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Climate Change in Wales: Health Impact Assessment Summary Report

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Foreword

I am delighted to introduce this Health Impact Assessment (HIA) of Climate Change in Wales, which represents an important step forward in our work on climate change and health, well-being and equity. It aims to support action on climate adaptation and resilience in Wales by providing evidence on the wider health impacts of climate change in Wales, and what it means for people's lives in the places they live, work, learn and play. This includes economic, social, environmental and mental well-being.

Public Health Wales is the public health agency for the nation. It works towards a Wales where people live longer, healthier lives and where all people across the country have fair and equal access to the things that lead to good health and wellbeing. Over the past year Public Health Wales has engaged and spoken with many stakeholders across Wales to inform the development of our new Long Term Strategy. We heard that taking action on climate change is a priority for our partners and the public. Ensuring that action on climate change improves health and well-being and protects the most vulnerable is also important to people living in Wales.

As a result, Public Health Wales has made tackling the public health effects of climate change a strategic priority in our new Long Term Strategy from 2023 – 2035. As an organisation we recognise that climate change presents one of the most significant threats this century to physical and mental health and well-being and we are committed to working with partner agencies to scale up our work on climate adaptation and mitigation in the coming years.

The ambition of our work is to inform, enable and mobilise action on climate change across our own and other organisations, across sectors and across Wales. We want to ensure that the health and well-being of the people of Wales is protected, and made a central consideration in the development of policies, investments and responses to climate change. We hope you will join us in this challenge.

Dr Sumina Azam

National Director of Policy and International Health/
Director of the World Health Organisation Collaborating Centre
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Executive summary

Climate change will have a major long-term impact on health, wellbeing and equity. These impacts are multifaceted, are not static and will affect the population of Wales in the immediate and long-term. Climate change is a major challenge across the world and it has been recognised as an inhibitor to wellbeing, society, the environment and economic development at a national and international level.



Health Impact Assessment (HIA) is a systematic evidence based public health approach which is recognised and promoted across the world, including by the World Health Organisation. It considers the impact of policies and plans on health and wellbeing and also the differential impacts across the population which could exacerbate health and social inequalities.

The UK Committee on Climate Change (CCC, 2021) is clear that “Action to improve the nation’s resilience is failing to keep pace with the impacts of a warming planet and increasing climate risks facing the UK”. Baroness Brown, Chair of the CCC Adaptation Committee stated in 2021 that:

“The severity of the risks we face must not be underestimated. These risks will not disappear as the world moves to Net Zero; many of them are already locked in. By better understanding and preparing for the coming changes, the UK can prosper, protecting its people, its economy, and its natural environment. A detailed, effective action plan that prepares the UK for climate change is now essential and needed urgently.”

Baroness Brown, Chair of the CCC Adaptation Committee (CCC, 2021)

Purpose

This summary report provides the main findings of a **HIA of climate change in Wales**. It is a high-level, evidence-based strategic overview of the **main health and wellbeing impacts of climate change in Wales**.

The HIA aims to support a range of agencies to enhance action on climate adaptation and resilience in Wales by providing evidence on **the health, wellbeing and equity impacts of climate change in Wales, and what it means for people’s lives in the places they live, work, learn and play. This includes economic, social, environmental and mental wellbeing.**

Audience

The HIA provides **evidence to inform action on health and wellbeing** for a wide range of stakeholders including:

- Policy and decision makers across departments in national and local government
- Local Health Boards and clinicians
- Multisector partnerships like Public Services Boards and Local Resilience Fora
- Environment sector, transport and other infrastructure agencies
- Education, social care, community organisations and civil society.

The outputs of the HIA activity include:

- An evidence based HIA Summary report (this report)
- Individual chapters on the evidence of impact of climate change on the wider determinants of health and population groups in Wales
- A set of 4 infographics
- A PowerPoint slide deck
- A Technical Report

Summary of findings

Peer reviewed evidence, grey literature, health intelligence and stakeholder insights drawn together through the HIA process highlighted the following themes and findings in respect to public health in Wales.

Impact on population health and equity

- 1. Climate change is complex** and is an **important determinant of health and wellbeing**. Climate change does not exist in a vacuum and is caused and can be mitigated by, a wide range of international policies and political actors, as much as national, subnational and individual actions. Wales has control over some important policy levers and drivers to create action for climate change and health but not for others for example, the carbon emissions of other states and international trade, which also impact on the health and wellbeing of the Welsh population.
- Climate change will have potential **major, multifaceted, co-occurring and inequitable impacts** across a range of determinants of health for example, nutrition and food security, community resilience and cohesion, displacement of people, access to healthcare, damage to housing, transport and infrastructure, environmental determinants including water supply, biodiversity and the economy.
- 3. Climate change will impact on the health and wellbeing of the whole population of Wales, and some population groups are likely to experience disproportionate negative impacts.** For example, those on low incomes, children and young people, older adults, farmers, fishers and those who live in coastal areas. Settings such as education, workplaces, and health and social care facilities are also impacted by climate change and extreme weather events. Therefore, population and place-based vulnerability should be integrated into adaptation and resilience planning as much as sectoral and service-based risks.

4. There are a number of **compounding and cumulative impacts on some population groups** in Wales arising from climate change, Brexit, the ongoing impact of the COVID-19 pandemic and the current cost of living crisis.
5. The impact on **mental wellbeing** should be explicitly considered as part of climate change plans and adaptation. Anxiety about the future, sense of control, democratic participation, and trauma from extreme weather and flooding are key factors influencing mental health and wellbeing.

Policy

6. There **have been a range of policy responses, actions and mitigations** to date. These need to be built on and constructed in an integrated, systems-based approach with cross-sector involvement, as actions intended to have positive impacts for one sector could also have negative unintended impacts for health and wellbeing.
7. There are a **number of practical opportunities for health** that arise from climate change, and its mitigation. These include for example, **promoting active travel and nature-based solutions and green, blue and natural environments**. This could lead to increased outdoor activity, recreation and tourism in Wales, improved air quality and connecting with the natural environment in green and blue spaces to benefit physical and mental health and wellbeing.
8. There are **many synergies across policy areas which could facilitate health, wellbeing and mitigate the impact of climate change and promote sustainable development**. This includes for example, improved digital ways of working and service delivery, modes of transport and housing design and development.
9. The **Wellbeing of Future Generations (Wales) Act and the five ways of working provide an enabling policy context** to facilitate sustainable development and policies which can provide co-benefits for health, wellbeing, society, the environment and equity. This can support and promote action on climate change to enable health, social and environmental justice.
10. There are a number **of cross cutting and contextual factors** that influence the impacts of climate change on health and wellbeing. These include health equity, social and environmental justice, risk communication, and the role of democracy and community participation in climate adaptation.

Practice

11. **Action on adaptation is not keeping pace with climate change**, and an enhanced approach and prioritisation of adaptation activity and investment is now needed in policy and practice across sectors.
12. **Processes such as Health Impact Assessment (HIA) and Mental Wellbeing Impact Assessment (MWIA)**, can enable decision and policy makers to better understand the cumulative impacts of climate change on health and wellbeing. These processes can also engage citizens in participatory and democratic decision making and accountability that promotes trust and a sense of control.

Research

13. Further research is needed in several areas including identification of potential changing and increased health service demand arising from climate change, effective mitigation of short to long-term impacts of flooding and other extreme weather impacts on mental health and wellbeing on affected populations. The HIA has identified significant gaps in data and evidence on health impacts in Wales of extreme heat, drought and vector borne disease and implications for mental health, violence, alcohol and substance misuse and family and intergenerational relationships in Wales. Further evaluation of adaptation measures and a research strategy on climate change and population health is needed to inform action.

Population groups affected

The whole population is affected by climate change. Vulnerable population¹ groups that are particularly negatively or positively affected include: those on low incomes, age related groups for example, children and older people, women, occupational groups such as outdoor workers and health and social care staff, people with long-term health conditions and disabilities, and geographical communities such as rural and coastal communities.



¹ Please see page 20 for definition of “vulnerability”.

Potential actions

There are a wide range of actions which policy and decision makers can take to enable health and wellbeing in relation to climate change in Wales. These include for several areas of action:

- **Enhancing mitigation and adaptive capacity via long-term investment in preventive action:** This includes, for example, investing in action guided by enhanced, robust, routine public health surveillance and intelligence on the health, wellbeing and equity impacts of climate change and extreme weather events in Wales; building adaptive capacity and capability across the NHS, other Public Bodies and sectors and ensuring that health, wellbeing and equity are integrated into cross sector adaptation planning; and building knowledge and skills in climate change within the public health workforce. This aligns with the Faculty of Public Health Strategy on climate change.
- **Enhancing prevention and public involvement via targeted communications and education:** This includes, for example, promoting action to mitigate and adapt to climate change by applying behavioural science and the evidence base on risk communication and evaluating the impact. It can also include providing clear, trusted and targeted information for the public and non-biased high quality teaching materials for schools on climate change, that address public concerns and mobilise citizen and community led action on climate change.
- **Enhancing public involvement:** Including enhancing control, resilience and participation via democratic decision-making processes, governance, and community engagement in climate change policy and planning, for example, flood and coastal erosion policy.
- **Enhancing integration and collaboration:** Including, for example, strengthening the integration of health, wellbeing and equity impacts into climate change adaptation and mitigation policy development, to maximise opportunities for health and wellbeing, and prevent or mitigate unintended consequences, and via application of HIA or MWIA.
- **Investing in co-benefits for health:** This includes, for example, investing in strategies and climate resilient infrastructure to increase physical activity and active travel, factoring in potential for enhanced opportunities for outdoor recreation and active travel due to climate change.



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This HIA Summary report (this report) is also available in Welsh. It is accompanied by several outputs:

- Individual chapters on the evidence of impact of climate change on the wider determinants of health and population groups in Wales
- A set of 4 infographics
- A PowerPoint slide deck
- A Technical Report

Setting the scene

Public Health Wales NHS Trust (PHW) recognises that climate change is one of the most significant threats of the century, endangering physical health, mental health and wellbeing. It threatens all areas of life that impact our ability to achieve and maintain good health. As a result PHW has made tackling the public health effects of climate change a priority in its Long Term Strategy from 2023 – 2035 and is committed to working with partner agencies to respond and facilitate action on climate adaptation and mitigation (Public Health Wales NHS Trust, 2023).



As part of this commitment to supporting system wide action, this health impact assessment (HIA) is a strategic and comprehensive appraisal of the potential implications of climate change in the immediate to long-term on the population health of Wales. It provides robust evidence to inform public bodies, agencies and organisations in their preparations for, and responses to, climate change and climate change events. It aims to support adoption of policies and plans that can promote and protect health and wellbeing for all in Wales and in those population groups and geographical areas particularly at risk of negative impacts.

The HIA provides high level strategic recommendations in respect to strengthening responses to the health and wellbeing impacts of climate change. It is a baseline of the current status quo. It does not include a detailed consideration of mitigation. Mitigating actions must be brought forward by policy makers and other relevant actors and stakeholders (such as government; health sector; resilience and spatial planners; estates and transport managers; communities and the Third and Business sectors) as they are the most informed and influentially placed to do so.

It must be stressed that climate change is a complex, long term, political, economic, social and environmental conundrum to address and resolve. Any actions taken need to be carefully balanced to ensure that positive intentions and actions, for example decarbonisation, are managed so that any potential unintended negative impacts and consequences that could occur on the population are avoided. Participatory democratic instruments such as citizen assemblies can help to ensure that climate action takes into account the views, needs and concerns of the general public.

The HIA acknowledges that much progressive thinking, contingency and strategic planning has happened to date in Wales and continues to do so. However, action on adaptation is not keeping pace with the effects of climate change. Climate change is something that everyone in Wales has a duty to take action on to protect health – both via mitigation and adaptation. In light of the close connection between climate change, health, biodiversity and pandemics like COVID-19 it is of paramount importance that mitigation of climate change and support of biodiversity are on the top of the agenda when ‘building back better and fairer’ after the COVID-19 pandemic.



