

Creative Design: Tanvi Ranjan

Find out more: For any questions or queries about this policy report, or to discuss it further, please get in touch: info@ukhealthalliance.org

Stay posted about our work: To register for updates from the UKHACC, go to:

<https://action.ukhealthalliance.org/page/69209/subscribe/1>



Foreword

By Professor Mike Davies

University College London



This report, *Building a Climate-Resilient Health System in the UK*, is a timely and important contribution to the national discourse on climate change and health. The UK Climate Change Committee recently reported that “...delivery of adaptation to address and prevent human health impacts from climate change remains insufficient”.

The NHS has placed considerable emphasis on efforts to reduce greenhouse gas emissions (i.e. ‘mitigation’ measures) but has given less attention to adaptation action. As this report notes, these issues must be addressed together to safeguard public health and create a sustainable, climate-resilient future.

Climate change impacts on all sectors, including healthcare delivery. It is critical for the health sector itself to adapt, but protecting health from the impacts of climate change also requires wider sectoral changes (housing, transport, green spaces, etc.) and an integrated, joined-up approach is needed.

The report powerfully sets out the challenges to health posed by climate change in the UK. Such vulnerabilities are both direct (heat, flooding, wildfires and droughts), but also indirect (food and water insecurity, infectious diseases, mental health and healthcare services delivery). Climate change is happening now – the report, for example, points to research showing that nearly half of the healthcare workers surveyed have experienced extreme weather disrupting NHS services over the past few years.

The report also notes other related challenges such as increased demand for services during climate related events, combined with workforce shortages, which act to further stress healthcare capacity. Some of the delivery of that healthcare is also taking place in ageing infrastructure which is not well adapted to handle extreme weather events and is thus unable to ensure uninterrupted service provision.

Urgent action is required to protect the UK’s health system in response to these threats and challenges. The report presents a comprehensive roadmap for strengthening the resilience of healthcare services and underscores the urgency of integrating climate adaptation into health policy and practice.

The report makes a series of important recommendations. Not least of these is the need for investment and protected funding for adaptation measures. Without the interventions funded by such investment, it will become even more challenging to protect public health and ensure the long-term resilience of the NHS. Another key recommendation relates to the need to educate patients and health workers and improve public awareness. The reports points to the need to expand community-based programmes to provide information on both climate-related health risks and preventive measures.

The report concludes by emphasising that climate resilience must be a core pillar of the future of the NHS. The health impacts of climate change are already placing pressure on services and enabling the NHS to adapt to these growing risks is essential I commend the UK Health Alliance on Climate Change for producing a report that is as actionable as it is urgent. It calls for policymakers, healthcare leaders, and communities to work together in safeguarding our health against the realities of a changing climate.

Executive Summary

The increasing frequency and intensity of climate-related events pose significant challenges to the UK healthcare system. Extreme weather events, rising temperatures, and shifting disease patterns threaten the health of the population and strain existing and future healthcare resources. This report outlines strategic recommendations to enhance the resilience of the UK healthcare system to climate change, focusing on adapting infrastructure, workforce preparedness, and community engagement.

Climate change is no longer a distant threat but a present-day reality that demands immediate action. The UK is not immune to these challenges. Its impacts are felt across sectors, including healthcare delivery. Adaptation and mitigation are both crucial to tackling climate change. For the NHS, adaptation protects healthcare services during events like heatwaves and floods, while mitigation cuts emissions to meet net-zero goals.

Despite a strong focus on mitigation, adaptation efforts in the health sector have fallen behind—new research commissioned by MedAct showed that almost half (49%) of surveyed healthcare workers said they have experienced NHS services being disrupted by extreme weather over the past five years.[1] Without intervention and investment, it will become increasingly more difficult to protect public health and ensure the NHS remains resilient in the long term.

Key Challenges



Extreme weather events

Heatwaves, flooding and storms disrupt healthcare services, damage infrastructure, and increase demand for emergency care.



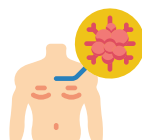
Vulnerable populations

The older people, children and those with pre-existing conditions are disproportionately affected, requiring targeted interventions.



Workforce & capacity strains

Increased demand for services during climate-related events exacerbates workforce shortages and stresses healthcare capacity.



Changing disease patterns

Warmer temperatures and shifting ecosystems contribute to the spread of vector-borne diseases and exacerbate chronic conditions like cardiovascular and respiratory illnesses in addition to reducing opportunities for wellbeing activities such as exercise.

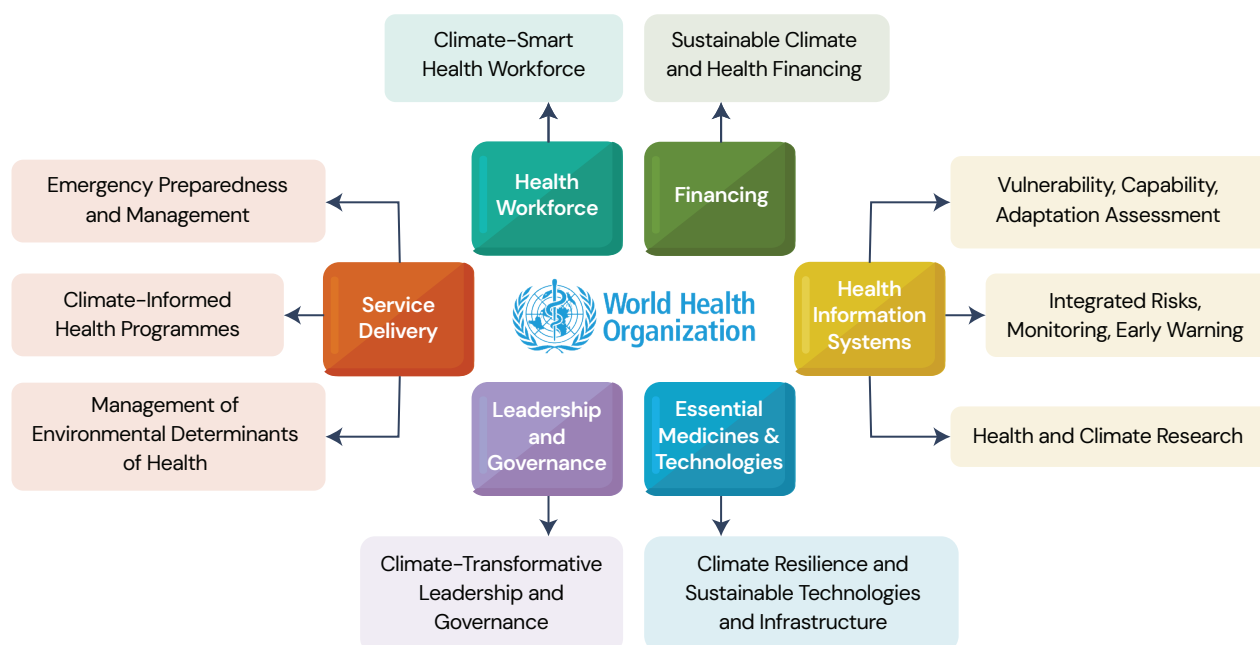


Infrastructure vulnerability

Ageing facilities are often ill-equipped to handle extreme weather events and unable to ensure uninterrupted service provision.

WHO Building Blocks for a Climate-Resilient Health system

The WHO outlines six building blocks of health systems that are crucial for building climate-resilient and low-carbon health systems.



Recommendations

1 Provide Sustainable Funding

- Allocate ring-fenced multi-year funding for climate adaptation initiatives within the NHS budget.
- Explore and enable public-private partnerships to finance large-scale infrastructure upgrades.

Financing

Responsible: UK and devolved nation Departments of Health and Social Care, HM Treasury



2 Strengthen Research on Climate Adaptation

- Invest in research to quantify climate health vulnerabilities and guide evidence-based policy-making.
- Invest in research to identify cost-effective adaptation strategies.

Health Information Systems

Responsible: HM Treasury, UK and devolved nation Departments of Health and Social Care, NHS England, NHS Scotland, NHS Wales, Health and Social Care Northern Ireland, Integrated Care Boards (England), regional and local health boards (Scotland, Wales), and Health and Social Care Trusts (Northern Ireland)



Recommendations

3 Enhance Workforce Preparedness

- Integrate climate adaptation training into medical, nursing, pharmacy and allied health professionals curricula.
- Ensure that NICE and SIGN provide clear guidance for clinicians on managing climate-related health risks and incorporating sustainability into clinical practice.
- Develop rapid response protocols for climate-induced health emergencies.
- Establish support systems for healthcare workers during extreme weather events to maintain service continuity.



Health Workforce

Responsible: UK and devolved nation Departments of Health and Social Care, NHS England, NHS Scotland, NHS Wales, Health and Social Care Northern Ireland, Integrated Care Boards (England), regional and local health boards (Scotland, Wales), and Health and Social Care Trusts (Northern Ireland), Local authorities, NICE, SIGN, education providers (universities, colleges, Health Education England, NES Education for Scotland, Health Education and Improvement Wales), regulators (GMC, NMC, HCPC)]

4 Promote Public Health Resilience

- Expand community-based programmes to educate the public on climate-related health risks and preventive measures.
- Enhance surveillance systems to monitor and respond to emerging health threats like vector-borne diseases.
- Ensure collaboration of DHSC, NHS and ICBs with local authorities to create heatwave and flood response plans.



Health Information Systems

Service Delivery

Responsible: UK and devolved nation Departments of Health and Social Care, NHS England, NHS Scotland, NHS Wales, Health and Social Care Northern Ireland, Integrated Care Boards (England), regional and local health boards (Scotland, Wales), Health and Social Care Trusts (Northern Ireland), Local authorities

5 Foster Cross-Sector Collaboration

- Strengthen partnerships between the NHS, local councils, and environmental agencies from planning to implementation stages to align climate adaptation efforts.
- Leverage technology and data-sharing platforms for better coordination during crises.
- Advocate for integrated urban planning to reduce health risks from climate impacts.



Health Information Systems

Leadership and Governance

Responsible: all levels

Recommendations

6 Integrate Climate Adaptation in Health Policies

- Mandate the development of a Health National Adaptation Plan (HNAP) across each of the devolved nations, outlining specific strategies for the healthcare sector to respond to climate risks.
- Align NHS climate resilience initiatives with the UK Climate Change Risk Assessment (CCRA) and other national climate policies to streamline resources and efforts.
- NHS organisations should have climate change response plans that cover both emissions reductions and adaptation planning; ICS Green Plans in England, Climate Change Response plans in Wales, and Sustainability Plans in Scotland.



Health
Information
Systems

Service
Delivery

Responsible: National governments, UK and devolved nation Departments of Health and Social Care, NHS England, NHS Scotland, NHS Wales, Health and Social Care Northern Ireland, Integrated Care Boards (England), regional and local health boards (Scotland, Wales), and Health and Social Care Trusts (Northern Ireland)

7 Strengthen Healthcare Infrastructure

- Conduct climate risk assessments for all NHS facilities to identify vulnerabilities at the local level.
- Urgently undertake existing repairs required and retrofit existing healthcare buildings with climate-resilient features, including improved insulation, flood defences, and renewable energy systems.
- Ensure all new healthcare facilities meet high environmental and climate resilience standards.
- Prioritise integration and expansion of high quality green spaces within healthcare estates.
- Ensure collaboration of DHSC, NHS and ICBs with mayoral and local authorities to integrate climate considerations in any future planning decisions.



Health
Information
Systems

Essential
Medicines &
Technologies

Responsible: UK and devolved nation Departments of Health and Social Care, NHS England, NHS Scotland, NHS Wales, Health and Social Care Northern Ireland, Integrated Care Boards (England), regional and local health boards (Scotland, Wales), and Health and Social Care Trusts (Northern Ireland)



Policy Report

The UK Health Alliance on Climate Change (UKHACC) report highlights **the importance of making the UK's health system more resilient to climate change** and sets out the steps required to achieve this. This report complements other UKHACC policy reports that address mitigation action needed to protect and promote health: a just energy transition^[2], sustainable food systems^[3], and protecting biodiversity.^[4]

Production of this report involved a review of existing policy and grey literature in the UK and interviews with healthcare professionals and administrative staff within the healthcare sector in the UK (which have been presented as insights below). The report is structured according to the World Health Organization's (WHO) climate-resilient health systems framework. The detailed methodology is available in the appendix section.