Introduction

Human health and wellbeing is embedded within, and inextricably linked to, the health and wellbeing of social and natural systems (Cook et al., 2019; Sandifer et al., 2015). The world and its population are currently living in an era, also termed the Anthropocene, where human activities are having a major impact on the earth's geology and ecosystems with resulting environmental, social, economic, physical and mental health and wellbeing impacts (Whitmee et al., 2015).

For over a decade, climate change has been recognised as one of the biggest threats to global health in the 21st century and is also likely to widen health inequalities (Costello et al., 2009). Health is determined by a wide range of factors including behaviours, the living environment, social and community factors, economic factors, education, access to services and healthy food – and all of these are likely to be impacted by climate change (Marmot et al., 2020; Watts et al., 2021).

The need to take action on the climate and nature emergencies in order to protect population health and wellbeing is becoming ever more urgent. Increasingly frequent extreme weather events (heat, drought and flood) have occurred in Wales in recent years and impacted infrastructure, services and population physical and mental wellbeing.

A fundamental shift is required in political, economic and personal action, and thinking in order to protect and promote the health and wellbeing of the population and the planet. The COVID-19 pandemic emergency has shown how rapid global action is possible and behaviour can be shaped and changed. It also demonstrates the importance of considering the integrated nature of the health, wellbeing, the natural environment, the economy and the social and environmental consequences of human activity.

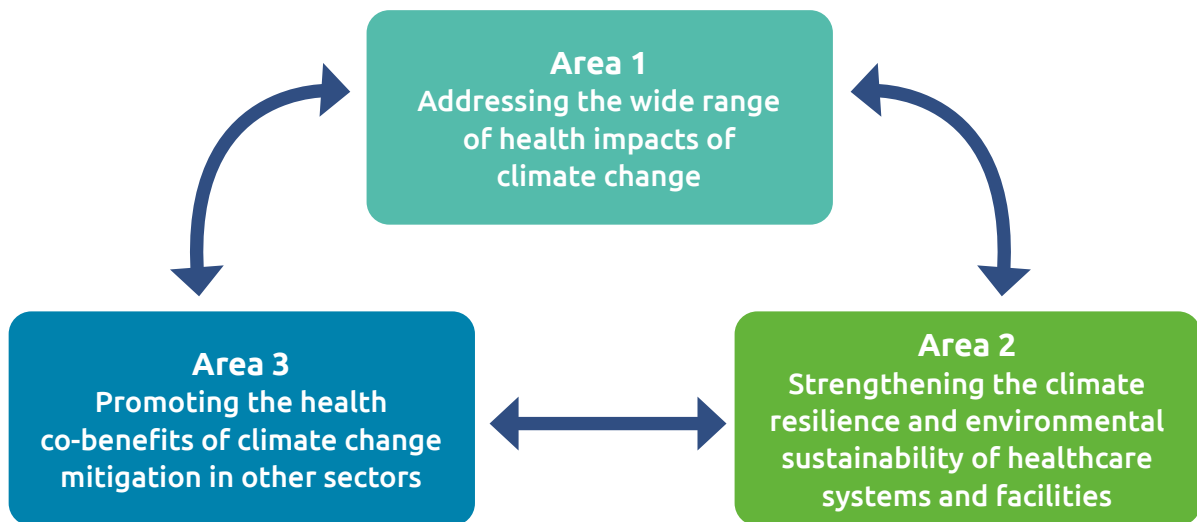
The context for this Health Impact Assessment report is directly informed by:

- The Intergovernmental Panel on Climate Change (IPCC) 6th Assessment report which states that: “Adaptation options that are feasible and effective today will become constrained and less effective with increasing global warming. Maladaptation can be avoided by flexible, multi-sectoral, inclusive, long-term planning and implementation of adaptation actions, with co-benefits to many sectors and systems” (IPCC, 2023).
- The United Nations Environment Programme (UNEP) Emissions Gap Report (UNEP, 2022) statement that policies currently in place for reducing emissions with no additional action are projected to result in global warming of 2.8°C over the 21st century. In order to limit global warming to 1.5°C, global annual greenhouse gas (GHG) emissions must be reduced by **45 per cent by 2030**. The UNEP are clear that this requires a *rapid transformation of societies and economies*.
- The IPCC (2018) report set out the increased risk to human health and ecosystems of warming in excess of 1.5°C, for example: “Adaptation is expected to be more challenging for ecosystems, food and health systems at 2°C of global warming than for 1.5°C”.
- The UK and Wales Climate Change Risk Assessments 3 (CCRA3) (Kovats and Brisley, 2021; Netherwood, 2021) and the UK Committee on Climate Change (UKCCC) (2021) statement that “Action to improve the nation’s resilience is failing to keep pace with the impacts of a warming planet and increasing climate risks facing the UK”
- Wales State of Natural Resources Report (NRW, 2020), which identifies that Wales is not achieving sustainable management of natural resources.

- The Welsh Government’s declaration of a climate emergency in 2019 (Welsh Government, 2019a): and commitment in its Programme for Government in 2021 to “embed the climate and nature emergency” across all policies (Welsh Government, 2021a).
- The second carbon budget for Wales places the country on a net zero by 2050 trajectory (Welsh Government, 2021b).
- The Welsh Chief Medical Officer’s Special Report (Welsh Government, 2022a) recommends a ‘One Health’ approach that sees the health and wellbeing of the population, animals and ecosystems as being linked, thereby necessitating collaboration across sectors and disciplines to address issues or risks that occur at the animal-human-ecosystems interface and promote any co-benefits of action.

The World Health Organization (WHO, n.d.a) programme on climate change and health incorporates three areas of focus to achieve “climate resilient” population health, which are strongly interrelated and inclusive of action on both adaptation and mitigation (see Box 1) – see Figure 1 below.

Figure 1: WHO areas of focus for climate resilient health



The primary focus of this HIA is in Area 1: “Addressing the wide range of health impacts of climate change” from an adaptation perspective. However, evidence and analysis on Areas 2 and 3 is also included on:

- Climate resilient healthcare systems and facilities (see Section D7.1)
- Health co-benefits of climate mitigation in other sectors (e.g., see Sections D2.1; D5.6; D8.1)

Box 1: Definitions of climate adaptation and mitigation

Adaptation (to climate change):

“The process of adjustment to actual or expected climate and its effects, in order to moderate harm or exploit beneficial opportunities” (IPCC, 2022, p. 2898)

Mitigation (of climate change):

“A human intervention to reduce emissions or enhance the sinks of greenhouse gases.” (IPCC, 2022, p.2915). *Climate change mitigation strategies include reducing greenhouse gas emissions and sources, and enhancing greenhouse gas sequestration.*

Wales

According to the UK Climate Projections 2018 (Met Office, 2018a; 2018b), as a result of climate change, warmer, wetter winters and hotter, drier summers are expected for Wales, with accompanying sea levels rises. Table 1 below shows the key projections for Wales for the 2070s (Met Office, 2018a; 2018b):

Table 1: Key climate projections for Wales for the 2070s					
	Summer rainfall change	Winter precipitation change	Summer temperature change	Winter temperature change	Sea level rise (by 2100)
	Central Wales				Cardiff
Low emission scenario (RCP2.6)	39% drier to 3% wetter	2% drier to 19% wetter	No change to 3.3°C warmer	0.1°C warmer to 2.4°C warmer	27 to 69 cm
High emission scenario (RCP8.5)	56% drier to 2% wetter	No change to 29% wetter	0.9°C warmer to 5.9°C warmer	0.7°C warmer to 4.1°C warmer	51 to 113 cm

During the last decade Welsh average land temperature was 0.9°C above the temperature of the period of mid-1970s to mid-2010s. Rainfall increased by 2% and sunshine hours by 6.1%. Weather extremes (especially extreme summer temperatures) have also increased (Netherwood, 2021).

The statutory Climate Change Risk Assessment for Wales 3 (CCRA3) (Kovats and Brisley, 2021, Netherwood, 2021) identifies the following priorities to protect health and wellbeing in Wales – see Table 2:

Table 2: Climate Change Risk Assessment for Wales 3 (CCRA3) (Kovats and Brisley, 2021; Netherwood, 2021)	
More action needed	Further Investigation needed
Risks to health and wellbeing from high temperatures	Risks to building fabric
Risks to people, communities and buildings from flooding	Risks to health and wellbeing from changes in air quality
Risks to the viability of coastal communities from sea level rise	Risks to health from vector-borne disease
Risks to health and social care delivery	Risks to food safety and food security
Risks to education and prison services	Risks to water quality and household water supplies
	Opportunities for health and wellbeing from higher temperatures

Current policy context and opportunities to enhance adaptive action

Wales has an enabling environment to facilitate sustainable development and policies to support both climate change adaptation and mitigation. The Wellbeing of Future Generations (Wales) Act 2015 places a duty on all Public Bodies to facilitate sustainable development and create a resilient, more equal and healthier Wales. Wales also appointed a Minister for Climate Change in 2021 after having declared a climate emergency in 2019 (Welsh Government, 2019a; n.d.).

The Climate Change Act (2008) also places duties on the UK and Welsh Governments to produce National Adaptation Plans. The current adaptation plan in Wales “Prosperity for all: A Climate Conscious Wales” (Welsh Government, 2019b) runs to 2025. A progress report has recently been published (Welsh Government, 2022b), and a new National Adaptation Plan is planned for 2024.

The current National Adaptation Plan for Wales (Welsh Government, 2019b) has five action areas to address the health and wellbeing impacts of climate change:

1. Increase understanding of the risk increased temperatures bring to public health and wellbeing.
2. Continue tackling fuel poverty through the Welsh Government Warm Homes Programme.
3. Update and revise plans and advice in line with research to increase understanding of the future risk extreme weather brings to health and social care delivery.
4. Ensure climate change risk is considered in future policy development to improve air quality in Wales.
5. Increase understanding of the risks from vector borne pathogens.

The Welsh Government’s recent adaptation progress report (Welsh Government, 2022b), acknowledges that climate change adaptation in Wales and across the UK is not keeping pace with the risks arising from climate change and the need to develop an updated strategic approach. The Welsh Government has commissioned an independent assessment by the UKCCC in relation to climate adaptation progress and future priorities in Wales, which will inform the next national adaptation plan. The Welsh Government has stated that the next plan will include consideration of updated methodological approaches for mapping and monitoring of pathways towards good adaptation outcomes; whole system perspectives for addressing different areas of climate risk, taking into account the implications of cascading impacts and interrelationships; a ‘Team Wales’, with broader consideration and support for the actions needed across the Welsh public sector, stakeholders and society.

At national, regional and local levels multiple policies and plans already provide opportunities to strengthen integration of actions to address the health, wellbeing and equity impacts of climate change – See Appendix A. However, recent analysis suggest that climate risk and adaptation planning has a limited profile in regional and local strategic plans in Wales (Netherwood et al., 2023). In addition, there is currently limited interpretation of climate risk for specific population groups and geographies in the updated regional Wellbeing Assessments undertaken in Wales (Netherwood et al., 2023).

There are proposals in a number of Public Services Boards (PSBs) Wellbeing Plans to undertake a local climate change risk assessment (Netherwood et al., 2023). This HIA aims to inform and support regional and local assessments and planning by providing an evidence base to support the interpretation of impacts on specific determinants of health and population groups. In addition, throughout the HIA appraisal sections, examples of cross-sector policy opportunities to address climate change impacts on health and wellbeing are provided which are relevant to each determinant of health, such as food security or education.

Health Impact Assessment

Within this context of the declaration of a climate emergency by Welsh Government in 2019 and growing concern about the immediate and future impacts of climate change, Public Health Wales recognised the need to carry out a HIA of climate change in Wales. As a result, the Wales Health Impact Assessment Support Unit (WHIASU), Policy and International Health - WHO Collaborating Centre on 'Investment for Health and Wellbeing' Directorate, Public Health Wales (PHW), conducted the HIA.

HIA is a public health tool and approach which can identify potential, and where observed, actual health, wellbeing and equity impacts of a policy, plan or project across a population. HIAs enable identification of whether those impacts are positive or promote opportunities or if they have negative, or unintended negative consequences and for whom (European Centre for Health Policy, 1999; WHO, n.d.). HIAs can help to identify evidence-based actions and mitigation to diminish or remove negative impacts and maximise positive ones (Green et al., 2021a). Evidence utilised includes robust peer reviewed research articles, grey literature, policy analysis, health intelligence and other data and stakeholder insight and evidence. HIA aims to address inequalities in health and wellbeing outcomes, by identifying disproportionate impacts and identifying areas for action to ensure policies do not inadvertently widen inequalities.

This HIA is a strategic and comprehensive appraisal of the potential implications of climate change in the immediate to long-term on the population of Wales. It provides robust evidence to inform public bodies, agencies and organisations in their preparations for, and responses to, climate change and climate change events with a primary focus on adaptation (see Box 1). It aims to support adoption of policies and plans that can promote and protect health and wellbeing for all in Wales - especially vulnerable communities. It will support policy and decision makers at all levels of government and across organisational boundaries to advance action on climate change adaptation. The HIA proposes high-level strategic areas for actions to strengthen capacity building and action on the health and wellbeing impacts of climate change in Wales.

Whilst the major focus of the HIA is on adaptation, stakeholders who contributed to the HIA also raised opportunities and co-benefits for health arising from the mitigation of climate change and these have been included, and warrant further attention.

Aims and objectives

This assessment is unique in that it utilises HIA methodology to identify the populations who may be majorly affected, alongside the potential impacts on the determinants of health and wellbeing, and will highlight any potential opportunities for the future. The aim of the HIA is to inform policy makers, public bodies, third and private sector agencies about the potential positive and negative impacts on people's lives, health and wellbeing and structural inequality which may emerge from climate change in Wales.

It assesses how any impact may manifest itself over time on the population for example, short or long-term; the likelihood for example, possible or probable; and who will be affected. It identifies strategic actions that could be implemented by a range of stakeholders and key decision makers. Opportunities for health and co-benefits are also highlighted along with areas of future research for population health and climate change.

The HIA does not replace the evidence and action contained within the statutory Climate Change Risk Assessment for Wales and the UK (Kovats and Brisley, 2021; Netherwood, 2021). It aims to add value to these statutory assessments by providing a public health lens focused on population health, the social determinants of health and health equity in Wales, and the evidence and actions in the HIA should be read in conjunction with those documents.

Methodology

HIA is a standard 5 step process and the methodology for the HIA is summarised below in Table 3. A Strategic Advisory Group was established to oversee the HIA and PHW governance processes and quality assurance were carried out. The HIA uses a set of specific descriptors to describe and characterise impacts on the determinants of health and population groups and this can be found in Appendix B.

Table 3: The Methodological Process for the HIA (adapted from Green et al, 2021a)

HIA Step	Actions		How Step was undertaken in the HIA
1. Screening	Identified the preliminary health and wellbeing impacts and those affected in the population.		<ul style="list-style-type: none"> • A Working Group was established internal to Public Health Wales. • Wide ranging populations and determinants affected were identified. • 2 checklists were used as a guide.
2. Scoping	Identifies the: <ul style="list-style-type: none"> • geographical boundaries of the HIA • focus of inquiry • timeframes / deadlines • terminology to be used to define and characterise impact • stakeholders • engagement methods • data and evidence sources. 		<ul style="list-style-type: none"> • A checklist was used to develop the proposed scope by lead authors and working group. • Resources allocated and agreed by PHW. • Proposed scope and approach discussed with engagement from the Strategic Advisory Group and finalised. • Timeframe for completion was one year initially to inform policy and decision makers. However, this work was suspended during the pandemic.
3a. Appraisal – Evidence Gathering	Literature Review	Carry out literature review and synthesise into summary to identify relevant qualitative and quantitative evidence and statistics.	<ul style="list-style-type: none"> • Research Protocol compiled for a systematic rapid review. • Search carried out • Papers screened • Papers reviewed and samples checked • Quality review • Extraction table completed
	Collate Community Health Profile and environmental data	Used the scoping and screening checklists as a guide to gather data to identify relevant health intelligence and demographic, economic, environmental and social data / statistics. This includes gathering data in relation to population groups affected and determinants of health identified.	Data and health intelligence was obtained from robust sources including: <ul style="list-style-type: none"> • Welsh Government • National Survey for Wales • Public Health Wales Observatory • Welsh Index of Multiple Deprivation • Office of National Statistics • Statistics Wales • Natural Resources Wales • UK Government <p>All data collected was compiled into a Community Health Profile which fed into the final HIA report (see Technical Report).</p>

	Stakeholder evidence	<p>Identified key information, knowledge and evidence of external stakeholders identified as part of the Scoping Process by:</p> <ul style="list-style-type: none"> • Undertaking interviews and transcribing for analysis • Carrying out 2 participatory stakeholder workshops • Developing a summary of results to input into the final report. 	<ul style="list-style-type: none"> • 19 stakeholder interviews were undertaken • 2 workshops were held with 33 people attending • Stakeholders involved in these included representatives from a wide range of public bodies, academia and the third sector. These included for example: <ul style="list-style-type: none"> • Natural Resources Wales • Welsh Government • Public Health Wales • Health Boards • Local Authorities • Renew Wales • Cardiff University • University of West of England <p>Multiple disciplines were also involved including health and social care, housing, land use planning, sustainable development, transport, emergency services, climate change, food and agriculture and community representatives.</p>
3b. Appraisal of Evidence	<ul style="list-style-type: none"> • Triangulation of evidence to assess and characterise the positive and negative impacts and form a picture of the scale, scope and duration of these. • Form suggestions for action and main findings in dialogue with stakeholders. 		<ul style="list-style-type: none"> • Impact on determinants of health identified • Population Groups identified as being affected identified • Characterisation of impact table drafted.
4. Reporting and Recommendations	<ul style="list-style-type: none"> • Compile report and suggested actions • Carry out quality assurance with key stakeholders • Review and 'Sign off' in PHW • Publication of HIA 		<ul style="list-style-type: none"> • Report published • Dissemination via networks and stakeholders involved
5. Review, reflection and monitoring	<ul style="list-style-type: none"> • Review and evaluate the process of carrying out the HIA • Develop monitoring indicators / steps 		<ul style="list-style-type: none"> • Monitoring and evaluation plan to be developed • Review and reflection session • Compile review and reflection paper.

Summary of key findings

The HIA has identified a number of population groups (Table 4) who are more vulnerable and disproportionately impacted by the health and wellbeing impacts of climate change. The HIA has identified that climate change will have impacts across all of the social determinants of health (Table 5), some of which have the potential to impact across the whole population for example, impacts on food security and nutrition (see Section D1). Individual evidence appraisal summaries² for each determinant and population group can be accessed by the embedded links in Tables 4 and 5. A summary table of impact is also provided in Appendix C.

Impact on population health and equity

1. **Climate change is complex** and is an **important determinant of health and wellbeing**. Climate change does not exist in a vacuum and is caused and can be mitigated by, a wide range of international policies and political actors, as much as national, subnational and individual actions. Wales has control over some important policy levers and drivers to create action for climate change and health but not for others for example, the carbon emissions of other states and international trade, which also impact on the health and wellbeing of the Welsh population.
2. Climate change will have potential **major, multifaceted, co-occurring and inequitable impacts** across a range of determinants of health for example, nutrition and food security, community resilience and cohesion, displacement of people, access to healthcare, damage to housing, transport and infrastructure, environmental determinants including water supply, biodiversity and the economy.
3. **Climate change will impact on the health and wellbeing of the whole population of Wales, and some population groups are likely to experience disproportionate negative impacts**. For example, those on low incomes, children and young people, older adults, farmers, fishers and those who live in coastal areas. Settings such as education, workplaces, and health and social care facilities are also impacted by climate change and extreme weather events. Therefore, population and place-based vulnerability should be integrated into adaptation and resilience planning as much as sectoral and service-based risks.
4. There are a number of **compounding and cumulative impacts on some population groups** in Wales arising from climate change, Brexit, the ongoing impact of the COVID-19 pandemic and the current cost of living crisis.
5. The impact on **mental wellbeing** should be explicitly considered as part of climate change plans and adaptation. Anxiety about the future, sense of control, democratic participation, and trauma from extreme weather and flooding are key factors influencing mental health and wellbeing.

² Evidence from stakeholders is referenced in the appraisal sections as W1 and W2 for insights from participatory workshops, and Int. 1 etc for evidence from expert interviews.

Policy

6. There **have been a range of policy responses, actions and mitigations** to date. These need to be built on and constructed in an integrated, systems-based approach with cross-sector involvement, as actions intended to have positive impacts for one sector could also have negative unintended impacts for health and wellbeing.
7. There are a **number of practical opportunities for health** that arise from climate change, and its mitigation. These include for example, **promoting active travel and nature-based solutions and green, blue and natural environments**. This could lead to increased outdoor activity, recreation and tourism in Wales, improved air quality and connecting with the natural environment in green and blue spaces to benefit physical and mental health and wellbeing.
8. There are **many synergies across policy areas which could facilitate health, wellbeing and mitigate the impact of climate change and promote sustainable development**. This includes for example, improved digital ways of working and service delivery, modes of transport and housing design and development.
9. The **Wellbeing of Future Generations (Wales) Act and the five ways of working provide an enabling policy context** to facilitate sustainable development and policies which can provide co-benefits for health, wellbeing, society, the environment and equity. This can support and promote action on climate change to enable health, social and environmental justice.
10. There are a number **of cross cutting and contextual factors** that influence the impacts of climate change on health and wellbeing. These include health equity, social and environmental justice, risk communication, and the role of democracy and community participation in climate adaptation.

Practice

11. **Action on adaptation is not keeping pace with climate change**, and an enhanced approach and prioritisation of adaptation activity and investment is now needed in policy and practice across sectors.
12. **Processes such as Health Impact Assessment (HIA) and Mental Wellbeing Impact Assessment (MWIA)**, can enable decision and policy makers to better understand the cumulative impacts of climate change on health and wellbeing. These processes can also engage citizens in participatory and democratic decision making and accountability that promotes trust and a sense of control.

Research

13. **Further research is needed in several areas including** identification of potential changing and increased health service demand arising from climate change, effective mitigation of short to long-term impacts of flooding and other extreme weather impacts on mental health and wellbeing on affected populations. The HIA has identified significant gaps in data and evidence on health impacts in Wales of extreme heat, drought and vector borne disease and implications for mental health, violence, alcohol and substance misuse and family and intergenerational relationships in Wales. Further evaluation of adaptation measures and a research strategy on climate change and population health is also needed.