What is Climate Adaptation?

Climate adaptation focuses on preparing for and managing the impacts of climate change that are already occurring or are anticipated in the future. The goal of adaptation is to reduce vulnerabilities and enhance the resilience of systems, such as healthcare, infrastructure, and communities, to cope with these effects. For example, building flood defences, retrofitting hospitals to withstand extreme weather, and developing heatwave action plans are adaptation measures aimed at minimising harm from climate-related events.



What is a climate-resilient health care facility?

According to the WHO, *"Climate-resilient and environmentally sustainable health care facilities anticipate, respond to, cope with, recover from and adapt to climate-related shocks and stresses. They do this while minimising their negative impacts on the environment and by leveraging opportunities to restore and improve it, so as to bring ongoing and sustainable health care to their target population and protect the health and well-being of future generations."*



The Impact of Climate Change on the Health Service

Climate change represents a significant and growing threat to global public health, and the UK is no exception. Rising temperatures, extreme weather events, and indirect impacts such as food system disruptions and increased spread of vector-borne diseases are already straining health systems globally. The Lancet Countdown warns that health systems in high-income countries, including the UK, are underprepared to manage the intensifying risks posed by climate change.^[5]

The UK Climate Change Committee (CCC) has highlighted critical gaps in the country's adaptation measures both in relation to protecting population health from the impacts of climate change and the delivery of healthcare during extreme weather. With NHS staff and facilities already under immense strain, building climate resilience is essential to protect public health, minimise harm, and keep services running during climate related disruptions. Nearly half (49%) of healthcare workers report that extreme weather, such as flooding and heatwaves, has disrupted NHS services in the past five years. Over two thirds (68%) have witnessed ambulance delays and staff absences due to such events, while more than half (55%) have seen a rise in hospital admissions of the elderly and infants during extreme heat.^[1]

Both adaptation and mitigation are vital in managing the challenges posed by climate change. For health systems like the NHS, adaptation ensures the continuity of healthcare services during events such as heatwaves and floods, while mitigation seeks to address the root causes of climate change by reducing greenhouse gas (GHG) emissions, thereby preventing the exacerbation of its impacts. While equally important, the NHS UK has placed considerable emphasis on mitigation efforts but has lacked the same prioritisation of adaptation measures. These strategies must be adopted together to safeguard public health and create a sustainable, climate-resilient future.



Insights



I think climate adaptation is not something that's certainly being talked about very much in the health board. So I'm part of the staff green group and I'm looped into some of the quite high-level strategy discussions at the board level around sustainability. But I think a lot of the focus is on mitigation which is definitely important and I guess is also where individual staff can maybe have an impact but I haven't seen a lot of discussion around resilience and adaptation.

– Paediatric Trainee, Wales



The Vulnerability of Health in the Face of Climate Change in the UK

Direct Impacts

Heat

Temperatures above 25°C are linked to an increased risk of heat-related deaths and surge in hospital admissions, primarily due to the exacerbation of cardiovascular and respiratory diseases, heat-related illnesses, and worsening conditions like kidney disease, electrolyte disturbances and skin cancer.^[6,7] Vulnerable groups such as older people, pregnant women, and children are particularly affected. Elevated temperatures during heatwaves exacerbate air pollution, increasing concentrations of pollutants such as ozone (O₃), particulate matter (PM₁₀), and nitrogen dioxide (NO₂), which further drive hospitalisations for cardiovascular and respiratory conditions.^[8] Moreover, extreme heat has been associated with negative mental health effects, including increased aggression, irritability, and a higher risk of suicide, particularly among vulnerable groups such as those from lower socio-economic backgrounds, adolescents, older adults, individuals with preexisting health conditions (whether mental or physical), and those living in inadequate housing.^[9] Heat-related deaths are expected to rise, and without adaptation measures, this could increase 6-fold by 2050 compared to the 2007–2018 level.^[10]



Heat is a priority risk for the NHS in England, as healthcare infrastructure is generally ill-equipped to handle extreme temperatures, with air conditioning not routinely installed and poor ventilation. Approximately 90% of England's hospital buildings are vulnerable to overheating, with NHS estates experiencing high indoor temperatures even during moderately warm summers; some wards have recorded temperatures exceeding 30°C when outdoor temperatures are just 22°C.^[11] NHS England standards recommend ward temperatures between 18°C and 28°C, and 18°C to 25°C for sensitive areas like birthing and recovery rooms.^[11] The incidence of overheating at NHS sites in England has nearly doubled from 2,980 incidents in 2016–17 to 5,554 in 2021–22.^[2] For example, during the July 2022 heatwave, IT systems at Guy's and St Thomas' NHS Foundation Trust failed due to overheating, triggering a critical incident that disrupted clinical services for several weeks.^[12] Beyond compromising patient safety, excessive heat poses occupational health risks, discomfort, and reduced productivity for healthcare staff.

Similarly, overheating in hospitals throughout the rest of the UK is a significant concern, yet there are currently no systems in place to report instances of overheating in healthcare facilities in Scotland, Wales, and Northern Ireland.^[13–16] Public Health Wales has recognised that without a reporting system in place, it is not currently possible to quantify the impacts of higher temperatures on the resilience of NHS Wales services.^[15,16]

Flooding

Flooding, which is becoming more frequent in coastal and low-lying areas, not only leads to physical injuries and displacement but also increases the risk of waterborne infections and mental health challenges. The impacts of flooding are not experienced equally, with disadvantaged and low-income households, as well as individuals with medical conditions or disabilities, being hit the hardest.^[17]



The UK's healthcare infrastructure is also at risk of flooding, with approximately 10% of hospitals located in high flood-risk areas.^[2] According to the UK's Environment Agency in 2024, 25.5% of the healthcare facilities in England are at risk of flooding and this is projected to rise to 31.5% by 2040–60.^[18] In England, 495 emergency services, 2,474 GP surgeries, and 2,187 care homes are vulnerable, while in Wales, 51 GP practices, 16 hospitals, and 81 emergency service locations face similar risks.^[2,16] In Scotland, over 400 health and social care facilities are at risk of frequent flooding, a number expected to rise even if global warming remains below 2°C.^[13] No data for Northern Ireland could be found.

The impact of flooding on healthcare services is already evident. Between April 2021 and March 2022, NHS England sites reported 176 flooding incidents, primarily in general acute hospitals, with the East of England and London being the most affected regions.^[2] In Scotland, severe flooding in Perthshire left patients cut off from healthcare for a week.^[13] An individual working in primary care in Wales reported a 25% increase in appointment calls following the 2020 floods, partly due to patients being unable to access the surgery during the event.^[16] With flood risk to healthcare facilities projected to grow, there is an urgent need for adaptation measures.^[14]

Droughts

Climate-related droughts in the UK present numerous health risks, primarily due to reduced water availability and compromised water quality. In 2018, drought conditions led to 10 public water supply incidents and 76 water quality issues across England and Scotland.^[8] Projections suggest that by the end of the century, warming of 2°C to 4°C could result in a daily water deficit of 1,220–2,900 million litres, with large parts of England and Wales facing shortages.^[8] The limited availability of water can affect crucial medical practices, as is already being observed globally. Droughts often coincide with heat waves, exacerbating health impacts for vulnerable groups such as young children, older people, and those with pre-existing conditions. Drought conditions also heighten the risk of wildfires, which worsen air quality and further strain public health systems.



Wildfires

Climate change is increasingly exposing the UK to the threat of wildfires, with incidents rising by 72% in 2022 compared to the previous year, totalling over 44,000 cases.^[19] The extreme summer heat of 2022, which dried out vegetation and soils, played a significant role in this surge. Met Office projections indicate that fire-conducive weather will become more frequent, with the number of summer days favourable for wildfires expected to double under 2°C of warming and increase fivefold under 4°C.^[20] This trend poses grave risks to biodiversity, carbon storage, and public health.



Alarmingly, almost all wildfires in the UK are human-induced, underscoring the urgent need for public awareness and engagement to mitigate risks.^[20] Despite the escalating threat, the UK's preparedness remains a concern. There has been a substantial decline in firefighting capacity; since 2010, approximately 12,000 firefighter positions have been cut, resulting in understaffed services and overburdened personnel during emergencies. The Home Office had committed to publishing a Wildfire Action Plan by mid-2024 to address key challenges in fire hazard assessment, Fire and Rescue Service response, and land management strategies.^[20] However, the plan is yet to be released.

Poor air quality associated with wildfires is another concern. Increased levels of ground-level ozone, particulate matter, oxides of nitrogen and sulphur, and allergenic pollen linked to wildfire events are exacerbating respiratory conditions, including asthma and chronic obstructive pulmonary disease (COPD).^[10] Strengthening community engagement and bolstering the UK's climate resilience are critical steps in mitigating the rising threat of wildfires.

Indirect Impacts

Food and Water Insecurity

Climate change poses significant risks to the UK's food supply, with important implications for public health. Over the last 30 years, the UK's reliance on imported food has increased, with almost half of the UK's food imported and 78% of fruit and vegetables sourced from abroad.^[8] This dependence on imports, particularly from climate-vulnerable countries, is projected to continue rising, potentially leading to supply shortfalls as extreme weather events in other countries affect food availability and price. The 2022–2023 winter floods and cold weather in Morocco disrupted tomato and other fruit and vegetable harvests.^[8,21] Similarly, the 2010 drought in Russia and Pakistan



caused cereal shortages and export bans, driving food price spikes, resulting in a 50% increase in UK food bank usage.

Drought raises the cost of resources used for livestock production, as seen during the 2018 UK drought, where feed costs rose by 20–25%, leading to higher consumer prices for meat and milk. Drought-induced food price volatility poses long-term risks to the UK's food system, necessitating adaptation to maintain food security amid climate challenges.^[8] While there may be short-term benefits to UK food production due to warmer conditions, without sufficient adaptation measures such as introducing climate-resilient varieties, increasing temperatures are expected to reduce net crop yields in the longer term. Disruptions in the supply of healthy foods could result in diets higher in saturated fat, sugars, and salt, adversely impacting public health. Ensuring a resilient food supply is crucial to meeting dietary recommendations and protecting health.

Interruptions in water supply during floods and droughts may lead to poor hygiene and sanitation, increasing the risk of diarrhoeal diseases, as seen during the 2018 drought in Ireland.^[22] Also, poor water quality during droughts can increase concentrations of harmful chemicals, such as nitrates and trihalomethanes (THMs), posing risks to human health, including cancer from prolonged exposure to THMs. Drought-induced low water levels can promote harmful algal blooms, contaminating water with toxins that cause skin irritation, gastrointestinal issues, and respiratory problems. Outbreaks of waterborne diseases have been linked to private water sources, which are more vulnerable during droughts, particularly in rural areas.^[8,22]

Infectious Diseases

Climate change is significantly affecting the incidence and distribution of infectious diseases in the UK. Rising temperatures are shifting the geographical range of pathogens and prolonging transmission periods. Foodborne and waterborne diseases due to pathogens such as *Salmonella* (causes typhoid), *Campylobacter* (causes bloody diarrhoea), and *Vibrio* (causes cholera), are particularly sensitive to climatic factors, with evidence indicating an increased risk due to warming.



There is also an increased risk of vector-borne diseases in the UK due to the change in the distribution and activity of vectors such as ticks and mosquitoes. Warmer temperatures may expand the range of tick species which transmit Lyme disease and tick-borne encephalitis. Invasive mosquito species capable of transmitting dengue, chikungunya, Zika viruses, and West Nile virus may establish in the UK as the climate warms. Modelling suggests that by the 2040s and 2050s, much of England could become suitable for these mosquitoes, with London potentially facing endemic dengue transmission by the 2060s under high-warming scenarios.^[8] Early detection and robust vector surveillance are crucial, as once non-native species are established, elimination is challenging. Public awareness and behaviour changes are essential to mitigate these emerging health risks.



Insights

Physical health concerns were highlighted by 12 out of 15 interviewees, who emphasised the growing impact of climate change on respiratory conditions, heat-related illnesses, and the emergence of tropical diseases. Several participants noted an increase in respiratory issues linked to worsening air quality, while others reported a rise in heat stroke cases, particularly during more frequent and intense heat waves. Additionally, there were mentions of previously uncommon tropical diseases now appearing in regions like the UK, underscoring the changing disease landscape driven by climate shifts.