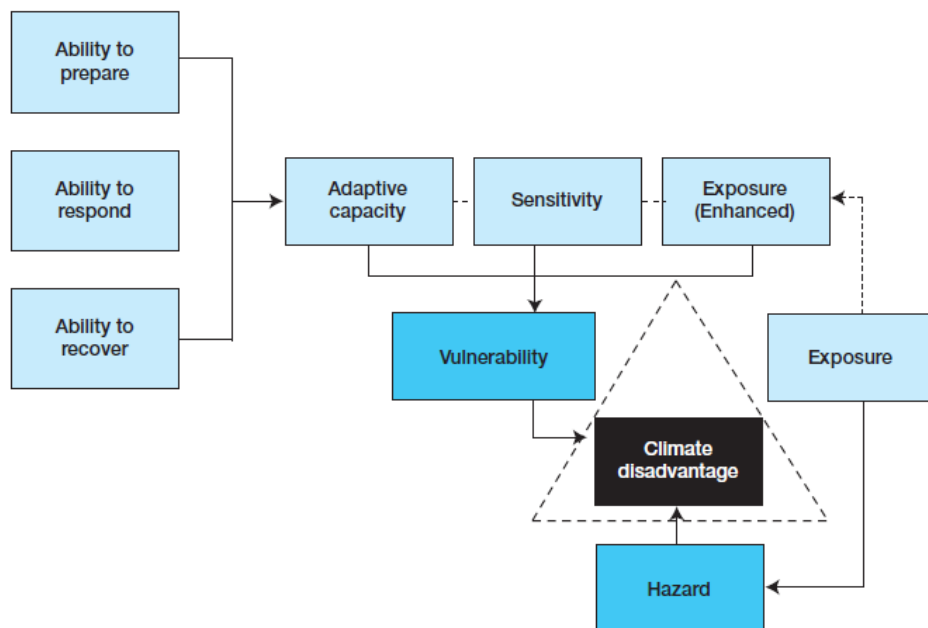
Key findings: Impacts on population groups in Wales

Climate change will impact on the health and wellbeing of the whole population in Wales, however, the impacts of climate change on health and wellbeing are not distributed equally (Lindley et al., 2011). The Climate Change Risk Assessment 3 for the UK states that “opportunities for adaptation are unlikely to be evenly distributed across the UK population” (Kovats and Brisley, 2021, p. 16). Therefore, it is important that cross sector and organisational adaptation policies identify and plans for differential and specific impacts on a range of population groups in order to promote and protect health and wellbeing in the face of climate change.

The literature on environmental health and disaster risk reduction uses the term “vulnerability” to refer to a “...state of susceptibility to harm from exposure to stresses associated with environmental and social change and from the absence of capacity to adapt” (Adger, 2006). Vulnerability, as conceptualised in this HIA, is not inferring vulnerability as either a property of a particular group or individual, or as a deficit (Brown, 2014; Preston et al., 2014). Rather, the HIA approaches vulnerability as arising from both personal, social, and environmental living circumstances along with structural social, economic, political and governance factors that influence access to the resources, opportunities and capabilities needed for adaptation (Brown, 2014; Lindley et al., 2011; Preston et al., 2014).

Lindley et al. (2011) argued that climate adaptation policy should move beyond traditional physical and economic measures of impact, to incorporate broader impacts on wellbeing and quality of life including social and psychological factors. This HIA has utilised the conceptual framework for assessing socio-spatial vulnerability and climate disadvantage developed by Lindley et al. (2011). It uses this as the basis for understanding vulnerability in relation to climate change adaptation and identifying population groups who may be disproportionately impacted in Wales. It provides a framework that enables consideration of both the social determinants of health, including social and mental wellbeing, as well as structural factors and inequalities (see Figure 2 below).

Figure 2: Conceptual framework for assessing socio-spatial vulnerability and climate disadvantage³ (Lindley et al., 2011)



³ Source: reproduced with kind permission from Sarah Lindley (Lindley et al., 2011)

The appraisal of impacts on population groups has also been informed by the ‘intersectionality’ of social identities, meaning that people’s lives and experience of inequality are not experienced in isolation and an individual and communities can experience cumulative inequality across a number of dimensions (Marmot et al., 2020; Phoenix, 2018).

Table 4 below summarises the population groups who are more vulnerable and disproportionately impacted by the health and wellbeing impacts of climate change in Wales identified in the HIA.

Table 4: Population Groups who are more vulnerable and disproportionately impacted by the health and wellbeing impacts of climate change in Wales	
P1	Age related groups
P1.1	Babies, children and young people
P1.2	Older adults
P2	Sex/gender related groups
P2.1	Women
P2.2	Pregnant women
P2.3	Men
P3	Groups at higher risk of discrimination or other social disadvantage
P3.1	Displaced people and Refugee and asylum seekers (see D3.2)
P3.2	People with long-term health conditions and/or disabilities
P3.3	People who are homeless
P3.4	Minority ethnic groups
P3.5	People who are new to an area
P4	Income related groups
P4.1	People living on a low income
P5	Occupational groups (see D6.1)
P6	Geographical Groups
P6.1	Coastal communities
P6.2	Flood risk areas (see D5.3)
P6.3	Former and current industrial areas
P6.4	Urban areas
P6.5	Rural areas
P6.6	Areas of multiple disadvantage

The HIA has identified that specific characteristics of the population in Wales leads to some overarching vulnerabilities including:



- **Personal factors – age (older adults):** the proportion of the Welsh population aged over 65 will continue to increase (Welsh Government, 2021c) and older adults, who are more likely to be living with long term health conditions, are more sensitive to a range of climate change related health impacts including higher temperatures and flooding (see Section P1.2).

- **Personal factors – age (children and young people):** whilst people aged under 15 make up a smaller and reducing proportion of the population in Wales (Welsh Government, 2021c), babies, children and young people will be living with the consequences of climate change for longer and have access to less resources and agency to prepare, adapt and recover from climate related events. Babies and young children are more sensitive to both higher temperatures and reduced access to healthy food (see Section P1.1, D1, D4 and D5.4).

- **Personal factors – health:** 33% of adults in Wales reported a limiting longstanding illness in 2021/22 (Welsh Government, 2022c). People in Wales live on average for around 18 years not in good health, and there is a gap in healthy life expectancy of 13.3 years between people living in the least and most disadvantaged areas of Wales (data for 2018-2020) (Public Health Wales Observatory, 2022). People living with a range of health conditions are more vulnerable to climate change related health impacts including higher temperatures, flooding and reduced air quality (see Section P3.2).

- **Social and environmental factors – occupation:** over 40% of the workforce in Wales work in jobs that are identified as being more exposed to the health and wellbeing impacts of climate change including outdoor workers such as farmers and construction, people working in health, social care and emergency services, education, transport and manufacturing (see Section D6.1).

- **Social factors - low income:** for the last decade, almost a quarter of the population in Wales have been living in poverty – in 2020 it was 23%, with nearly 1 in 3 children living in poverty (31%) (Roberts et al., 2022; Stats Wales, 2023). Wales already has higher levels of poverty compared to the rest of the UK, and its population is likely to be worse affected by both the climate and cost of living crises. This will have a major impact on the resources that individuals and families have to prepare, respond and recover from the increasing frequency of extreme weather predicted as a result of climate change (see Section P4.1).

- **Social factors - housing:** Wales has the oldest housing stock in the UK (Piddington et al., 2020) and 18% of all homes in Wales pose an unacceptable risk to health (defined as homes having at least one of the 26 Category 1 hazards), with hazards significantly higher in the private rented sector compared to owner occupied or social housing (Welsh Government, 2020a). Increased intensity of rainfall and storm events is likely to lead to damage to homes, increases of water penetration and elevated moisture content of outdoor and indoor air affecting damp and mould levels (Netherwood, 2021; Int. 12)⁴. In addition, over-heating in some homes may increase, and certain types of housing (such as caravans) may increase vulnerability to climate risks (see Sections D5.1). Those on lower incomes or in the private rented sector may have less resources and opportunity to adapt or repair their homes (see Section P4.1).



4 Evidence from stakeholders is referenced as W1 and W2 for insights from participatory workshops, and Int. 1 etc. for evidence from expert interviews.

- **Environmental factors – geography:** Over 60% of the population of Wales lives and works in coastal areas (Welsh Government, 2015) including the coastal urban centres, of Cardiff, Swansea and Newport and the coastal area of North Wales. This means that a significant proportion of the population is potentially exposed to the health and wellbeing impacts of sea level rise, coastal erosion and flooding (Welsh Government, 2021d). In addition, the health impacts on coastal communities where flood risk policy could change from a ‘holding the line’ policy (active flood defence) to ‘no active intervention’ or ‘managed realignment’ by 2100 are highly significant for physical, mental, social, economic and environmental wellbeing (see Section P6.1, D5.3).

- **Environmental and social factors – former industrial areas:** the former mining areas of Wales contain at least 2,456 disused coal tips, with most located in the South Wales valleys (Welsh Government, 2022d). The risk of slope failure in some tips may increase as a result of heavier rain occurring more frequently due to climate change (Kovats and Brisley, 2022), with water ingress posing the biggest risk to stability (Coal Authority, 2020). A programme of inspection and safety measures has been initiated (Welsh Government, 2022e). In addition, old mining infrastructure can also be liable to flooding or subsidence, creating impacts on nearby housing (Coal Authority, 2021; Kovats and Brisley, 2021) (Sections D5.7 and P6.3).

Finally, there are **many compounding and cumulative impacts on some population groups** in Wales arising from **Brexit, the ongoing impact of the COVID-19 pandemic and the current cost of living crisis** (Green et al., 2021b; 2021c; 2022; Roberts et al., 2022). Those groups most exposed to these cumulative impacts include:

- Babies, children and young people
- Older adults
- Women
- Black and minority ethnic groups
- People with disabilities and long-term health conditions
- Migrants and their families
- People living on a low income
- Social and private renters
- Rural communities
- People living in areas of multiple disadvantage
- Farmers, fishers and agricultural workers
- Key workers – including health, social care, transport, education and emergency services



These cumulative impacts also need to be considered in policy responses to climate change.



Key findings: Determinants of health and wellbeing

The HIA of climate change has identified that all of the determinants of health and wellbeing are impacted by climate change (see Table 5), with the potential to lead to cumulative and long-term impacts on overall population health and inequalities. Given the long-term nature of climate change and the projected increased frequency of extreme weather events, the health and wellbeing impacts are not limited to singular extreme weather events such as a heatwave or flooding event in any given year, nor are they limited to one type of health outcome (for example, mortality from extreme heat). Instead, they are likely to be multifaceted and cumulative spanning physical, mental and social health and wellbeing outcomes at the individual and community levels, with the potential to widen inequalities.

In addition, alongside the impacts of accelerating climate change, the major social and economic transition required to achieve a sustainable, low carbon Wales to protect future generations will also place challenges on the social infrastructure that supports the wellbeing of people in Wales (Welsh Government, 2022f).

Engagement with communities and stakeholders in Wales about place based climate change adaptation suggest that there is both understanding and experience of these interacting impacts already:

“Communities are concerned about the pervasive and wider risks to the community, place, economy, landscape and nature – not just the direct impact of severer weather on people. There is a clear understanding from agencies and communities that severe weather will impact on infrastructure that community relies on but will also have wider societal and economic impacts” (Netherwood and Thomas, 2019).

Therefore, whilst the HIA considers impacts on the determinants of health individually, it also aims to bring a focus on the interacting and cumulative impacts that will impact on people and places. Table 5 below provides a summary of the determinants of health impacted and individual evidence summaries for each of the determinants can be accessed via the embedded hyperlinks in the table.



Table 5: Determinants of Health impacted by climate change in Wales	
D1	<u>Food security and nutrition</u>
D2	<u>Behaviours Affecting Health</u>
D2.1	<u>Physical and outdoor leisure activity</u>
A1 ⁵	<u>Alcohol and substance misuse</u>
D3	<u>Social and community factors</u>
D3.1	<u>Community resilience and cohesion</u>
D3.2/P3.1	<u>Population displacement, mobility and migration</u>
A2	<u>Violence</u>
A3	<u>Family and intergenerational relationships</u>
D4	<u>Mental health and wellbeing</u>
D5	<u>Living and environmental conditions affecting health</u>
D5.1	<u>Housing</u>
D5.2	<u>Air Quality</u>
D5.3/P6.2	<u>Flooding</u>
D5.4	<u>Higher temperatures and extreme heat</u>
D5.5	<u>Water supply and quality</u>
D5.6	<u>Natural Environment and Biodiversity</u>
D5.7	<u>Landslides and coal tips</u>
D5.8	<u>Wildfires</u>
D5.9	<u>Vector Borne Disease</u>
D6	<u>Economic conditions affecting health</u>
D6.1/P5	<u>Working conditions</u>
D6.2	<u>Economic development and skills</u>
D7	<u>Access and quality of services</u>
D7.1	<u>Health and social care: access and delivery</u>
D7.2	<u>Education</u>
D8.	<u>Macro-economic, environmental and sustainability factors</u>
D8.1	<u>Transport</u>
D8.2	<u>Infrastructure</u>

5 Sections labelled A1-A3 summarise evidence appraised on impacts on three social determinants of health that were identified as important by stakeholders and are highly relevant to population health in Wales. However, limited evidence was identified in the literature to enable assessment of the level of potential impact on Wales, therefore each of these areas are recommended areas for further research

Negative impacts

This section describes the major negative impacts on the determinants of health. Other determinants could be affected at a moderate or minimal level. The full spectrum of impacts are captured in the appraisal sections and the Table of Impact in Appendix C.

● Food security and access to healthy food

Major negative impacts on **food security and access to healthy food** are identified, with the potential for cumulative impacts on food poverty arising from the current cost of living crisis. Food supply in Wales is exposed to the impacts of climate change internationally through for example, drought or transport disruption to supply chains, and a changing climate will also impact on food production in the UK. Impacts are also identified on the nutritional value and quality of food (see Section D1).

● Environmental

The **ecosystems** that are essential for population health and wellbeing will be negatively impacted by the nature and climate emergencies, including **water supply and quality; green infrastructure and biodiversity; air and soil quality** (see Sections D5.2 - 5.8). This can have not only direct physical impacts from individual incidents, such as sewerage contamination of water causing gastrointestinal illness or wildfires impacting respiratory health (see Sections D5.5 and D5.8), but also wider social, economic and mental health impacts – for example the impact of drought on farmers (see Sections D5.5, D4, D6.1, P6.5). Impacts on mental wellbeing linked to loss and damage to the natural environment also occur (for example, “solastalgia”) (Albrecht et al., 2007) (see Section D4).

Increased exposure to flooding from all sources, linked to heavier rainfall and sea level rise, is identified as a major negative impact on health and wellbeing. Flooding can impact directly on physical health via mortality or injury, it can cause financial stress and insecurity – particularly for those not insured, damage to homes, disruption to education and food production. Major and long-term impacts are identified on mental health and wellbeing, with strong evidence of significant increases in Post-Traumatic Stress Disorder (PTSD), depression and anxiety on people whose homes are flooded. These impacts are also observed amongst those whose lives are disrupted by flooding but who did not have floodwater in the liveable part of their homes (although to a lesser extent), and are worse where people did not receive a warning. (see Sections D5.3, D4, P6.1).

Higher temperatures and extreme heat are identified as having a major negative impact on health and wellbeing, particularly for vulnerable groups such as older adults, people with disabilities and long-term health conditions and younger children. Those in key settings such as care homes, hospitals, education settings and prisons and key occupational groups are also more exposed. Heat impacts go beyond mortality, and include possible impacts on injuries, mental health and social wellbeing (see Sections D4; D5.4; D6.1).

People spend the majority of their time in **indoor environments, at home, work and school**. Impacts are identified on the living environment in homes such as overheating and damp from increased rainfall (see Section D5.1) which at a time of increased remote working could worsen health outcomes. Working conditions will also be impacted across occupations, but with more significant negative impacts on outdoor workers, health, social care and emergency services, manufacturing, transport, education and prisons (see Section D6.1). Education settings are identified as at risk of overheating during periods of extreme heat, with health and education outcomes potentially impacted (see Section D7.2). This finding emphasises the importance of a whole system, people and places approach to climate change adaptation as people are exposed to impacts in multiple locations and areas of their lives.

● Mental health and wellbeing

Mental health and wellbeing is likely to be impacted via multiple pathways. Direct impacts on mental health and wellbeing arising from: trauma from exposure to acute extreme weather events and disasters that increases the risk of clinical conditions such as PTSD and anxiety disorders; more frequent exposure to “sub-acute” events, such as lengthy droughts or longer heatwaves, that lead to chronic stress. Indirect impacts on mental health and wellbeing may arise from: physical health impacts of climate change; climate change impacts on the living and natural environment; social and economic changes; climate adaptation and mitigation policy, communications and actions; awareness of the threats and impacts of climate change on the current and future generations (see Section D4). In addition, there are potential impacts on Adverse Childhood Experiences identified with regards to additional stressors on parents arising from flooding (see Section A3; D5.3) or other consequences of climate change, impacts on rates and/or severity of mental disorder, and possible impacts on violence and substance misuse (see Sections A1; A2). Community resilience, education, empowerment and collective action and social support are important mechanisms to mitigate impacts on mental wellbeing (see Box 2, Sections D3.2 and D4).

Box 2: Findings from place-based engagement with stakeholders and communities in Wales on climate adaptation highlights mental health and wellbeing as a key concern:

“Pervasive and cumulative risk of climate impacts on people’s **mental health**”

“**Social networks** are not strong enough to deal with increased impacts of climate change and to respond collectively”.

(Netherwood and Thomas, 2019; 2021)

● Access to health and care services

Increasing frequency of emergencies and extreme weather events, such as flooding will place additional and more demands on health care and impact on the wellbeing of staff. Extreme heat will also increase demands on services, and hospitals and care homes can be at risk of overheating, with impacts on their operational resilience, staff and patient health and wellbeing. Some health and social care sites in Wales are at risk of flooding (see Section D7.1). Additional and changing demands on services may also arise from cumulative health and wellbeing impacts of climate change across the population. However, in the long-term cold weather mortality and morbidity are projected to decline which may reduce “winter pressures” (see Section D7.1). The **health and social care sector and workforce** is exposed to a number of negative impacts arising from climate change, which will be cumulative and compounding following the major demands on this sector from the COVID-19 pandemic (see Section D6.1).

● Infrastructure

Major negative impacts are identified on **key areas of infrastructure** such as transport, internet, telecoms, and energy that underpin the resilience of the economy, communities and provision of essential goods and services, including health and social care (see Section D8.2).

● Health behaviours

Climate change is also likely to impact on people’s **health behaviours**, and there is some evidence that health behaviours and outcomes that are relevant to current public health priorities could be impacted including; dietary behaviours and access to healthy food in relation to obesity, cancer and cardiovascular disease prevention; alcohol and substance misuse; physical activity; and violence (see sections D1; D2.1; A1; A2).

Opportunities / positive impacts

Possible opportunities to enhance health and wellbeing have also been identified in the HIA. These largely arise via adaptation and mitigation policy and actions (see also “co-benefits” for health section below) and build on the response to the COVID-19 pandemic. A smaller number are linked to warmer weather arising directly from climate change. There is good evidence that these opportunities could benefit health and wellbeing, and there is strong evidence of the positive impact of key decarbonisation pathways related to active travel, diets, and reducing emissions on health and wellbeing (Milner et al., 2023). However, whether some of these opportunities occur or not is largely dependent on policy decisions and investment, alongside population behaviour change. Therefore, most are identified as possible (may or may not occur) and there is a lack of evidence for the intensity of some of the opportunities / positive impacts as most have not yet occurred.

Possible opportunities include:

● Nature based solutions and green, blue and natural environments:

- Increased outdoor activity, recreation and tourism in Wales (linked to warmer weather), and connecting with the natural environment in green and blue spaces to benefit physical and mental health and wellbeing (see sections D2.1; D5.6). This may also provide greater opportunities for “green” social prescribing.
- Nature based mitigation strategies can benefit health and wellbeing e.g., by the removal of air pollutants, preventing floods, reducing heat impacts of climate change and increasing access to green and natural spaces for physical and mental health (see Section D5.6).

● Community led action, resilience and social capital:

- Building community resilience and social networks; this can have a preventive effect as it helps communities to cope with current situations and prepares the population for future climate related extreme weather (see Section D3.1).
- Enhancing social cohesion and social capital can protect communities from isolation and mental health impacts during climate related disasters (see Sections D3.1 and D4).
- Building on and sustaining the expansion of community-led action and mutual aid developed during the COVID-19 pandemic which led to more social cohesion and participation in many areas in Wales.
- Building community resilience through sustainable skills development (e.g., repair) and community food growing (see sections D3.1).
- Community-led action on climate change can build trust, social capital, enhance a sense of control and resilience which are protective factors for mental wellbeing (see section D3.1).

● Food security and nutrition

- Community food growing and building resilient local food systems (see Section D1).
- Enhancing healthy eating via the adoption of a healthy and sustainable diet based on a higher intake of plant-based foods for example the Lancet EAT well diet (see Section D1).

● Economy, skills and education

- New skills, industries and jobs created linked to a “green economy” / decarbonisation, and a “circular economy” (see section D6.2).
- Targeted education to empower and enable people to make choices and to take action on climate change as citizens (see sections D3.1; D7.2).

● Health and social care

- Developing new models of climate resilient health and social care including digital/virtual delivery of services (see Section D7.1).
- Enhancing actions on adaptation in the health and care sectors e.g., to reduce overheating risks, enhancing resilience to flooding across estates, protect workforce health, protect vulnerable people in extreme weather and emergencies, understand areas of increasing and new demands (see Section D7.1).

● Reducing emissions and improving energy efficiency of homes

- Greater investment in decarbonised public transport and active travel can lead to positive health outcomes via lower emissions, improved air quality, and increased physical activity (see Section D8.1).
- Improving the energy efficiency of homes to reduce emissions, fuel poverty and cold related morbidity and mortality (see Section D5.1) and facilitating a transition to renewables.



Cross cutting themes and contextual factors

Throughout the appraisal process for the HIA, including ongoing discussions with stakeholders, review of the literature and engagement with policy making on climate change and health, a number of important cross cutting factors and themes emerged. These factors and themes interact and are important considerations in understanding health impacts and planning adaptive actions to protect health and wellbeing.

Health equity and social and environmental justice

Climate injustice is identified by Preston et al. (2014) as *“in part due to the differential social impacts of climate change and uneven patterns of social vulnerability... and is also found when examining the distribution of costs and benefits of policies to address climate change”* (p. 4). Procedural justice⁶, such as opportunities to participate and influence decision-making and policy responses on climate change, is also an important dimension of environmental justice (Mitchell, 2019; Preston et al., 2014) and is addressed in the section on democracy and participation below.

Issues relating to climate justice have been identified in relation to climate change adaptation in the HIA, in particular, in relation to intergenerational justice (see Section A3), social justice issues raised by planning for sea level rise, flooding and coastal erosion in coastal communities (see Section P6.1), and distributional justice in the form of socioeconomic inequalities linked to income and housing (see P4.1; P6.6; D5.1).

The UK Climate Change Risk Assessment 3 summary for Wales (Netherwood, 2021), states that the effects of climate change on people will be strongly influenced by their social, economic and cultural environment. The appraisal of the impacts of climate change on the health and wellbeing of key population groups contained in this HIA highlights that some groups are more vulnerable (whether through sensitivity, exposure or adaptive capacity) than others, and therefore, climate change may contribute to widening inequalities in health.

Social justice and fairness is also central to considerations in terms of how the opportunities and mitigations in the transition to a low carbon economy are distributed e.g., economic opportunities and energy efficiency measures (see Section D5.1; P4.1; P6.6; D6.2). MacBride-Stewart and Parken (2021) summarise this by stating that that:

“The poorest and most marginalised populations are least responsible for climate change but are a) the most likely to be exposed to its negative effects, b) more susceptible to damage and c) have the least resources to respond, cope and recover. Climate change mitigation could benefit marginalised communities if done well but could increase inequalities if the impacts on different groups in society are not factored in. It is important that climate change does not become separated from equalities thinking and understanding, or limited to decarbonisation when it is just one part of achieving sustainability and wellbeing for people and planet” (p. 5).