12 out of 15 interviewees emphasised the growing impact of climate change on respiratory conditions, heat-related illnesses, and the emergence of tropical diseases.



There is direct impact from climate change to the practice of dermatology because of disease changes. For example, tropical diseases like Leishmaniasism you didn't come across those in the past many years in the UK, whereas in the past couple of years we've begun to see tropical infections presenting to our local primary care and to secondary care with cutaneous lesions and skin lumps and bumps that were later identified to be this type of tropical diseases. So that is a direct impact on our population because of weather changes. [It can happen] due to travel but I think my case was possibly acquired near the UK.

– Dermatology consultant, England



Mental Health

Extreme weather events such as flooding, drought and wildfires in the UK pose significant mental health risks, with long-term impacts such as post-traumatic stress disorder (PTSD), anxiety, and depression. Systematic reviews confirm these risks, particularly in children, due to disrupted surroundings and adult stress. Following the 2013–2014 floods in England, there were elevated rates of mental health conditions in affected individuals: 36.2% for PTSD, 28.3% for anxiety, and 20.1% for depression, compared to much lower rates in unaffected populations.^[10] Evacuations, displacement, and prolonged home repairs exacerbate these outcomes, highlighting the need for consistent post-flood institutional support. Similarly, in the 2018 UK drought, financial stress from increased livestock feed costs led to poor farmer well-being.^[8]



Insights

Out of the 15 health professionals interviewed, 11 mentioned effects on mental health as one of the key threats from climate change. One respondent described that mental health issues due to climate change can be broadly divided into 3 categories. The first is acute, directly as a consequence of an extreme weather event-related trauma. The second is chronic, due to nutritional insecurities or lack of job stability. And lastly, is a dire existential anxiety.



11 out of 15 health professionals mentioned effects on mental health as one of the key threats from climate change.



Mental health is a huge ticking time bomb and I think it's already exploding in social care and in acute care. There is a lack of assessment of the numbers, the support required and the infrastructure in place. This is broadly [true for] mental health but climate concerns will only contribute towards that mental ill health and it will become increasingly so.

– Paediatric consultant, England

Healthcare Service Delivery

Climate-related events can lead to significant supply deficits in hospitals, affecting both resources and personnel.^[23] Disruptions in global supply chains may cause shortages of essential supplies like blood, medicines, consumables, hygiene items, oxygen, and food. Extreme weather events, such as Storm Darragh in December 2024, can prevent staff from reaching their workplaces due to hazardous travel conditions, flooded roads, and power outages and delay shift changes.^[24] Travel disruptions may also lengthen journey times to emergency sites and hospitals, intensifying the strain on healthcare services. These combined factors can severely hinder hospitals' ability to provide timely care during climate-induced emergencies.



Insights

Without resilient healthcare services, existing health inequalities are likely to worsen, disproportionately affecting marginalised groups. 10 out of 15 respondents highlighted that these populations often lack the resources needed to adapt to the effects of climate change and already face significant health disparities. As climate impacts intensify, their health risks are expected to increase, further exacerbating vulnerabilities and widening health and economic inequalities.



10 out of 15 respondents highlighted that marginalised groups often lack the resources needed to adapt to the effects of climate change and already face significant health disparities.



Then from an inequalities point of view, it will be marginalised communities that are most disproportionately impacted. They're probably suffering health inequalities already and then they don't necessarily have the kind of financial resource or whatever else is available to them to be able to kind of mitigate and adapt to the effects of climate change.

– Leadership staff at an English ICB



Insights

Supply chain disruptions were mentioned by 8 out of 15 interviewees, who expressed concerns about the growing challenges in accessing medications and medical equipment due to climate-related events. Participants noted that extreme weather events, such as flooding and heatwaves, can affect the production and distribution of essential medical supplies. These disruptions not only impact patient care but also create long-term vulnerabilities within the healthcare system, making it increasingly difficult to maintain consistent treatment and service delivery.



8 out of 15 interviewees mentioned the growing challenges in accessing medications and medical equipment due to climate-related events.



[Referring to spread of infectious diseases] But probably even bigger than that is disruption to supply chains, so we're seeing it already with certain medications becoming increasingly difficult to get hold of and that's only going to get worse. If areas where a lot of these medications get made are affected by climate change, by flooding or fires you name it, so that's quite a big impact to my work and the potential impact of my work over the next 10 to 20 years. I have started to notice it already but it's gonna get worse and worse. I mean we saw massive disruptions to supply and change during coronavirus and this is a similar kind of international level threat.

– Internal Medicine Registrar, England



Assessment of the UK Health Service against the WHO Building Blocks for a Climate Resilient Health System

Leadership & Governance

Health services across England, Scotland, Wales and Northern Ireland have incorporated climate mitigation into their plans to reach net zero. While some adaptation measures have been taken, this has not been given the same profile as climate mitigation in the UK's healthcare sector.

As part of the 2024 Wales Climate Adaptation Strategy, there are key recommendations for the Welsh Government, Public Health Wales, and providers to support adaptation efforts in the healthcare sector.^[25] In the strategy, all health and care organisations in Wales are encouraged to develop, publish and implement climate change response plans, covering emissions reductions and adaptation planning. NHS Wales has developed a Climate Adaptation Toolkit to help health and care providers assess and respond to climate risks, while Public Health Wales' Health Impact Assessment (HIA) provides a comprehensive evaluation of climate change's effects on population health.^[26] HIAs support climate adaptation by identifying health risks and benefits of climate policies, infrastructure projects, and adaptation measures, ensuring interventions enhance resilience, protect vulnerable populations, and minimise unintended health harms.

NHS Scotland's Climate Emergency and Sustainability Strategy aims to strengthen its climate resilience by ensuring healthcare facilities can withstand extreme weather and other climate-related risks. This includes adapting buildings and infrastructure to withstand flooding, heat, and storm damage, improving water efficiency and drainage, and using nature-based solutions like greener estates to support biodiversity and air quality.^[13] Some progress has been made. Twenty of the 22 Scottish NHS Boards have completed climate change risk assessment; 15 have developed high-level adaptation plans.^[27]

In England, the Greener NHS programme reports on progress and planned adaptation activities in its health and care adaptation report.^[28] With the latest report published in early 2025, it showed some progress has been made by NHS England, such as the development of a Net Zero Building Standard. This standard aims to mitigate overheating risks, and provide guidance about adaptation measures such as passive cooling solutions through greenspaces and natural ventilation.^[29] Integrated care systems (ICSs) and NHS trusts in England are required to develop board-level approved green plans, which should include a dedicated section on adaptation.^[30] However, very few of the plans that have been published include a robust section focusing on adaptation measures.

Northern Ireland's Second Climate Change Adaptation Programme (NICCAP2), from 2019 to 2024, has made little progress in addressing population health and the health and social care system.^[31] It included just one health-related action: the creation of an online platform for climate change and health information for practitioners. While the platform is in place, it is not regularly updated. According to the CCC, organisations such as the Public Health Agency and Health and Social Care Trusts lack clear policies on addressing the health impacts of climate change.^[14] The Third Northern Ireland Climate Change Adaptation Programme (NICCAP3) will be published in 2025, and will be an important opportunity to enable climate resilience within its health and care system.



Case Study:

Local climate adaptation plans by NHS Trusts

King's College Hospital NHS Foundation Trust in London published a Climate Change Adaptation Plan 2023–2026, which assesses the implications of climate change on the Trust's ability to provide healthcare services. This plan identifies priority climate risk areas by evaluating current climate risks and projections, considering potential local clinical risks, and the broader implications of climate change on national and international infrastructure and supply chains. It outlines steps to enhance resilience, including infrastructure assessments and adaptation strategies.^[32]

Similarly, North Bristol NHS Trust has developed a Climate Change Adaptation Plan, which addresses regional climate risks and outlines mitigation and adaptation strategies for health and social care providers in the Bristol, North Somerset, and South Gloucestershire areas. This plan provides a comprehensive framework for enhancing climate resilience in the local health system, ensuring continued service delivery amidst changing climate conditions.^[33]



Insights

The participants' responses reflect diverse perspectives about responsibility for climate resilience within the health sector. A dominant theme was that responsibility should be shared across various levels, from government bodies and health institutions to individual healthcare professionals and patients. Many emphasised that while it is everyone's duty, there must be clear accountability at the institutional and leadership levels to foster collaboration and drive sustainable practices. One participant highlighted the danger of shared responsibility becoming "nobody's responsibility," urging systemic accountability to enable collaborative efforts. Another participant pointed out that different stakeholders have varying levels of power to drive change, noting that junior healthcare professionals have limited influence, whereas those in leadership positions hold greater responsibility to create supportive environments for sustainable practices. Several respondents advocated for policy reforms, such as integrating sustainability considerations into NICE guidelines and granting greater autonomy to NHS trusts. The overall consensus was that multi-level responsibility, with top-down leadership and bottom-up engagement, is essential to drive meaningful change.



To a certain extent, everybody has a responsibility to get involved but different people have got different amounts of power within the health system. So your average F1 doctor who's just coming out of (medical school) training although they might take a lot of responsibility, their knowledge isn't that high or they don't have that much power in the system. So actually their ability to change things is quite low. The people in leadership positions have to create an environment where these things can happen.

– Internal Medicine Registrar, England



Insights

The participants observed that while some adaptation measures are in place, efforts are often fragmented, reactive rather than proactive, and lack sufficient funding and strategic planning. The responses highlight the need for coordinated efforts across stakeholders, with senior leadership buy-in, restructuring healthcare services into smaller, prevention-focused care hubs, and dedicated climate resilience teams identified as essential long-term strategies. Clear, evidence-based communication from a health perspective is crucial for effective stakeholder engagement. Supportive leadership, engaged staff, and technological innovations like digital health records and remote consultations are key to reducing carbon footprints. Ultimately, fostering a culture of responsibility, supported by strong government policies on climate change and public health, is critical to ensuring systemic resilience.

**Fostering a culture of responsibility,
supported by strong government policies
on climate change and public health, is
critical to ensuring systemic resilience.**



It should be a very top-down responsibility. I think it should be government, then health boards, and then it's the practice's responsibility. We're having to not replace staff who are retiring because of increased tax costs and real terms cuts in our funding over 20 years. So we've got less money and we're doing more for less money. And it's the same at all levels of change we need to make. There's too much emphasis on the individual, not enough responsibility or emphasis on a higher level.

– GP, Scotland



A coordinated public health campaign on climate which engages and orients all government departments to address the existential threat to health and societal stability caused by the climate and ecological breakdown. This would need to include a broad-based public information campaign, coupled with a plan to re-organise our agricultural, transport, health, energy, foreign, infrastructure and ecological policies to facilitate a justice-based response to the crisis.

– Obstetrics & Gynaecology Consultant, England

Health Workforce & Service Delivery

This section integrates both the health workforce and service delivery components from the WHO framework, as they complement each other and help prevent duplication.

As climate change intensifies and its health impacts grow, health professionals play a crucial role in raising public awareness and managing climate-related health conditions. To adapt to the health impacts of climate change, NHS staff must be provided with adequate training and resources to support patients during climate-related events, such as heatwaves and flooding, as well as to identify and manage emerging diseases. Yet, engagement with climate adaptation strategies within the UK health system remains minimal. Even awareness among health professionals that climate change is a health issue, and understanding of mitigation strategies despite their relatively higher political visibility, remains limited.

Staff shortages are a significant issue, with vacancy rates at 8.4% for NHS England, between 3–7.5% for NHS Scotland, 5.4% for NHS Wales, and 6.1% for Northern Ireland Health and Social Care.^[34–37] These shortages hinder the ability to effectively manage surges in healthcare demand during extreme climate events, alongside providing routine care. The ongoing workforce challenges impact the availability and response of staff to meet patient needs during such events. Emergency departments, in particular, which deal with patients suffering from acute health issues caused by extreme weather, will struggle to respond unless the current capacity issues, including high patient volumes in corridors or temporary facilities, are urgently addressed.

Few healthcare organisations have dedicated roles for overseeing climate resilience at the workforce level, possibly due to a lack of central support and the low profile of adaptation measures, resulting in limited prioritisation within NHS organisations or a shortage of expertise within the NHS to deliver this work. In their 2023–2026 Green Plan, University Hospitals of Coventry and Warwickshire NHS trust committed to appointing a climate change adaptation lead by 2023–24 to help implement the recommendations from the third Health and Social Care Sector Climate Change Adaptation Report.^[38]

NHS England's Fourth Health and Care Adaptation Report, published in 2025, noted it has expanded climate adaptation training through e-learning platforms, incorporating climate risks into existing programmes.^[28] The Carbon Literacy for Healthcare e-Learning pathway helps green champions recognise vulnerable populations and understand how extreme weather events affect healthcare, with around 3,000 staff completing the training. Additionally, over 900 leaders have taken part in the Sustainability Leadership for Greener Health and Care Programme, designed to equip decision-makers with the skills to build a more sustainable health system. Further plans include appointing climate adaptation leads in regional health protection teams, strengthening public health expertise in adaptation, and creating concise training modules to improve workforce understanding of healthcare adaptation.

NHS Wales and NHS Scotland have introduced training programmes to help healthcare staff understand and respond to climate change. In Wales, healthcare workers can become Climate Smart Champions by undergoing training on sustainable healthcare and lead efforts to make the NHS more sustainable and

carbon neutral.^[39] Additionally, the health and social care adaptation toolkit offers a deeper understanding of climate adaptation and provides guidance on how to achieve it.^[26] In Scotland, NHS staff can take an environmental sustainability course that explains how climate change affects health and what actions can reduce its impact.^[40] Training also includes ways to make healthcare services more sustainable while maintaining quality care. No dedicated training initiatives for the healthcare workforce by the Health and Social Care Northern Ireland could be found.

Regulators play an important role across the four nations to ensure clinicians have sufficient training and knowledge to meet the needs of patients experiencing the health impacts of climate-related events. There is a commitment in the UK's Nursing and Midwifery Council's (NMC) Environmental Sustainability Plan to promote sustainable practices among healthcare professionals.^[41] Similarly, the UK's General Medical Council (GMC) has integrated education for sustainable healthcare into undergraduate medical education curricula but studies have shown significant variability in how these are adopted by medical schools in practice.^[42] Without mandating the inclusion of this curricula, its implementation will likely remain limited. In 2023, the GMC updated Good Medical Practice – the ethical standards that guide doctors working in the UK. While two duties were added under a new heading on managing resources effectively and sustainably, these revisions failed to adequately articulate the urgency of the issue.^[26] There has been guidance issued from the Council of Deans of Health and Intensive Care Society on embedding sustainable healthcare in the curriculum for allied health professionals, yet this is not mandated by the Health and Care Professions Council.^[29,43]

The Adverse Weather and Health Plan (AWHP) for 2025–2026 sets out key measures to prepare the health workforce in England for the challenges posed by adverse weather events.^[6] It highlights the need for targeted training and education to equip healthcare professionals with the skills required to effectively manage climate-sensitive health issues. The plan emphasises interagency collaboration between public health, emergency services, and local authorities to ensure a coordinated response during weather-related emergencies. The AWHP also stresses the importance of sufficient resource allocation, including staffing and medical supplies, to address the increased demand for healthcare during extreme weather.

Individual actions by healthcare workers must be supported by services that are designed to adapt to climate change, yet these measures are largely underdeveloped. For example, the new green plan guidance published by NHS England focuses significantly on mitigation but misses an opportunity to encourage providers to adequately address climate adaptation.^[44] There is a lack of comprehensive occupational health guidance for providers to protect healthcare workers from the health and well-being effects of exposure to extreme temperatures. Existing guidelines tend to be general and often overlook the specific challenges of different clinical settings. Public education on climate-related health risks remains largely reactive and limited to event-specific measures, such as heat-health alerts. There is a clear and urgent need for a sustained national campaign to improve climate-health literacy and support long-term behaviour change. Evidence from the Royal College of Paediatrics and Child Health (RCPCH) and Clean Air Fund on air pollution communication reveals that many health professionals do not engage with patients on these issues because they underestimate the urgency and relevance. This inaction is driven by gaps in understanding the health impacts, perceived insufficiency of evidence, a misleadingly optimistic view of air quality in the UK, and the persistent framing of air pollution—and by extension, climate change—as environmental rather than health concerns.^[45]



Insights

The responses from participants regarding formal training on climate change and health highlighted significant gaps in medical and health education curricula. None of the participants had received structured training on this topic during their undergraduate or postgraduate studies. Some participants spoke about voluntarily seeking relevant learning opportunities. A few participants found initiatives such as those by the Centre for Sustainable Healthcare and the Carbon Literacy Project to be helpful resources. For those trained in earlier decades, climate-related education was entirely absent, even on a voluntary basis. Despite this, some self-educated participants in senior positions are now actively raising awareness through professional conferences and teaching sessions.



So I've got many friends who are clinicians and even there you've got a very bimodal distribution. You've got very engaged, usually the younger [climate change] knowledgeable healthcare professionals but you've still got a vast majority who haven't made the connection yet. So nearly all my consultant friends don't understand the link between health and climate change. They're still stuck on the polar bear posters from 25 years ago. So we're in an echo chamber and you have to get out and explain to them that climate change is health and health is climate change. And that it's nothing to do with polar bears anymore.

– Paediatric consultant, England

Participants involved in education described efforts to integrate climate health teaching into medical school curricula. One public health doctor highlighted lectures on the emergence of tropical diseases in the UK due to climate change. However, many emphasised the need for a systemic approach. One participant pointed out that regulatory bodies were missing opportunities to embed sustainability concepts into assessments such as the PACES exam, which medical graduates are required to undertake during their training. Several participants expressed disappointment at the lack of formal training, noting that doctors have historically driven public health improvements, such as recognising the importance of clean water in cholera prevention. They viewed this as a lost opportunity for modern medical education to proactively address climate health challenges.

Regulatory bodies were missing opportunities to embed sustainability concepts into assessments such as the PACES exam.



And it's not been part of any part of my exams like the PACES or anything else. Not even a single question of like if you're prescribing an inhaler which one would be the more sustainable option? And I think that's a lost opportunity really and I would like to see it being more part of the curriculum but not as a separate thing but actually just part of it.

– Internal Medicine Registrar, England

Workforce challenges, highlighted by 7 out of 15 respondents, primarily revolved around travel disruptions and difficulties in shift scheduling during adverse weather conditions, such as flooding or heatwaves. The inability of staff to reach the workplace could lead to delays and reduced workforce availability. These disruptions not only affect the immediate delivery of healthcare services but also place additional strain on existing staff, who must often work extended hours to cover gaps in rotas.



7 out of 15 highlighted that workforce challenges primarily revolved around travel disruptions and difficulties in shift scheduling during adverse weather conditions.



The NHS estates are heavily dependent on outdated and poorly designed buildings. The problem of heat for workers and patients can be a real issue during heatwaves which are becoming a regular occurrence. Power outages due to flooding is also a frequent concern. Air conditioning whilst making the workplace more comfortable also contributes to greenhouse gas emissions.

– Public Health Consultant, Scotland

Vulnerability, Capacity, and Adaptation Assessment

In the UK, the CCC, UKHSA, and NHS are actively conducting climate risk assessments to identify populations most at risk from climate change, evaluate weaknesses in health systems, and implement targeted adaptation measures to varying degrees across the devolved nations.^[28] These assessments focus on understanding how climate hazards, such as heatwaves, flooding, and vector-borne diseases, impact vulnerable groups, including older people, children, and those in disadvantaged areas. Tools like the WHO Climate Vulnerability Checklists and the Climate Just web tool provide frameworks to assess risks and guide equitable interventions.^[46,47]

There are specific frameworks and tools that help guide NHS organisations to identify climate change risks and adapt against these vulnerabilities. The Climate Adaptation Framework for NHS organisations in England has been modelled based on the Adaptation Capability Framework by the Scottish Government.^[48] In Wales, the Health and Social Care Climate Adaptation Toolkit has been produced to guide organisations in building climate resilience, offering structured guidance for developing adaptation strategies and action plans.^[49]

Limited access to localised climate impact data hampers comprehensive vulnerability assessments, creating significant data gaps. Inconsistent implementation of vulnerability and capacity assessments across the NHS leads to uneven levels of preparedness, with some trusts and boards failing to regularly update these critical evaluations. Insufficient engagement with local communities and patients hinders the identification of vulnerabilities and the development of tailored adaptive responses. A limited awareness of overheating, a major climate risk, puts healthcare delivery at risk, especially in facilities where these risks have not been systematically identified or managed. Furthermore, the absence of robust monitoring systems to track the effectiveness of adaptation interventions over time limits the ability to evaluate and refine these strategies, weakening the overall resilience of the health system to climate impacts.

Insights

The participants highlighted significant concerns about the vulnerability of their healthcare organisations to climate change. Many noted that healthcare facilities are often old infrastructures that are ill-equipped to withstand extreme weather events such as heatwaves and flooding, with poor ventilation and inadequate cooling systems. They also expressed concerns about supply chain disruptions affecting essential medical supplies and the potential for climate-related workforce shortages due to travel disruptions and occupational health risks.



So in extreme weather instances, losing power to our building, threat to the water system, and those are definitely impacts on a wider scale in terms of how that will impact the health of the population. And then the fact that that will just increase admissions into hospitals, GP practises and there isn't capacity to deal with that. Supporting the health of the population, would see that as the largest threat in terms of the climate emergency.

– GP, England

Integrated Risk Monitoring and Early Warning

The UK Health Security Agency (UKHSA) plays a key role by leading research on climate-related health impacts and managing early warning systems for extreme weather.^[6]



Heat: The UKHSA, in partnership with the Met Office, operates the Weather-Health Alerting System, a crucial component of the AWHP.^[6] This system provides early warnings about adverse temperatures to help protect public health. It includes Heat-Health Alerts (active from June 1 to September 30) and Cold-Health Alerts (active from November 1 to March 31), with provisions for extraordinary alerts outside these periods if significant heat or cold events occur.^[50] The alerts target stakeholders such as health and social care providers, emergency responders, voluntary organisations, and government departments, ensuring they are informed and prepared to take appropriate actions. Registration is available for stakeholders to receive alerts via email, facilitating timely responses. The Heat-Health Alert Summary action cards offer clear, checklist-style guidance for various health and care settings.^[51]



Flood: The Flood Forecasting Centre, a collaboration between the Environment Agency and the Met Office, provides real-time flood risk assessments for England and Wales. These assessments are issued through daily Flood Guidance Statements, which help emergency responders anticipate and prepare for potential flooding incidents. The UK's Environment Agency operates the Flood Warning Service, which issues three levels of alerts: Flood Alert (prepare for possible flooding), Flood Warning (immediate action required), and Severe Flood Warning (significant risk to life).^[52] In Scotland, the Scottish Environment Protection Agency (SEPA) operates its own flood forecasting and warning service, including the Floodline service, which provides specific alerts for at-risk communities.^[53] While Northern Ireland doesn't have a dedicated flood forecasting and warning service, the Met Office works with the Department for Infrastructure (DfI) Rivers and Northern Ireland Water to forecast areas where floods are likely.^[54]



Infectious diseases: The UK has implemented several early warning systems to detect and respond to infectious diseases promptly. A key component is the Syndromic Surveillance Service, managed by the UKHSA, which monitors real-time health data from various sources,

including general practitioners, emergency departments, and telehealth services. This system enables the early identification of community-based infectious disease outbreaks, facilitating swift public health interventions. Additionally, the UK has established a statutory notification system requiring healthcare professionals to report specific infectious diseases to local authorities. This mandatory reporting structure ensures that cases of notifiable diseases are promptly communicated, allowing for coordinated responses to control the spread of infections. Furthermore, the UK is developing a real-time Biothreats Radar as part of its Biological Security Strategy.^[55] This initiative aims to monitor emerging biological threats, providing early warnings to enhance national preparedness and response capabilities.

UKHSA's risk monitoring systems are not yet fully integrated across health and environmental sectors, resulting in delays in coordinated responses to climate-related events. The lack of specialised early warning systems for healthcare facilities can lead to challenges in maintaining service provision during floods. Many early warning systems lack the granularity needed to address localised risks effectively, limiting their ability to provide precise guidance for specific regions. Research indicates that existing flood early warning systems often prioritise financial impacts over health outcomes, suggesting a gap in addressing the specific needs of healthcare services during flood events.^[56] Expansion of early warning systems to account for emerging risks such as wildfire smoke and water scarcity is needed. Additionally, warning systems are not adequately tailored to the needs of healthcare facilities and vulnerable populations, leaving critical gaps in preparedness.