⁶ Procedural justice can be defined as fair procedures and decision making processes including being treated with dignity and respect, having a voice, and perceived transparency, neutrality and trustworthiness of decision making authorities (Yale Law School, n.d.)

The Welsh Government (2022f) has committed to a “just transition” including consideration of the implications of decarbonisation for existing socioeconomic and health inequalities. The wide ranging and long-term implications of climate change for social and environmental justice and health equity were identified in the HIA. The potential for unintended consequences and trade-offs to occur in climate adaptation and mitigation policies (IPCC, 2018; Bennett-Lloyd et al., 2019) suggest that more detailed policy and impact analysis of the processes and consequences of climate policy, including the application of HIA, would be beneficial (EASAC, 2017).

Democracy and public participation in climate adaptation

Stakeholders in the HIA raised the importance of participation in local democracy and decision making as a protective factor for community resilience in the context of climate change (W2). The role of access to resources, and how decisions are made to allocate them to support adaptation to climate change, was also a common theme (see Section D3.1; D5.3; P6.1). Having a voice in local decisions is good for health and wellbeing (Public Health England, 2015) and having a sense of control over decisions that affect your life is a protective factor for mental wellbeing (Cooke et al., 2011). Facilitating participation and inclusion is also a protective factor for mental wellbeing, and community empowerment is important to tackling health inequalities (Cooke et al., 2011; Marmot et al., 2020; Public Health England, 2015).

Overall, 19% of people aged over 16 in Wales feel that they are able to influence decisions affecting their local area (Welsh Government, 2020b).

Therefore, in addition to the direct impacts on health and wellbeing from climate change, indirect impacts also arise via pathways of policy development and implementation, and the opportunities afforded to people to participate meaningfully in decision making. Learning from the communication and implementation of adaptation policy in Wales, for example Shoreline Management Plans, identifies that where communication and engagement is insufficient this can lead to stress and anxiety for local residents (Bennett-Lloyd et al., 2019; Environment Agency, 2019).

The Joint Flood and Coastal Erosion Risk Management Research and Development Programme (which includes Natural Resources Wales) has recently published an evidence review to inform community engagement practice in situations where engagement might be particularly challenging, such as where communities may face limited future protection from flooding or coastal erosion (Environment Agency, 2019). This review highlights some important considerations in engagement including:

- The readiness of communities and stakeholders to engage in difficult adaptation decisions
- A need for care in how issues, options and people are described and ‘framed’
- The importance of considering mental health and wellbeing in relation to ‘difficult knowledge’ about climate change
- A need to recognise power imbalances between statutory agencies and communities
- To make conscious and transparent choices about how evidence of risk and policy options are produced and communicated. (Environment Agency, 2019).

Wales has already generated positive examples of citizen and community engagement in climate change, to date this has largely been focused on how to best achieve a “just transition” to a low carbon and sustainable society (Cynnal Cymru, 2021; IPPR, 2021). There is also a set of national principles for public engagement in policy and decision making that can guide practice across Public Bodies (Participation Cymru, n.d.) and good practice guidance on community engagement for empowerment for public health practitioners (Public Health Wales NHS Trust, 2019). Practice is also developing in

relation to effective community engagement and participation in place based adaptation planning, for example:

Climate Ready Gwent is a project that engaged with a range of groups in the community including children, older adults, community and town councils, farmers, cultural, heritage and environmental organisations to explore the 'lived experience' of climate change, identify localised climate impacts, and explore methods of capturing and communicating risk and adaptive action to both communities and decision makers (Netherwood and Thomas, 2019).

Communities and Climate Change in a Future Wales which is a project that aimed to develop methods of engagement to ensure the voices of marginalised and/or under-represented communities in Wales are heard in the development of climate change policy, and to use creative methods to enable communities to imagine their priorities and preferences, hopes and fears, around future climate change so that their views can shape policy (Liveley et al., 2022).

HIA and MWIA can provide a participatory and transparent process via which stakeholders, including communities can actively engage in policy and decision making processes (Dannenberg, 2016). HIAs can strengthen relationships and build trust between community and government institutions (Sohn et al., 2018). A briefing paper to be published by PHW on the use of HIA in climate adaptation provides a number of example of application in Wales and internationally (Drane and Edmonds et al., forthcoming).

Public perceptions of climate change, risk communication and behaviour change

Comparable UK wide surveys in 2016 and 2019 have found a doubling in the proportion of the public who are very or extremely worried about climate change; 19% in 2016 compared to 40% in 2019 (Steentjes et al., 2020). Many in the population of Wales are concerned about climate change, and are seeing the impact in their neighbourhoods and daily lives (see Box 3). Engagement with communities in Wales on their past and current experience of climate change reinforces survey findings that people are already observing and experiencing impacts (Netherwood and

Box 3: Levels of concern and worry about climate change, and perceived impacts in Wales (Wood et al., 2022)

- 82% of adults aged over 16 in Wales are fairly or very concerned about climate change
- Six in ten (61%) adults aged over 16 in Wales believed that climate change is already having an impact in Wales
- 47% adults aged over 16 in Wales report flooding in their local area in the last 5 years and 20% report ill health from extreme weather
- 56% think that risks to people's health from climate change are already occurring
- Over half of people (56%) thought that the effects of climate change on the health of people in Wales would be mostly negative, whilst 29% thought they would be equally positive and negative and 8% only positive

Thomas 2019; 2021). This is important in relation to developing approaches to community engagement (for example, the readiness of communities to engage in adaptation), risk communication and behaviour change in relation to climate change.

Evidence appraised in the HIA has highlighted challenges and the potential for unintended negative consequences of communicating climate risks to the public, including health and wellbeing impacts, (for example see Sections D4; P6.1) and key themes are explored here.

Firstly, in relation to media communication; the way that climate change is communicated on social media was felt by stakeholders in the HIA to impact mental wellbeing, for example the term 'climate emergency', and reports from climate related disasters were seen as potentially impacting negatively on mental wellbeing (W1, Int. 2). News and media coverage of climate change is also reported in the literature as influencing stress responses and mental health and wellbeing (Cianconi et al., 2020; U.S. Global Change Research Program, 2016).

Secondly, the communication of risk from climate change to specific locations or communities by public bodies is identified as having important implications for health and wellbeing, in that such information can lead to stress and anxiety (Bennett-Lloyd et al., 2019). The field of climate change adaptation includes highly technical data and evidence that is often presented with multiple variables for projections of global warming, and accounting for multiple possible population and adaptation options (for example: see Sayers et al., 2020). Highly complex and technically challenging reports and plans can create barriers to effective community and multi sectoral engagement and understanding of risk and adaptation options (Bennett-Lloyd et al., 2019).

A review of a number of coastal adaptation projects by the Environment Agency in England (2019) found that:

“Raised awareness of risk, due either to environmental changes or policy changes (for example, no active intervention) generates real impacts at community level including reduced property values/blight (or perceptions of), increases in complaints and pressure group activity, changes to community as people move, business decline and increased stress. Such impacts are (or should be) factored into cost-benefit calculations”
(Environment Agency, 2019, p. 13).

As noted above the Environment Agency (2019) report highlights some important considerations in communicating and engaging the public in adaptation planning including making “conscious and transparent choices about how evidence of risk and policy options are produced and communicated”.

Thirdly, a recent survey with the public on climate change highlighted the need for clear and trusted information on climate change for the public (see Box 4) (Wood et al., 2022). There was also a call from stakeholders in the HIA for good quality teaching materials and resources to be developed that provide objective and suitable information for children i.e., not sensationalised, or biased. This was reported as a major gap and an opportunity for the future (Int. N3; W2) (see Section D7.2).

BOX 4: Results from a survey with the public in Wales (Wood et al. 2022)

- 54% agreed with the statement that there is so much conflicting information about climate change it is difficult to know what to believe
- 32% agreed with the statement that the media exaggerates the impact of climate change

Lastly, presenting people with negative facts and data about climate change is not effective in changing individual climate related behaviour (Williams and Gould, 2022). Effective engagement with the public on climate change adaptation should avoid generating a sense of powerlessness and instead move to *“pointing to practical examples that people can relate to and building efficacy”*, which are critical to engagement and building resilience (Corner et al., 2020).

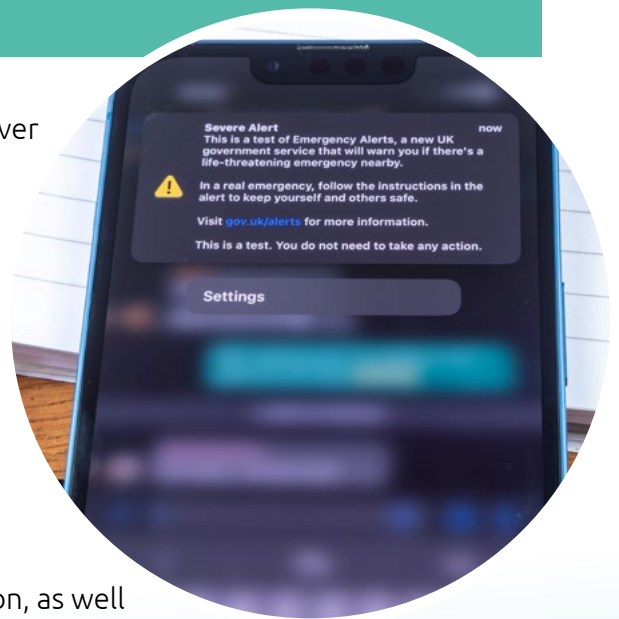
The major motivator for adopting or increasing climate friendly actions in a recent survey in Wales was *“knowing that they will help future generations”* (Wood et al., 2022). Stakeholders in the HIA also felt that it is important to give a sense of hope and optimism via positive messages to reduce climate change driven anxiety and there is an opportunity to encourage individuals to take control of their futures and shape their behaviour to help mitigate climate change (W2).

Access to information and digital services

People need access to information about climate risks that is appropriately targeted so they can prepare, respond and recover from extreme weather and other climate related risks, for example, early flood warning systems (Lindley et al., 2011). This includes considerations of access, language, levels of education and understanding about climate change. A study of adaptive behaviour across the UK found that people are *“missing information about the effectiveness of different behaviours”* (Power et al., 2020) and Howarth et al. (2019) identify a lack of awareness of protective behaviours in heatwaves.

The appraisal in the HIA, particularly in relation to population groups, identified the increasing importance of digital communication for both health and climate related information, as well as health service delivery. Inequalities in access to the internet were identified in older adults, residents of social housing and people living in areas of multiple disadvantage. This has implications for agencies working to promote and protect health in relation to climate change and highlights the importance of multiagency working and using multiple channels for the communications.

The COVID-19 pandemic led to the rapid development of new models of care and remote delivery of health services, for example, remote consulting (Welsh Parliament Health, Social Care and Sport Committee, 2020). Whilst, this development may provide important resilience for the potential disruption to delivery of health and social care anticipated in relation to climate change, it could also leave health services more exposed to digital infrastructure disruption (see Section D7.1; D8.1; D8.2).



Co-benefits for health and wellbeing from taking action on climate change

Whilst the HIA has taken an adaptation perspective, stakeholders repeatedly identified opportunities to enhance health and wellbeing via climate change mitigation such as via increasing physical activity via active travel (section D8.1), nature-based solutions that enhance access to green spaces and nature (section D5.6), opportunities for health from sustainable diets (section D1), and improved air quality from lower fossil fuel emissions (section D5.2). Community-led action on climate change adaptation and mitigation can also build trust, social capital, enhance a sense of control and resilience which are protective factors for mental wellbeing (see Section D3.1; D4).