Climate and Health Research

Climate and health research within healthcare institutions remains inconsistent, with varying levels of engagement across different regions and disciplines. While some institutions actively integrate climate considerations into research and policy, many lack dedicated funding, expertise, and strategic direction to advance this field. There is limited evaluation of adaptation interventions in the healthcare sector and an absence of robust economic analyses about the costs and benefits of resilience measures. Within the current fiscal environment, this makes it extremely difficult for healthcare organisations and local authorities to adopt adaptation measures, which can have significant up-front costs.

To help address these gaps, UK Research and Innovation (UKRI) has committed £15 million to support research on climate adaptation, including nature-based solutions.^[57] Additionally, the National Institute for Health and Care Research (NIHR) has announced £100,000 in grants for research focused on strengthening the resilience of health and social care services during extreme weather events.^[58] At the same time, UKRI and NIHR have recently awarded £42 million to establish 7 new transdisciplinary research hubs that will explore how the UK's transition to net zero can also protect and improve health.^[59] This is critical, as mitigation and adaptation must go hand in hand; however, funding for adaptation must increase proportionately to address the growing challenges.

There is a need for sustained investment in climate health research, as well as improved integration of environmental sustainability and climate adaptation into clinical guidelines. The National Institute for Health and Care Excellence (NICE) provides best practice guidance to healthcare professionals in the UK, based on up-to-date evidence and research. While NICE has issued some guidance that incorporates environmental considerations, such as in asthma care and adapting inhaler prescribing

and use ^[60], the Centre for Sustainable Healthcare ^[61] has called for this to become a core element of all guidance.

NICE makes recommendations on how to identify, refer, diagnose, treat and manage patients' health, playing a crucial role in disseminating climate and health research and evidence. This is a key mechanism for clinicians to receive advice about best practice clinical care, and further consideration should be given for NICE's role in adapting to climate change. As the health effects of climate change worsen, healthcare professionals will need to be supported to help patients adapt to these changes. Healthcare professionals are trusted members of the community and are uniquely placed to discuss with their patients the health impacts of public health threats and adapting treatment and management as needed. Building on existing resources, ^[62,63] NICE guidance should take account of adaptation efforts, including best practice for communicating to patients about adapting to climate change from a treatment perspective where appropriate. Collaborative working between the NHS, NICE and other national organisations, such as the Medicines and Healthcare products Regulatory Agency (MHRA) is essential to move beyond clinical guidance and swiftly implement climate action changes across the system.



Insights

Several participants noted that NICE has not sufficiently integrated climate change into its health guidelines. They pointed out that environmentally conscious prescribing (e.g., the carbon footprint of medications) is not yet considered a standard practice in NICE's recommendations. Prescribing choices are largely driven by clinical outcomes and cost, without factoring in their environmental impact. There was a strong sense of hope that NICE could play a leading role in integrating sustainability and climate change into healthcare guidelines. Participants advocated for updated NICE guidelines that take climate change into account, especially in areas like sustainable prescribing, resource consumption, and adaptation to climate-induced health risks.

Environmentally conscious prescribing (e.g., the carbon footprint of medications) is not yet considered a standard practice in NICE's recommendations.



So the key thing is NICE guidance must start considering environmental sustainability as part of their guideline consideration. Urology has done well in decarbonizing the bladder cancer pathway. So you need those kind of published guidance. Clinicians are not going to do more unless the guidance requires them to do so.

– Dermatology Consultant, England

“

Is it any surprise that the system is slow to change? Not really. That's why I believe NICE has a significant responsibility to take action, even if it's just a small step. They should start incorporating assessments that, even if they don't immediately change the outcomes, would at least highlight the waste we're producing and where these drugs are being made. It may not seem like much, but it's a step in the right direction. I know that my generation, and definitely those that follow, are much more aware of climate change and eager to make a difference..

– Internal Medicine Registrar, England



Climate resilient and sustainable technology and infrastructure

There are examples across the NHS in England, Scotland and Wales where healthcare facilities are adapting to the current impacts of climate change, including integrating green spaces with estates, adopting sustainable technologies, and improving infrastructure.^[13,64,65]

Green Spaces

A key aspect of the NHS's adaptation efforts is the incorporation of green spaces within healthcare estates.* Initiatives such as the NHS Forest and the NHS Greenspace Demonstration Project encourage the creation and enhancement of green areas around hospitals and clinics, including the planting of food-producing trees.^[66–68] These multifunctional spaces provide multiple health, environmental, and economic benefits: they help mitigate the urban heat island (UHI) effect by cooling the air and lowering temperatures during heatwaves, reduce flooding risks, improve biodiversity, and promote sustainable food resilience. This reduces the health risks associated with extreme weather events, particularly for vulnerable populations.

Green spaces play a vital role in improving air quality by filtering pollutants such as particulate matter (PM2.5) and nitrogen dioxide (NO2). Trees and vegetation absorb these harmful pollutants while releasing oxygen, creating healthier environments for patients, staff, and surrounding communities. Improved air quality can lead to fewer hospital admissions for respiratory and cardiovascular conditions, further benefiting the health sector. Green spaces are increasingly being used in social prescribing, where healthcare professionals refer patients to activities like walking, gardening, or spending time in nature to improve physical and mental health. Studies show that these activities can reduce stress, enhance recovery, and alleviate conditions such as anxiety and depression, further supporting the NHS in promoting well-being and reducing healthcare demand.^[69] NHS Lothian in Scotland found that every £1 spent on a green health project (therapeutic gardening) in NHS grounds yields at least £2 in health benefits.^[13] NHS Scotland has a dedicated annual budget of £300,000 for green space projects within estates.^[27]

NHS Estates are one of the largest landowners in the UK.^[71] Yet, when it comes to utilising this land for the benefits of climate, nature and health, there is a lag. While individual actions by clinicians or institutions are extremely important, greater reward would come from more joined-up action from higher levels of the NHS to transform the estates into biodiverse rich, thriving green spaces which would offer both climate mitigation and adaptation benefits.

** The WHO Operational Framework for Building Climate Resilient Health Systems does not specifically highlight green spaces in any section, despite their clear importance and strong evidence. Hence, we have included green spaces within the infrastructure subsection.*



Case Study:

Creation of a meadow in an NHS Estate ^[70,71]

Urban meadows offer a practical approach to reversing biodiversity loss while contributing to carbon reduction and mental well-being. The NHS owns 6,500 hectares of land, often in urban areas, offering the potential to play a key role in this effort.

In the Royal Devon University Healthcare NHS Foundation Trust (RDUH), 26,000 m² of mown lawn has been converted into perennial meadows. Informational signs were installed to educate the public about the transition. The management strategy now includes two hay cuts — one in early summer and another at the end of summer.

Based on previous studies, the project is estimated to have saved 22.8 Mg tonnes CO₂eq (equivalent to approximately 12 return flights from London, UK to New York, USA) annually through reduced mowing. The project will support approximately three times more plant and bug species and increase bat numbers. Meadows have higher reflectance, reducing urban warming and helping to maintain a cooler urban environment. Feedback from staff and visitors has generally been positive.

Urban meadows need to be actively managed and may increase the complexity of the mowing schedule, potentially reducing the cost savings. Land must be carefully selected to comply with fire safety and not prevent staff and visitors from relaxing. There may also be concerns about the look of meadows and a perception that they are untidy, meaning communication is key to successful implementation.

The success of the RDUH meadow project highlights the potential for large-scale meadow restoration across NHS properties. If implemented nationwide, such an approach could significantly mitigate biodiversity loss in the UK while offering environmental and societal benefits. Restoring meadows can be an important step toward reversing the ecological damage caused by modern land use practices.

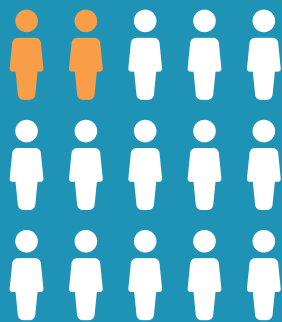
Sustainable Technologies

Sustainable technology helps the NHS adapt to climate change by improving energy efficiency, integrating renewable energy, and enhancing resilience to extreme weather. Features like smart heating, green roofs, flood barriers, and water-efficient systems ensure healthcare facilities remain operational during climate-related disruptions and maintain optimum temperatures during extreme heat or cold. Deves Health Centre in Wiltshire is one of the NHS's first net-zero buildings. It utilises green technologies such as heat pumps and solar panels to generate electricity and heat, thereby minimising environmental impact.^[72] This increases climate resilience as it provides a sustainable, secure, and uninterrupted source of energy during climate-related events, reducing service delivery risks. The UK government has also recently announced more than £100 million in funding from Great British Energy for NHS sites to install solar panels and battery storage systems, including 200 sites in England.^[73]

Telemedicine, remote monitoring, and virtual wards offer promising avenues for improving health system resilience to climate-related disruptions.^[74] These models, rapidly scaled during the COVID-19 pandemic, can reduce demand on acute care, maintain continuity of services during extreme weather events, and improve access for climate-vulnerable populations. Their wider use also aligns with the UK Government's strategic ambition to shift care from hospital to community settings, enabling more proactive and decentralised models of care.^[75] However, their integration into climate adaptation planning within the NHS remains limited.

Insights

2 out of the 15 participants highlighted the need for digitalisation and innovative technology to enhance healthcare service delivery and climate action. One participant noted the progress made by the field of dentistry.



2 out of the 15 participants highlighted the need for digitalisation and innovative technology to enhance healthcare service delivery and climate action.



Innovative tools and technology are really important in dentistry. Certainly in dentistry, we have led the way in the digitisation of all of our hospital records. So the majority of dental practices in primary care moved to digital patient records a long time ago and I think there's a big move to digitisation across the NHS and secondary care. And that includes things like digital radiology having QR codes for patient information leaflets. In Leeds, for example, the radiology department they're now sending images to the general dental practitioners in primary care rather than posting them and they've shown massive carbon savings.

– Dermatology Consultant, England

Infrastructure

In early 2025, the UK government committed to targeted replacement, maintenance, and critical safety upgrades for the primary care estate within the NHS and UK Health Security Agency, as part of its 10-Year Infrastructure Strategy.^[76] The Strategy aims to adapt infrastructure for future operating models, focusing on the government's three key health system shifts: hospital to community, analogue to digital, and illness to prevention. Following a review of the New Hospital Programme, the government announced a revised timeline to address infrastructure needs in 40 hospitals by 2040.^[77]

Many healthcare facilities in the UK still rely on outdated infrastructure that is not designed to withstand extreme weather events like heatwaves and floods. More than 600 days of clinical time were lost in 2024 due to deteriorating infrastructure, such as crumbling roofs at risk of collapse, water leaks, and malfunctioning heating and ventilation systems.^[78] Investment in climate-resilient infrastructure is not keeping up with the growing risks. In addition to high costs of retrofitting, some NHS estates face logistical challenges due to their status as heritage buildings. The government has increased the Department of Health and Social Care's capital budget by £3.1 billion for 2025/26, with £1 billion allocated for urgent repairs and upgrades.^[79] While this is a positive step, the total cost to address the NHS estate's repair backlog has now reached a record £13.8 billion, highlighting the need for long-term investment to restore facilities and ensure they are resilient to the climate crisis.^[78] The COVID-19 pandemic exposed the lack of resilience in healthcare systems, with hospitals overwhelmed by demand and staff overburdened. To prepare for the climate crisis, both the public and private sectors must address infrastructure vulnerabilities and strengthen healthcare systems with innovative solutions to close existing gaps, overcome logistical difficulties, and mitigate climate-related health risks.^[80]

Insights

Infrastructure challenges were highlighted by 9 out of 15 interviewees, who pointed to climate-related threats such as building damage, overheating, and rising maintenance costs. Many emphasised that extreme weather events, including heavy rain and high winds, increase the risk of structural damage, such as roof leaks and flooding. Additionally, poorly insulated buildings were reported to become uncomfortably hot during summers and difficult to keep warm in winter, leading to unsafe working conditions and escalating energy expenses. These challenges were seen as significant barriers to maintaining safe and functional healthcare environments.



9 out of 15 pointed to climate-related threats such as building damage, overheating, and rising maintenance costs.

“

So I think workplace is relatively sheltered as it's on a hill. But the main risks are probably from the poor quality of the infrastructure, in terms of it being very outdated. We are probably more vulnerable to extreme temperatures, hot and cold, as we don't have a way of cooling down the building really other than opening windows. It does get very hot in the summer. So that will leave it as a place that's not safe to work. And in the winter it can take a lot of money to keep it warm, but they can't keep it warm. So it gets really expensive.

– GP, Scotland



Climate and Health Financing

Years of underfunding have left the NHS in England with a £37 billion shortfall, resulting in outdated infrastructure, slow modernisation, and overstretched services, which weakens its ability to respond to climate-related emergencies.^[81] Similar funding pressures are evident in the devolved nations, with significant deficits reported in 2023; £732 million in Northern Ireland, around £400 million in NHS Scotland, and approximately £650 million across NHS Wales.^[82–84] Despite this, some efforts have been made to reduce the environmental impact of the health and social care sector. The UK government has made an investment of over £280 million through the Public Sector Decarbonisation Scheme for NHS estates in England.^[85] Scotland's government has committed at least £200 million over five years (2021–26) to decarbonise public sector estates, while Wales has invested £2.4 million over three years in its Health and Social Care Climate Emergency National Programme.^{[65][86]}

Funding for climate adaptation measures has lagged far behind mitigation investments. Although the UK government has committed £2.65 billion in flood defences aims to protect over 66,000 properties by March 2026. While the primary focus is on homes, businesses, and farmland, there is no specific mention of dedicated funding for healthcare facilities within this allocation.^[87] Investment in adaptation initiatives within the NHS has prioritised temporary solutions, such as portable cooling systems, and while this helps to address immediate risks, it fails to provide long-term resilience.^[85,88]

The CCC highlights several early adaptation investments that offer value for money, such as heat alert systems, heatwave planning, early warning systems, and capacity building. Each of these interventions could deliver over £10 in net economic benefits for every £1 spent.^[49] The CCC estimates that approximately £10 billion per year will be needed over the next decade for climate adaptation across the public and private sectors in the UK. However, specific financial allocations for health sector adaptation are not outlined in the available plans. To bridge this gap, the health sector could leverage innovative public-private partnerships, as it has successfully done in the past. For example, HCP Social Infrastructure Ltd's £1.1 billion redevelopment of two of Barts Health NHS Trust hospitals, deemed to be the largest private financing initiative hospital scheme in the UK, showcased how such partnerships can support healthcare planning, design, and construction while maintaining high standards of care.^[89]



So, there's never enough money! But we are going to be increasingly paying for it. We're starting to pay for it all already. So I think the main barriers are finance, shortsightedness, and siloed thinking.

– GP, Scotland



Insights

Out of the 15 participants, 10 highlighted finance as a key barrier to addressing climate resilience in the healthcare system. Several referenced the financial limitations that the health sector faces, including the high costs of retrofitting buildings, the financial burden of implementing green practices, and the lack of funding for green initiatives. They pointed out that budget constraints in the NHS and related institutions hinder progress, with financial decisions often driven by cost-effectiveness rather than sustainability. Despite growing evidence that sustainable policies are cost-effective in the long run and have significant health and economic benefits. One participant stressed that, despite the financial constraints, the long-term costs of inaction will eventually require the system to pay for climate resilience, making the investment in sustainability a future necessity.



10 out of 15 participants highlighted finance as a key barrier to addressing climate resilience in the healthcare system.



It is expensive to retrofit and insulate a building. For example, for ornate old treasured buildings, it is unsightly to have lots of solar panels on their roof. Decisions at university are made on a financial basis. If the finance director says this is not financially viable then we can't retrofit and insulate this building. It all boils down to this is expensive. We need a mind change. Such as the vice chancellor's enormous pay could be linked to how much, percentage wise, you have decreased the use of fossil fuels at your university. In other words, your remuneration is a function of your input into reducing the use of fossil fuels.

– Public Health Consultant, England

Recommendations

1 Provide Sustainable Funding

- Allocate ring-fenced multi-year funding for climate adaptation initiatives within the NHS budget.
- Explore and enable public-private partnerships to finance large-scale infrastructure upgrades.

Financing

Responsible: UK and devolved nation Departments of Health and Social Care, HM Treasury



2 Strengthen Healthcare Infrastructure

- Conduct climate risk assessments for all NHS facilities to identify vulnerabilities at the local level.
- Urgently undertake existing repairs required and retrofit existing healthcare buildings with climate-resilient features, including improved insulation, flood defences, and renewable energy systems.
- Ensure all new healthcare facilities meet high environmental and climate resilience standards.
- Prioritise integration and expansion of high quality green spaces within healthcare estates.
- Ensure collaboration of DHSC, NHS and ICBs with mayoral and local authorities to integrate climate considerations in any future planning decisions.

Health
Information
Systems

Essential
Medicines &
Technologies

Responsible: UK and devolved nation Departments of Health and Social Care, NHS England, NHS Scotland, NHS Wales, Health and Social Care Northern Ireland, Integrated Care Boards (England), regional and local health boards (Scotland, Wales), and Health and Social Care Trusts (Northern Ireland)



3 Promote Public Health Resilience

- Expand community-based programmes to educate the public on climate-related health risks and preventive measures.
- Enhance surveillance systems to monitor and respond to emerging health threats like vector-borne diseases.
- Ensure collaboration of DHSC, NHS and ICBs with local authorities to create heatwave and flood response plans.

Health
Information
Systems

Service
Delivery

Responsible: UK and devolved nation Departments of Health and Social Care, NHS England, NHS Scotland, NHS Wales, Health and Social Care Northern Ireland, Integrated Care Boards (England), regional and local health boards (Scotland, Wales), Health and Social Care Trusts (Northern Ireland), Local authorities



4 Enhance Workforce Preparedness

- Integrate climate adaptation training into medical, nursing, pharmacy and allied health professionals curricula.
- Ensure that NICE and SIGN provide clear guidance for clinicians on managing climate-related health risks and incorporating sustainability into clinical practice.
- Develop rapid response protocols for climate-induced health emergencies.
- Establish support systems for healthcare workers during extreme weather events to maintain service continuity.



Health Workforce

Responsible: UK and devolved nation Departments of Health and Social Care, NHS England, NHS Scotland, NHS Wales, Health and Social Care Northern Ireland, Integrated Care Boards (England), regional and local health boards (Scotland, Wales), and Health and Social Care Trusts (Northern Ireland), Local authorities, NICE, SIGN, education providers (universities, colleges, Health Education England, NES Education for Scotland, Health Education and Improvement Wales), regulators (GMC, NMC, HCPC)]

5 Foster Cross-Sector Collaboration

- Strengthen partnerships between the NHS, local councils, and environmental agencies from planning to implementation stages to align climate adaptation efforts.
- Leverage technology and data-sharing platforms for better coordination during crises.
- Advocate for integrated urban planning to reduce health risks from climate impacts.



Health Information Systems

Leadership and Governance

Responsible: all levels

6 Strengthen Research on Climate Adaptation

- Invest in research to quantify climate health vulnerabilities and guide evidence-based policy-making.
- Invest in research to identify cost-effective adaptation strategies.



Health Information Systems

Responsible: HM Treasury, UK and devolved nation Departments of Health and Social Care, NHS England, NHS Scotland, NHS Wales, Health and Social Care Northern Ireland, Integrated Care Boards (England), regional and local health boards (Scotland, Wales), and Health and Social Care Trusts (Northern Ireland)

7 Integrate Climate Adaptation in Health Policies

- Mandate the development of a Health National Adaptation Plan (HNAP) across each of the devolved nations, outlining specific strategies for the healthcare sector to respond to climate risks.
- Align NHS climate resilience initiatives with the UK Climate Change Risk Assessment (CCRA) and other national climate policies to streamline resources and efforts.
- NHS organisations should have climate change response plans that cover both emissions reductions and adaptation planning; ICS Green Plans in England, Climate Change Response plans in Wales, and Sustainability Plans in Scotland.



Health
Information
Systems

Service
Delivery

Responsible: National governments, UK and devolved nation Departments of Health and Social Care, NHS England, NHS Scotland, NHS Wales, Health and Social Care Northern Ireland, Integrated Care Boards (England), regional and local health boards (Scotland, Wales), and Health and Social Care Trusts (Northern Ireland)



Implementation Pathway

The UK government's NHS Fit for the Future mission aims to modernise the health service through a shift towards community care, digital innovation, and prevention. However, to truly future-proof the NHS, building climate resilience must be a core pillar of this transformation. The health impacts of climate change are already placing pressure on services. Ensuring that NHS facilities, supply chains, and care delivery can withstand and adapt to these growing risks is essential to safeguard public health, reduce disruption, and maintain the continuity of care. A climate-resilient NHS is not only more sustainable but also better equipped to serve communities in an increasingly uncertain future.^[90]

Foundation Building (Short Term: 1–3 years)

- Establish dedicated NHS climate adaptation funds and explore public-private partnerships.
- Conduct climate risk assessments and implement quick wins (e.g., flood defences, insulation and ventilation).
- Introduce basic climate adaptation training with NICE and SIGN issuing preliminary guidance.
- Expand awareness campaigns and strengthen early warning systems for extreme weather.
- Set up climate and health adaptation committees.
- Develop Health National Adaptation Plans (HNAP) for each of the devolved nations.

Scaling Up (Medium Term: 3–5 years)

- Implement sustainable financing models and create a long-term adaptation fund.
- Retrofit NHS buildings and ensure new facilities meet resilience standards.
- Integrate climate adaptation into medical, nursing and other health professionals' curricula and expand NICE and SIGN guidance.
- Establish community-led resilience hubs and enhance disease surveillance.
- Strengthen NHS-local authority partnerships and expand innovative digital technology use.
- Implement HAAP across all NHS trusts and mandate NHS climate adaptation action plans.
- Develop a national database on climate-health risks and scale up adaptation research.

Sustainable Adaptation (Long Term: 5+ years)

- Maintain long-term funding by expanding green financing options.
- Ensure all NHS facilities are climate-resilient and on track to net-zero.
- Create climate-health and adaptation leadership roles.
- Fully integrate climate adaptation into national health strategies.
- Embed climate resilience into urban planning by leveraging emerging tech.
- Regularly update the HNAP and integrate climate adaptation into NHS performance metrics.
- Establish a UK Centre for Climate-Health Research within the UKHSA or other relevant organisations to develop evidence-based policy tools for each of the four devolved nations.

Appendix I



Review of Policy and Grey Literature

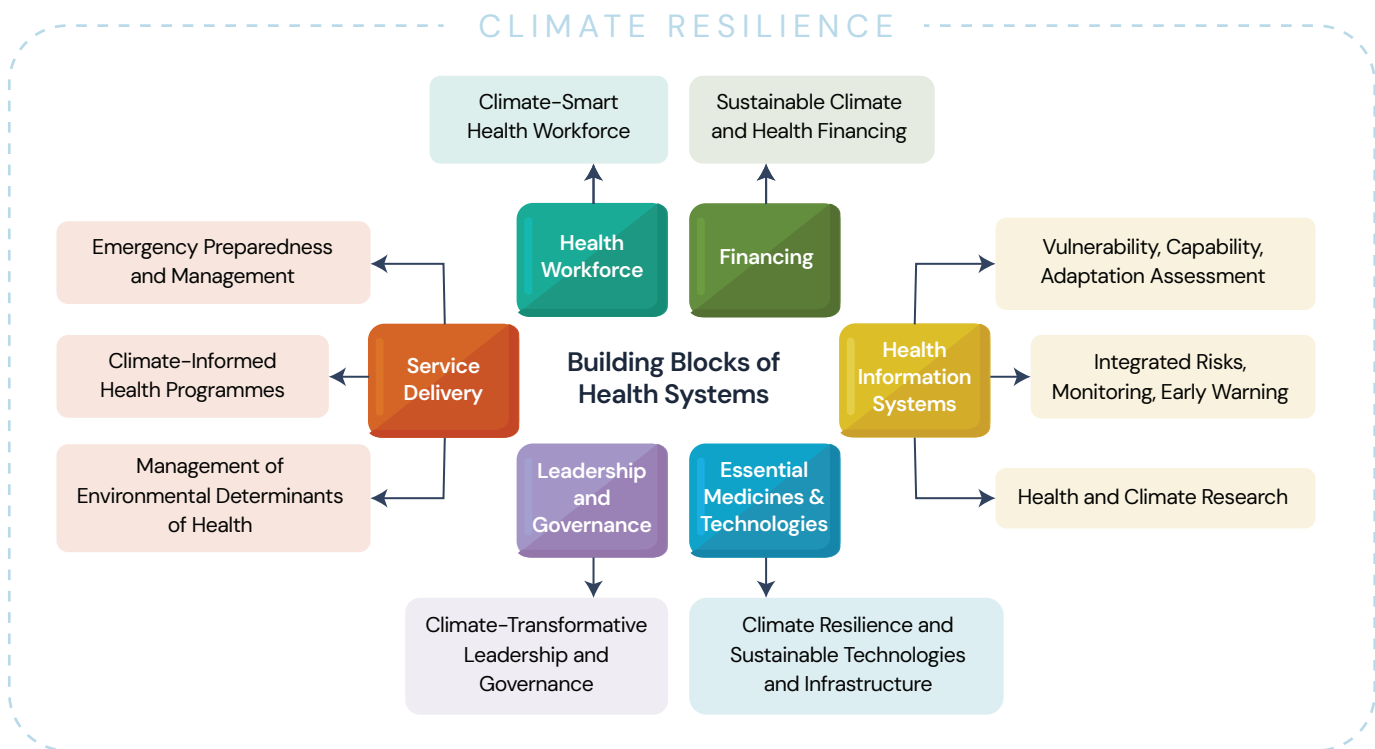
- A structured review of policy documents and grey literature was conducted between November 2024 and January 2025, with updates incorporated until the final draft as new policies emerged.
- The search strategy involved using Google Search with the following keywords: “climate adaptation/resilience/emergency + plan/policy/strategy + healthcare/NHS + UK/England/Wales/Scotland/Northern Ireland”.
- From the first three pages of search results relevant documents were selected for in-depth analysis.