Therefore, while conceptions of climate change mitigation can be associated with restriction or losses, the benefits for health, equity and quality of life associated with climate change mitigation are substantial (Jennings et al., 2019; Karlsson et al., 2020; The Lancet Countdown, 2022; Workman et al., 2018; UK Alliance on Health and Climate Change, 2016; Williams and Gould, 2022). A number of authors highlight that limited attention has been paid to the positive impacts on health of action on climate change and that there is scope to give more attention to the benefits for health (EASAC, 2017; Karlsson et al., 2020; Workman et al., 2018). Focusing-on co-benefits for health is also likely to lead to increased climate friendly behaviours (Williams and Gould, 2022).

Benefits to health and wellbeing were identified in a recent nationally representative public survey in Wales as an important influencing factor in encouraging climate friendly behaviours and action see Box 5.

BOX 5: Importance of different factor in encouraging adoption of climate friendly behaviours - Results from a survey with the public in Wales (Wood et al., 2022)

- 67% of respondents said that knowing that climate action would also improve their health was very important
- 28% said it was somewhat important
- 4% said benefits for health were not important in encouraging climate action

A UK wide survey (Steentjes et al., 2020) on climate risk also found that the top three climate adaptation priorities of the general public are:

1. The health and wellbeing of UK citizens

2. The wellbeing of vulnerable groups (e.g., the elderly and the very young)

3. Ensuring social and emergency services run smoothly

In summary, connecting the climate change policy agenda with co-benefits for health, and other public health priorities, can mobilise additional support for climate action and environmental sustainability, and help to strengthen the case and motivation for action by both policy-makers and the public (Corner et al., 2020; EASAC, 2017; Williams and Gould, 2022).

Areas for action

“Policy must also move beyond emergency planning and set about building the institutions and infrastructure needed to create enduring resilience across all social groups – through transformational adaptation”.
Preston et al. (2014)

The **Wellbeing of Future Generations (Wales) Act 2015 Five Ways of Working** provide a useful overarching framework for the approach to adaptation to protect health and wellbeing, and reduce inequalities:



Long-term: climate change is with us for the long term and must be seen as a priority across all plans, strategies and investments. A long-term approach will enable sustainable, considered and robust approaches to adaptation to be developed.



Prevention: there are many opportunities identified in the HIA to prevent or mitigate negative health and wellbeing impacts of climate change, and realise co-benefits for health and equity from adaptation and mitigation.



Integration: climate adaptation and mitigation action across sectors is highly likely to impact on the “healthier” and “more equal” Wales goals. Taking a place based or population health based approach to climate adaptation can support an integrated systems-based approach to adaptation that moves away from a siloed sector-based approach, to understanding the interacting and cumulative impacts on people across the Wellbeing Goals and setting such as home, work, school, economy, environment and community.



Involvement: people understand the impacts of climate change in their local areas, and high-quality engagement can help protect mental wellbeing by enhancing control and facilitating participation in decisions that affect people’s lives and livelihoods.



Collaboration: climate change impacts across human and natural systems. The impacts are felt across the economy, health, education, transport, natural environment, culture and heritage and more. Integrated systems-based solutions require collaborative approaches and shared learning and support will be central.

Area for action 1:

Take action on the health impacts identified in the HIA

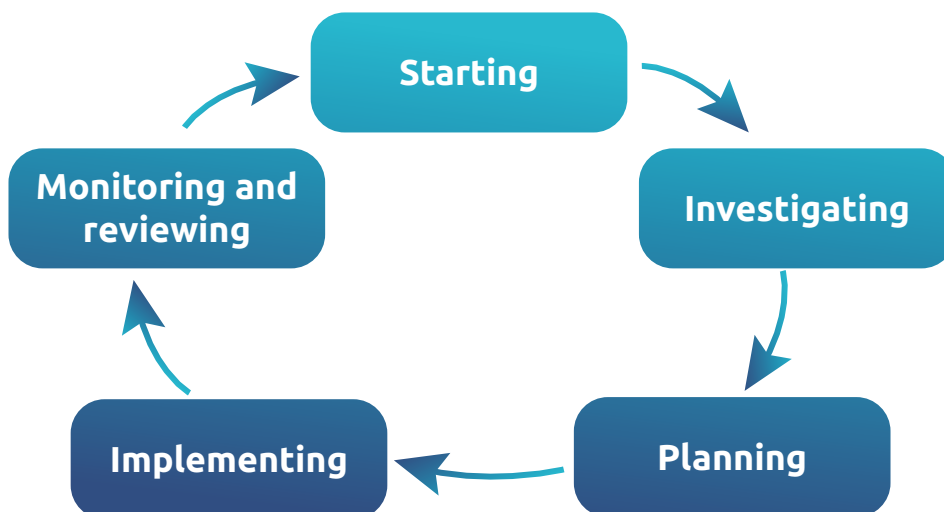
The data and evidence on health and wellbeing impacts, and inequalities contained in the HIA can help inform cross sector action across the stages of the adaptation planning cycle (Welsh Government, 2013) (Figure 3 below). For example:

- **Starting:** the evidence and findings in the HIA can support the framing of key messages on climate change and the scope for adaptation planning outcomes and interventions.
- **Investigating:** the evidence base in the HIA can inform investigation of key relevant impacts of climate change on people, places and organisations alongside local and sectoral expertise and insights.
- **Planning:** the HIA may support selection and prioritisation of impacts to be addressed in adaptation planning.
- **Monitoring and evaluating:** the HIA can be used to identify indicators to monitor impacts of climate change and outcomes of adaptive actions and interventions.

Examples of application could be:

- Local place-based climate risk assessments
- Adaptation planning for specific services or settings e.g., schools, workplaces, services working with older adults
- Population health and health inequalities strategies
- Climate adaptation and vulnerability assessments
- Public Services Boards' wellbeing assessments and plans
- Local Health Board Plans

Figure 3: Welsh Government (2013) Adaptation Planning Cycle



Area for action 2:

Apply the evidence base on effective adaptation and mitigation measures and evaluate impacts

- Invest in action guided by enhanced, robust, routine public health surveillance and intelligence on the health, wellbeing and equity impacts of climate change and extreme weather events in Wales.
- Apply evidence-based actions where indicated on interventions to support climate change adaptation and co-benefits for health arising from climate change mitigation (for links to examples please see Appendices D and E).

Area for action 3:

Enhance action on mitigation and adaptation via long-term investment in capacity building and preventive action

- Enhance investment in extreme weather responses – recognising that these will become more frequent and severe, including health and wellbeing behavioural interventions and settings-based guidance on heatwaves. Ensure that the needs of key vulnerable population groups are addressed for example, older adults, young children, people who are homeless.
- Enhance emergency and contingency planning for extreme weather and flooding, in order to maximise both prevention and mitigation of short, medium and long-term health and wellbeing impacts of incidents.
- Build adaptive capacity and capability across the NHS, other Public Bodies and sectors and ensure that health, wellbeing and equity are integrated into cross sector adaptation planning.
- Build the capacity of the current and future specialist and wider public health workforce to meet the challenges of the climate emergency for example, leadership on climate change, community engagement, risk communication, analysis and interpretation of integrated data on climate change and population health and wellbeing, implementing and evaluating adaptation interventions and strategies. This is recognised in the Faculty of Public Health's Climate Change Strategy (Faculty of Public Health, 2023).
- Include climate change into key public sector (including NHS) job roles and consult with the workforce on the skills needed to be able to deliver consideration and adaptation behaviour into this.
- Enhance support, leadership development and peer learning networks for staff working on the climate change agenda, recognising the mental and emotional content of the work.
- Develop climate change and health adaptation tools and resources, with recommended and evidence-based adaptation interventions, which can be utilised by public bodies, PSBs and communities to consider how health and wellbeing can be positively maximised and unintended negative impact mitigated in adaptation and related plans.
- Utilise approaches such as HIA and MWIA to better understand the impacts of climate change adaptation policy and plans and emergency planning responses on health and wellbeing and vulnerable population groups.

Area for action 4:

Enhance prevention and public involvement via communications and education

- Efforts to encourage action to mitigate and adapt to climate change can be supported by applying behavioural science and the evidence base on risk communication. Evaluating the impact of public messaging is also essential.
- There is a need for clear and trusted information for the public and non-biased high quality teaching materials for schools on climate change, that address public concerns and support citizen and community-led action on climate change.
- Language is important and can impact on how people feel about climate change, and their likelihood of taking action. Public communications should avoid generating a sense of powerlessness and instead identify the effective actions people can take together. It is important to give a sense of hope and optimism via positive, but realistic, messages and there is an opportunity to encourage individuals to take control of their futures and shape their behaviour to help mitigate climate change.
- Empowering all citizens, especially young people, to engage in climate action is central to the UN Framework Convention on Climate Change “Action on Climate Empowerment”, and the Congress of Parties (COP) 27 agreed a four year action plan to empower all members of society to engage in climate action (UNFCCC, 2022). Stakeholders in Wales have the opportunity to work together to achieve this vision.

Area for action 5:

Enhancing public involvement and community resilience

- Enhance control, resilience and participation via democratic decision-making processes, governance, and community engagement in climate change policy and planning, for example, flood and coastal erosion policy.
- Enhance capability and capacity for effective community engagement practice and risk communication in adaptation planning, for example, flood and coastal erosion risk management.
- Create sustainable investment in community resilience, community led action on climate change and social support structures, for example, via mutual aid networks, community roles in emergency responses, reducing social isolation, community transport, environmental improvements, and other local driven adaptive and mitigation actions.
- Utilise HIA and MWIA as a vehicle to engage with communities.

Area for action 6.

Enhance integration and collaboration

- Strengthen the integration of health, wellbeing and equity impacts into climate change adaptation and mitigation policy development, to maximise opportunities for health and wellbeing, and prevent or mitigate unintended consequences, for example by application of HIA.
- Whilst plans for corporate adaptation and business continuity for public service are important, clear accountability and governance mechanisms are needed in order to plan for the cross-cutting and cumulative place based and population health impacts of climate change that transcend organisational boundaries.
- Understanding the local context is essential in developing adaptation strategies and interventions (Kovats and Brisley, 2021). Integrated place-based climate risk assessments, underpinned by a local cross-organisational governance structure can support delivery of local place and population-based adaptation.
- Businesses and employers need to plan for adapting to climate change impacts including for increased heat, flooding and disruption to infrastructure that may affect their operations and the health, wellbeing and productivity of their workforce.
- The impact of climate change should be considered in tandem with other major issues in Wales for example, the COVID-19 pandemic, Brexit and cost of living crisis, and the cumulative impacts which these multiple challenges will have.
- There are many synergies across policy areas which could facilitate health, wellbeing and mitigate the impact of climate change and promote sustainable development. This includes for example, improved digital ways of working and service delivery, modes of transport and land use planning.
- Climate change is an important issue of international and national importance and transcends all boundaries and jurisdictions. Stakeholders need to work collectively across the four nations and internationally.

Area for action 7:

Invest in co-benefits for health

- Ensure that climate change mitigation and decarbonisation policy and investments across sectors maximise co-benefits for health and prevent widening inequalities and negative impacts on health and wellbeing – the application of HIA can support this.
- Invest in climate resilient infrastructure in spatial planning, for example, to mitigate the impacts of heatwaves, enable the sustainability of outdoor physical activity, sports and active play.
- Invest in the development of practical skills and skill sharing mechanisms for sustainable living, for example, repair, local food growing.
- Invest in strategies to increase physical activity and mental health, for example, via social prescribing and volunteering, factoring in potential for enhanced opportunities for outdoor recreation and active travel due to climate change.