Qualitative Data Collection



- Participants were recruited through the UKHACC members network via email.
- Nine participants consented to participate in semi-structured interviews conducted via Google Meet between December 2024 and January 2025.
- All interviews were recorded, transcribed, anonymised, and analysed using a mix of inductive and deductive approaches to identify key themes.
- To ensure broader representation, an online survey (Google Forms) was made available for those unable to attend video interviews. Six additional healthcare professionals provided written responses, making the total number of insights drawn from 15 participants.

The structure of the report follows the WHO’s climate-resilient health systems framework.



References

- 1 Health leaders call on Wes Streeting to oppose controversial oilfield. In: UK Health Alliance on Climate Change [Internet]. [cited 26 Apr 2025]. Available: <https://ukhealthalliance.org/news-item/health-leaders-call-on-wes-streeting-to-oppose-controversial-oilfield/>
- 2 A just energy transition for the good of health. In: UK Health Alliance on Climate Change [Internet]. [cited 13 Sep 2024]. Available: <https://ukhealthalliance.org/influencing-policy/a-just-energy-transition-for-the-good-of-health/>
- 3 Plant-powered Planet: Building a healthy & sustainable food system. In: UK Health Alliance on Climate Change [Internet]. [cited 7 Feb 2025]. Available: <https://ukhealthalliance.org/influencing-policy/plant-powered-planet-building-a-healthy-sustainable-food-system/>
- 4 Biodiversity, climate change and health. In: UK Health Alliance on Climate Change [Internet]. [cited 7 Feb 2025]. Available: <https://ukhealthalliance.org/influencing-policy/biodiversity-climate-change-and-health/>
- 5 Romanello M, Walawender M, Hsu S-C, Moskeland A, Palmeiro-Silva Y, Scamman D, et al. The 2024 report of the Lancet Countdown on health and climate change: facing record-breaking threats from delayed action. *Lancet*. 2024;404: 1847–1896. doi:10.1016/S0140-6736(24)01822-1
- 6 Adverse Weather and Health Plan. UK Health Security Agency; 2024. Available: https://assets.publishing.service.gov.uk/media/65fdb71af1d3a0001d32ae74/Adverse_Weather_and_Health_Plan__supporting_evidence__1_.pdf
- 7 UK Health Security Agency. Hot weather risks and their impact on health. 2025. Available: <https://khub.net/documents/135939561/174099487/Hot+weather+impact+on+health.pdf/b56b020c-885e-2c38-338b-f77c1a694ec4>
- 8 UK Health Security Agency. Health Effects of Climate Change in the UK: State of Evidence 2023. 2024 Jan. Available: <https://www.gov.uk/government/publications/climate-change-health-effects-in-the-uk>
- 9 Wainwright L. Heat and Mental Health. [cited 3 Mar 2025]. Available: <https://committees.parliament.uk/writtenevidence/123209/html/?>
- 10 Health Effects of Climate Change (HECC) in the UK: 2023 report. UK Health Security Agency (UKHSA); Available: <https://assets.publishing.service.gov.uk/media/6570a68b7469300012488948/HECC-report-2023-chapter-4-outdoor-air-quality.pdf>
- 11 Brooks K, Landeg O, Kovats S, Sewell M, OConnell E. Heatwaves, hospitals and health system resilience in England: a qualitative assessment of frontline perspectives from the hot summer of 2019. *BMJ Open*. 2023;13: e068298. doi:10.1136/bmjopen-2022-068298
- 12 Hosea L. Guy's and St Thomas': Hospitals in meltdown over IT issues – whistleblower. In: BBC News [Internet]. 27 Jul 2022 [cited 27 May 2025]. Available: <https://www.bbc.co.uk/news/uk-england-london-62308447>

- 13 NHS Scotland climate emergency and sustainability strategy: 2022–2026. [cited 11 Feb 2025]. Available: <https://www.gov.scot/publications/nhs-scotland-climate-emergency-sustainability-strategy-2022-2026/>
- 14 Adapting to climate change – Progress in Northern Ireland. In: Climate Change Committee [Internet]. Committee on Climate Change; 19 Apr 2023 [cited 5 Mar 2025]. Available: <https://www.theccc.org.uk/publication/adapting-to-climate-change-progress-in-northern-ireland/>
- 15 Climate Change in Wales: Health Impact Assessment – Higher Temperature and Extreme Heat. Public Health Wales; 2023 Jul. Available: <https://phwwhocc.co.uk/wp-content/uploads/2023/07/D5.4-Higher-Temps-Extreme-Heat-Eng-final.pdf>
- 16 Climate Change in Wales: Health Impact Assessment – Health and social care services: access and delivery. Public Health Wales; 2023 Jul. Available: <https://phwwhocc.co.uk/wp-content/uploads/2023/07/D7.1-Health-and-social-care-services-access-and-delivery-Eng-final.pdf>
- 17 Flooding and health: an overview. In: GOV.UK [Internet]. [cited 3 Mar 2025]. Available: <https://www.gov.uk/government/publications/flooding-and-health-advice-for-frontline-responders/flooding-and-health-an-overview>
- 18 National assessment of flood and coastal erosion risk in England 2024. In: GOV.UK [Internet]. [cited 17 Dec 2024]. Available: <https://www.gov.uk/government/publications/national-assessment-of-flood-and-coastal-erosion-risk-in-england-2024/national-assessment-of-flood-and-coastal-erosion-risk-in-england-2024>
- 19 Detailed analysis of fires attended by fire and rescue services, England, April 2022 to March 2023. In: GOV.UK [Internet]. [cited 6 Jan 2025]. Available: <https://www.gov.uk/government/statistics/detailed-analysis-of-fires-attended-by-fire-and-rescue-services-england-april-2022-to-march-2023/detailed-analysis-of-fires-attended-by-fire-and-rescue-services-england-april-2022-to-march-2023>
- 20 Samuel T, Wentworth J. Wildfire risks to UK landscapes. UK Parliament POST; 2024 Apr. doi:10.1098/rstb.2015.0341
- 21 Sutcliffe C, Hess T. The global avocado crisis and resilience in the UK's fresh fruit and vegetable supply system. [cited 13 Feb 2025]. Available: https://www.foodsecurity.ac.uk/blog/global-avocado-crisis-resilience-uks-fresh-fruit-vegetable-supply-system/?utm_source=MailingManager&utm_campaign=GFSNewsJune2017&utm_medium=email
- 22 Drought and water scarcity. [cited 3 Mar 2025]. Available: <https://climate-adapt.eea.europa.eu/en/observatory/evidence/health-effects/drought-and-water-scarcity>
- 23 Tsakonas K, Badyal S, Takaro T, Buse CG. Rapid review of the impacts of climate change on the health system workforce and implications for action. J Clim Chang Health. 2024;19: 100337. doi:10.1016/j.joclim.2024.100337
- 24 Heroes in the Storm: NHS staff battle through the elements to continue patient care during Storm Darragh. In: Betsi Cadwaladr University Health Board [Internet]. [cited 3 Mar 2025]. Available:

- 25 Climate Adaptation Strategy for Wales 2024. In: GOV.WALES [Internet]. [cited 12 Feb 2025]. Available: <https://www.gov.wales/climate-adaptation-strategy-wales-2024>
- 26 Health and social care climate adaptation toolkit. In: GOV.WALES [Internet]. [cited 12 Feb 2025]. Available: <https://www.gov.wales/health-and-social-care-climate-adaptation-toolkit>
- 27 Annual NHS Scotland Climate Emergency & Sustainability Report 2024. Scottish Government; Available: <https://www.gov.scot/publications/annual-nhs-scotland-climate-emergency-sustainability-report-2024/>
- 28 England NHS. NHS England » 4th Health and climate adaptation report. [cited 12 Mar 2025]. Available: <https://www.england.nhs.uk/long-read/4th-health-and-climate-adaptation-report/>
- 29 England NHS. NHS England » NHS Net Zero Building Standard. [cited 24 Dec 2024]. Available: <https://www.england.nhs.uk/publication/nhs-net-zero-building-standard/>
- 30 NHS. How to produce a green plan: A three year strategy towards net zero. Available: <https://www.england.nhs.uk/greenernhs/wp-content/uploads/sites/51/2021/06/B0507-how-to-produce-a-green-plan-a-three-year-strategy-towards-net-zero-june-2021.pdf>
- 31 Department of Agriculture, Environment and Rural Affairs of Northern Ireland. Northern Ireland Climate Change Adaptation Programme 2019 – 2024 End of Programme Report. Available: https://www.daera-ni.gov.uk/sites/default/files/2025-01/Northern%20Ireland%20Climate%20Change%20Adaptation%20Programme%202019-2024%20-%20End%20of%20Programme%20Review_0.pdf
- 32 Climate Ready King's: Our Climate Change Adaptation Plan 2023 – 2026. King's College Hospital NHS Foundation Trust; Available: <https://www.kch.nhs.uk/wp-content/uploads/2024/01/Kings-Climate-Change-Adaptation-Plan-2023-to-2026.pdf?>
- 33 Healthier Together Estates Climate Change Adaptation Plan 2021–2025. In: BNSSG Healthier Together [Internet]. [cited 11 Feb 2025]. Available: <https://bnssghealthiertogether.org.uk/directory/healthier-together-estates-climate-change-adaptation-plan-2021-2025/>
- 34 Staff Shortages. In: The King's Fund [Internet]. [cited 5 Mar 2025]. Available: <https://www.kingsfund.org.uk/insight-and-analysis/data-and-charts/staff-shortages>
- 35 NHS vacancy statistics: 31 March 2024 (official statistics in development). In: GOV.WALES [Internet]. [cited 5 Mar 2025]. Available: <https://www.gov.wales/nhs-vacancy-statistics-31-march-2024-official-statistics-development-html>
- 36 Northern Ireland Health and Social Care Active Recruitment Statistics & Northern Ireland Health and Social Care Workforce Statistics March 2024. In: Department of Health [Internet]. 22 May 2024 [cited 5 Mar 2025]. Available: <https://www.health-ni.gov.uk/news/northern-ireland-health-and-social-care-active-recruitment-statistics-northern-ireland-health-and-social-care-workforce-statistics-march-2024>
- 37 NHS Scotland Workforce: Latest statistics at 31 march 2024. NHS Scotland; Available: https://turasdata.nes.nhs.scot/media/r5dntvv2/workforcereport_june2024.pdf

- 38 Green Plan Summary 2023–2026. University Hospitals Coventry and Warwickshire NHS Trust; Available: [https://www.uhcw.nhs.uk/download/clientfiles/files/UHCW%20-%20Green%20Plan%20\(2023_2026\).pdf](https://www.uhcw.nhs.uk/download/clientfiles/files/UHCW%20-%20Green%20Plan%20(2023_2026).pdf)
- 39 We're recruiting NHS staff to be Climate Smart Champions. In: HEIW [Internet]. 3 Mar 2023 [cited 12 Mar 2025]. Available: <https://heiw.nhs.wales/news/were-recruiting-nhs-staff-to-be-climate-smart-champions/>
- 40 New environmental sustainability course launched. [cited 12 Mar 2025]. Available: <https://www.nes.scot.nhs.uk/nes-current/new-environmental-sustainability-course-launched/>
- 41 Environmental Sustainability Plan. Nursing and Midwifery Council; 2024. Available: <https://www.nmc.org.uk/globalassets/sitedocuments/sustainability/0150-environmental-sustainability-plan-web.pdf>
- 42 Planetary health and sustainable healthcare in medical education standards and outcomes. [cited 5 Mar 2025]. Available: <https://www.gmc-uk.org/education/standards-guidance-and-curricula/position-statements/planetary-health-and-sustainable-healthcare-in-medical-education-standards-and-outcomes>
- 43 AHP Critical Care Capability Framework. [cited 13 Mar 2025]. Available: <https://icsahpframework.ics.ac.uk/>
- 44 England NHS. NHS England » Green plan guidance. [cited 10 Feb 2025]. Available: <https://www.england.nhs.uk/publication/green-plan-guidance/>
- 45 Air Pollution Companion: Communication toolkit – Talking about air pollution. In: RCPCH [Internet]. [cited 29 Apr 2025]. Available: <http://www.rcpch.ac.uk/key-topics/air-pollution/communication/how>
- 46 Checklists to Assess vulnerabilities in Health Care Facilities in the Context of Climate Change. World Health Organization; 8 Apr 2021 [cited 13 Feb 2025]. Available: <https://www.who.int/publications/i/item/9789240022904>
- 47 Climate Just Web Tool. [cited 13 Feb 2025]. Available: <https://www.climatejust.org.uk/>
- 48 Sniffer and Sustainability West Midlands. A climate adaptation framework for NHS organisations in England. In: weADAPT [Internet]. 21 Aug 2024 [cited 13 Feb 2025]. Available: <https://weadapt.org/knowledge-base/governance-institutions-and-policy/a-climate-adaptation-framework-for-nhs-organisations-in-england/>
- 49 Climate Adaptation Toolkit: Guidance for building climate resilient health and social care in Wales. Welsh Government; Available: <https://www.gov.wales/sites/default/files/publications/2024-10/health-and-social-care-climate-adaptation-toolkit.pdf>
- 50 Weather–Health Alerting System. In: GOV.UK [Internet]. [cited 10 Jan 2025]. Available: <https://www.gov.uk/guidance/weather-health-alerting-system>
- 51 Heat–Health Alerting system: guidance for health and social care providers. In: GOV.UK [Internet]. [cited 6 Apr 2025]. Available: <https://www.gov.uk/guidance/heat-health-alerting-system-guidance-for-health-and-social-care-providers>

- 52 Flood Warning Data Integrity Guide. Environment Agency; 2014. Available: https://assets.publishing.service.gov.uk/media/5a7b8389ed915d131105fbce/Flood_Warning_-_Data_Integrity_Guide_v2_O.pdf
- 53 Flooding. [cited 10 Jan 2025]. Available: <https://www.sepa.org.uk/environment/water/flooding/>
- 54 Severe weather, storms, flooding and drought. In: nidirect [Internet]. 8 Feb 2016 [cited 6 Apr 2025]. Available: <https://www.nidirect.gov.uk/articles/severe-weather-storms-flooding-and-drought>
- 55 UK Biological Security Strategy. HM Government; 2023 Jun. Available: https://assets.publishing.service.gov.uk/media/64c0ded51e10bf000e17ceba/UK_Biological_Security_Strategy.pdf
- 56 by: C. Are flood early warning systems effective for mitigating the health impacts of flooding: An agile scope of the literature. {Public Health Wales}; 2024 May. Available: <https://phw.nhs.wales/services-and-teams/observatory/evidence/flooding-health-summary-of-two-scoping-reviews-of-the-literature/are-flood-early-warning-systems-effective-for-mitigating-the-health-impacts-of-flooding/>
- 57 £15m investment in research to help UK prepare for climate change. [cited 6 Apr 2025]. Available: <https://www.ukri.org/news/15m-investment-in-research-to-help-uk-prepare-for-climate-change/>
- 58 NIHR Climate Change and Health: Adapting Health and Social Care Systems – Development Awards. [cited 6 Apr 2025]. Available: <https://www.nihr.ac.uk/funding/nihr-climate-change-and-health-adapting-health-and-social-care-systems-development-awards/2025277>
- 59 £42m funding to ensure health is central to net zero strategies. [cited 29 Apr 2025]. Available: <https://www.ukri.org/news/42m-funding-to-ensure-health-is-central-to-net-zero-strategies/>
- 60 Asthma inhalers and climate change. {National Institute for Health and Care Excellence}; Available: <https://www.nice.org.uk/guidance/ng245/resources/bts-nice-and-sign-patient-decision-aid-on-asthma-inhalers-and-climate-change-pdf-13558151917>
- 61 CSH's joint letter to NICE: Act more urgently on climate change. In: Sustainable Healthcare [Internet]. 19 Aug 2024 [cited 5 May 2025]. Available: <https://sustainablehealthcare.org.uk/blog-cshs-joint-letter-nice-act-more-urgently-climate-change/>
- 62 Communicating on climate change and health: Toolkit for health professionals. World Health Organization; 22 Mar 2024 [cited 5 May 2025]. Available: <https://www.who.int/publications/i/item/9789240090224>
- 63 Climate change adaptation: a guide for health and care professionals. In: Sustainable Healthcare [Internet]. 7 Apr 2022 [cited 5 May 2025]. Available: <https://sustainablehealthcare.org.uk/blog-climate-change-adaptation/>
- 64 Greener NHS. Greener NHS. [cited 10 Jan 2025]. Available: <https://www.england.nhs.uk/greenernhs/>
- 65 Health and social care climate emergency national programme. In: GOV.WALES [Internet]. [cited 11 Feb 2025]. Available: <https://www.gov.wales/health-and-social-care-climate-emergency-national-programme>

- 66 NHS Forest: Green Space For Health. In: NHS Forest [Internet]. 26 Nov 2021 [cited 5 Jun 2023]. Available: <https://nhsforest.org/>
- 67 NHS Greenspace. In: NatureScot [Internet]. [cited 11 Feb 2025]. Available: <https://www.nature.scot/professional-advice/contributing-healthier-scotland/our-natural-health-service/nhs-greenspace>
- 68 White H. Fruitful: Enhancing UK Diets Through Food-Producing Trees and Hedges. In: NHS Forest [Internet]. 24 Sep 2024 [cited 27 May 2025]. Available: <https://nhsforest.org/blog/fruitful-enhancing-uk-diets-through-food-producing-trees-and-hedges/>
- 69 Mughal R, Seers H, Polley M, Sabey A, Chatterjee HJ. How the natural environment can support health and wellbeing through social prescribing. National Academy for Social Prescribing. 2022. Available: https://socialprescribingacademy.org.uk/media/zaknOrng/how-the-natural-environment-can-support-health-and-wellbeing-through-social-prescribing_.pdf
- 70 Marshall CAM, Wilkinson MT, Hadfield PM, Rogers SM, Shanklin JD, Eversham BC, et al. Urban wildflower meadow planting for biodiversity, climate and society: An evaluation at King's College, Cambridge. *Ecol Sol and Evidence*. 2023;4. doi:10.1002/2688-8319.12243
- 71 NHS property and estates: Naylor review. In: GOV.UK [Internet]. 31 Mar 2017 [cited 5 Mar 2025]. Available: <https://www.gov.uk/government/publications/nhs-property-and-estates-naylor-review>
- 72 NHS Property Services. [cited 10 Jan 2025]. Available: <https://www.property.nhs.uk/news/news/crfd-report>
- 73 England NHS. NHS England » £100 million funding from Great British Energy for NHS trusts to install solar panels and battery storage systems. [cited 6 Apr 2025]. Available: <https://www.england.nhs.uk/blog/100-million-funding-from-great-british-energy-for-nhs-trusts-to-install-solar-panels-and-battery-storage-systems/>
- 74 Fawad M, Ullah S, Xu X. Climate-responsive telemedicine: Innovative strategy for enhancing healthcare in the face of climate change. *J Glob Health*. 2024;14: 03043. doi:10.7189/jogh.14.03043
- 75 Road to recovery: the government's 2025 mandate to NHS England. In: GOV.UK [Internet]. [cited 29 Apr 2025]. Available: <https://www.gov.uk/government/publications/road-to-recovery-the-governments-2025-mandate-to-nhs-england/road-to-recovery-the-governments-2025-mandate-to-nhs-england>
- 76 Treasury HM. 10 year infrastructure strategy working paper: a cross-government plan for infrastructure. Available: https://assets.publishing.service.gov.uk/media/6793c62bc74f1dca7492f3a5/10_Year_Infrastructure_Strategy_Working_Paper_PUBLICATION_24_JAN.pdf
- 77 New Hospital Programme: plan for implementation. In: GOV.UK [Internet]. [cited 6 Mar 2025]. Available: <https://www.gov.uk/government/publications/new-hospital-programme-review-outcome/new-hospital-programme-plan-for-implementation>

- 78 NHS lost over 600 days of clinical time due to crumbling hospitals last year. [cited 16 Mar 2025]. Available: <https://www.libdems.org.uk/press/release/nhs-lost-over-600-days-of-clinical-time-due-to-crumbling-hospitals-last-year>
- 79 The Health Foundation. The NHS maintenance backlog: rising costs and falling investment – The Health Foundation. Available: <https://www.health.org.uk/reports-and-analysis/analysis/the-nhs-maintenance-backlog-rising-costs-and-falling-investment>
- 80 Raising NHS capital funds: options for government. In: NHS Confederation [Internet]. [cited 15 Mar 2025]. Available: <https://www.nhsconfed.org/publications/raising-nhs-capital-funds-options-government>
- 81 Independent investigation of the NHS in England. In: GOV.UK [Internet]. 12 Sep 2024 [cited 16 Mar 2025]. Available: <https://www.gov.uk/government/publications/independent-investigation-of-the-nhs-in-england>
- 82 NHS in Scotland 2023. Audit Scotland; Available: https://audit.scot/uploads/docs/report/2024/nr_240222_nhs_in_scotland_2023.pdf?
- 83 Department details 2023/24 Budget measures. In: Department of Health [Internet]. 22 May 2023 [cited 25 Mar 2025]. Available: <https://www.health-ni.gov.uk/news/department-details-202324-budget-measures>
- 84 NHS Wales: under pressure. In: HFMA [Internet]. [cited 25 Mar 2025]. Available: <https://www.hfma.org.uk/articles/nhs-wales-under-pressure?>
- 85 Department of Health, Care S. UK health services make landmark pledge to achieve net zero. In: GOV.UK [Internet]. 9 Nov 2021 [cited 10 Jan 2025]. Available: <https://www.gov.uk/government/news/uk-health-services-make-landmark-pledge-to-achieve-net-zero>
- 86 Scottish Green Public Sector Estate Decarbonisation Scheme: information note – June 2021. [cited 13 Feb 2025]. Available: <https://www.gov.scot/publications/scottish-green-public-sector-estate-decarbonisation-scheme-information-note--june-2021/>
- 87 Department for Environment, Affairs R. Record investment to protect thousands of UK homes and businesses. In: GOV.UK [Internet]. 4 Feb 2025 [cited 10 Feb 2025]. Available: <https://www.gov.uk/government/news/record-investment-to-protect-thousands-of-uk-homes-and-businesses>
- 88 £2.4m for projects to reduce NHS Wales emissions. In: GOV.WALES [Internet]. [cited 13 Feb 2025]. Available: <https://www.gov.wales/24m-projects-reduce-nhs-wales-emissions>
- 89 Healthcare UK: Public Private Partnerships. Department of Trade and Investment, Department of Health, NHS; Available: https://assets.publishing.service.gov.uk/media/5a7c7835e5274a559005a152/07_PPP_28.11.13.pdf
- 90 Build an NHS Fit For the Future. In: GOV.UK [Internet]. 5 Dec 2024 [cited 8 Apr 2025]. Available: <https://www.gov.uk/missions/nhs>