Area for action 8: Further research

- The existing evidence base on the health and wellbeing impacts of climate change contained in this HIA report and in the Climate Change Risk Assessments for Wales and the UK (Netherwood, 2021; Kovats and Brisley, 2021) should be utilised to inform the implementation and evaluation of adaptation policy and interventions to protect population health.
- Public Health Wales NHS Trust will use the findings of the HIA, and engagement with other stakeholders, to develop a research agenda on climate change and health in order to prioritise investment in research activity and action that maximises impacts on population health.
- Further investigation is needed to identify areas of potential changing and increasing health service demand arising from climate change, for example, mental health services, respiratory health, primary and unplanned care.
- Further investigation and investment in the development of capacity, skills, knowledge and tools for the application and interpretation of integrated spatial, health and demographic data to inform multi sector adaptation planning that takes account of multiple dimensions of both vulnerability, health and climate impacts.
- Climate science, climate change and the evidence base on health impacts is rapidly developing. In particular, with more investment in surveillance and research on observed health impacts in Wales, the evidence base on the health and wellbeing impacts of climate change will be constantly evolving. Therefore, it will be important that this HIA is reviewed regularly and updated in the future to remain a useful decision support tool.
- The HIA has identified significant gaps in data and evidence on health impacts in Wales of extreme heat, drought and vector borne disease and implications for mental health, violence, alcohol and substance misuse and family and intergenerational relationships in Wales. Further evaluation of adaptation measures is also needed.

Conclusion

This HIA summary depicts the major impacts and opportunities which can emerge from climate change and extreme weather events in Wales over the short to long term and presents some suggested areas of action to promote and protect health and wellbeing. Climate change is a global and local challenge which the world is facing along with other existential threats. It is not going to disappear or dissipate without more action and a better understanding of the wider impacts across individuals, society, the economy or the environment and enhanced action across all sections of society.

Climate change is not an isolated phenomenon. It is closely linked to other planetary systems such as biodiversity, water cycles, and land use – and to pandemics such as COVID-19. Therefore, to ensure the health and wellbeing of people and the planet and to avoid unwanted effects, it is essential to take a systemic approach and address interconnected challenges such as climate change and biodiversity loss together and in an interdisciplinary manner.

Tackling these will require fundamental changes in our ways of life – with the associated challenges of ensuring social justice and acceptance by the general public and protecting health. An emphasis on health and positive opportunities has been shown to increase the public's support of climate change mitigation policies and this needs to be further promoted and enabled. The HIA alongside other work across PHW, the government and civil society can enable this so that long term co-benefits for all are realised.

Limitations

The impacts in the report have been based on a robust literature review and the UK Committee on Climate Change commissioned research on the expected impacts of climate change on the population of the UK and Wales. However, climate science, climate change and the evidence base on health impacts is expansive and rapidly developing and the findings in this HIA will need to be reviewed and updated in the light of emerging evidence at regular intervals. Where impacts have been based on international, rather than Wales or UK based evidence this has been noted.

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Appendix A: Mapping of opportunities for adaptation in policies and strategies

Appendix A: Major Welsh national, regional and local level policies and strategies that provide opportunities to strengthen integration of actions to address the health, wellbeing and equity impacts of climate change (adapted from Netherwood et al. (2023))














National level cross sector policies	National level adaptation plans	National health and social care policies	Regional level	Local level
<ul style="list-style-type: none"> • The Future Wales National Plan 2040 • Environment (Wales) Act (2016): • Llwybr Newydd: the Wales Transport Strategy 	<ul style="list-style-type: none"> • Prosperity for all: A climate conscious Wales – current National Adaptation Plan • National Strategy for Flood and Coastal Erosion Risk Management in Wales 	<ul style="list-style-type: none"> • Welsh Government Health and Social Care Climate Emergency National Programme • A Healthier Wales • Healthy weight, healthy Wales • Connected communities • New mental health strategy 	<ul style="list-style-type: none"> • Regional growth deals • Public Services Boards wellbeing assessment and wellbeing plans • Area Statements • Regional Partnership Boards Regional Plan 	<ul style="list-style-type: none"> • Local regeneration plans • Local Development Plans • Nature Recovery Plans • Local Authority Corporate Plans • Local Health Board Integrated Medium Term Plans










Appendix B: Descriptors used to characterise impacts








Type of impact	
Positive / opportunity	Negative
Impacts that are considered to improve health status or provide an opportunity to do so	Impacts that are considered to diminish health status
Likelihood of impact	
 Confirmed	 Confirmed
 Probable	 Probable
 Possible	 Possible
Intensity / severity of impact	
 Major	 Major
 Moderate	 Moderate
 Minimal	 Minimal
Duration of impact	
 S = Short term	Impact seen in 0 – 3 years
 M = Medium term	Impact seen in 3 – 10 years
 L = Long term	Impact seen in >10 years






Appendix C: Summary table of impacts

Summary of impacts on population groups








Population group	Intensity i.e. minimal; moderate; major	Likelihood i.e. probable; possible; confirmed	Duration i.e. short/ medium/ long-term	Intensity i.e. minimal; moderate; major	Likelihood i.e. probable; possible; confirmed	Duration i.e. short/ medium/ long-term	Rationale i.e. positive/opportunity or negative/unintended consequence
Positive impacts/opportunities							
P1.1 Babies, children and Young people	No evidence identified	 (not all will be positively engaged or have the opportunity for engagement)			 (on broad scope impacts).  (specific impacts from flooding & heatwaves)		Positive/Opportunity: Linked to education, empowerment and activism, collective action is important for improving wellbeing. Education is a key resource for this opportunity Negative: more sensitive to impacts arising from higher temperatures and extreme heat; flooding; air quality. More vulnerable to impacts arising from food security and nutrition. More vulnerable to eco-anxiety, and mental health impacts from flooding and natural disasters. Potential for impacts on ACEs. Disruption to education and access to social, and economic opportunities.
P1.2 Older adults					 (heat, flooding)  (lower adaptive capacity and ability to prepare, social isolation)		Positive/Opportunity: Climate change is forecast to reduce winter-related mortality in Wales from 83.9 per 100,000 in 2000 to 48.7 per 100,000 in 2080 (PHW Winter Pressures Report)*. Negative: More vulnerable to impacts from extreme heat, flooding, extreme weather. May impact on social isolation and likely to disrupt access to health and social care.

<p>P2.1 Women</p>				<p>No evidence identified</p>		<p>No evidence identified</p>	<p>Negative: Higher exposure to increases in domestic abuse and occupational impacts such as heat and stress in the health and social care sector. More likely to have lower income and be a one parent and have less resources to adapt. Higher pre-existing risk of anxiety/depression.</p>
<p>P2.2 Pregnant women</p>						<p>S to L</p>	<p>Negative: Women and their unborn baby are more vulnerable to a number of health impacts arising from climate change during pregnancy including higher temperatures and extreme heat; air pollution; mental health impacts arising from extreme weather and flooding, and disrupted access to healthcare.</p>
<p>P2.3 Men</p>	<p>No evidence identified</p>		<p>S to L</p>		 (occupational risks)  (suicide: limited direct evidence for UK and Wales)	<p>S to L</p>	<p>Positive: Opportunities for employment and training in the “green economy”. For example, currently most people in construction apprenticeships are men (MacBride-Stewart and Parkin, 2021). Negative: more likely to work in vulnerable occupational groups such as outdoor workers e.g. farming. Higher pre-existing risk of suicide.</p>
<p>P3.1 People who are displaced including refugee and asylum seekers</p>						<p>S to L</p>	<p>Negative: Increased risk of anxiety, depression and Post-Traumatic Stress Disorder (PTSD); disruption to education and access to services; loss of social support; housing insecurity. Economic impacts on incomes, livelihoods and employment.</p>

<p>P3.2 People with long-term health conditions and/or disabilities</p>				<p>★★★ to ★★★ in specific circumstances</p>		<p>S to L</p>	<p>Negative: More vulnerable during heatwaves, drought, poor air quality and flooding. Exposed to overheating in care homes and hospitals. Worsening symptoms of some conditions and sleep disturbance. May face barriers to accessing emergency and health protection information. Disruption to health and social care.</p>
<p>P3.3. People who are homeless</p>				<p>★★★</p>	 / 	<p>S to L</p>	<p>Negative: Those who are homeless and living on the street are more exposed to all extreme weather. More vulnerable to physical and mental health impacts and those linked to substance misuse.</p>
<p>P3.4 Minority ethnic groups</p>				<p>★★★</p>	 (occupational and socioeconomic factors)	<p>S to L</p>	<p>Negative: more vulnerable due to lack of resources for adaptation; more likely to be on low income, in private rented housing, less insurance. More exposed via occupations in health and social care and greater population in urban area influences heat exposure.</p>
<p>P3.5 People who are new to an area</p>				<p>★★★</p>		<p>S to L</p>	<p>Negative: More vulnerable in extreme weather due to lack of local knowledge and social networks. May face language barriers in accessing guidance and emergency weather warnings</p>
<p>P4.1 Low-income groups</p>	<p>★★★</p>	<p>?</p>	<p>L</p>	<p>★★★ (possible cumulative impacts – triple challenge with COVID-19 and Brexit)</p>	 /  (in relation to flooding)	<p>S to L</p>	<p>Positive: Reduced energy costs in the long-term from warmer winters. Negative: Reduces resource availability for adaptation. Less likely to have insurance and resources to cope with emergencies. Larger relative financial impacts from flooding. Increase in food poverty.</p>

<p>P5 Occupational groups: Outdoor workers (i) Manufacturing (ii) Transport workers (iii) Health and social care staff and emergency services (iii) Prison and education staff (iv)</p>						<p>S to L</p>	<p>Negative: Heat related illness (i - iv) and injuries (i,ii); Injury and mortality from extreme weather/flooding (i; iii); Respiratory illness from exposure to wildfires and poor air quality (iii); Stress, sleep disturbance and mental health from exposure to increased emergencies/disasters (iii). Skin damage from increased ultra-violet B radiation (i). Increased exposure to vector borne disease (i).</p>
<p>P6.1 Coastal areas</p>	<p>No evidence identified</p>		<p>No evidence identified</p>		 <p>in some areas</p>	<p>S to L</p>	<p>Positive/Opportunity: Potential for increase in tourism due to higher temperatures. Negative: More exposed to the mental and physical health impacts of flooding Economic and housing security for individuals and families Uncertainty and anxiety regarding the future Potential for negative impacts on coastal economies such as tourism and fishing. Loss of valued places leading to emotional distress (“solastalgia”).</p>

<p>P6.2 Flood risk areas</p>				<p>***</p>	<p>✓✓</p>	<p>S to L</p>	<p>Negative: Death or injury Long-term and severe impacts on mental health and wellbeing. Economic impacts on incomes, livelihoods and employment Disruption to education Loss of valued places leading to emotional distress ("solastalgia") Damage to homes. Disruption to access to services Illness arising from contaminated water. Loss of tourism, recreational and leisure amenity Damage to cultural and heritage sites. Damage and disruption to transport and infrastructure Loss of and damage to possessions. Disruption to social support. Stress and disruption from temporary or permanent displacement</p>
<p>P6.3 Former and current industrial areas</p>	<p>***</p>	<p>✓?</p>	<p>S to L</p>	<p>*** to ***</p>	<p>?</p>	<p>S to L</p>	<p>Positive: decarbonisation could improve air quality. New skills, industries and jobs created linked to a "green economy" / decarbonisation Negative: greater exposure to changes to air quality, coal tip risk and damage from extreme weather and flooding to old mining infrastructure</p>


















<p>P6.4 Urban areas</p>			<p>S to L</p>		<p>✓ to ✓✓</p>	<p>S to L</p>	<p>Positive: Use of nature based solution and active travel Negative: Increased vulnerability to impacts from higher temperatures and extreme heat Urban housing such as smaller homes, flats and overcrowded dwellings more vulnerable to overheating Increased vulnerability to changes in air quality Exposed to impacts from flooding</p>
<p>P6.5 Rural communities</p>	<p>Unknown</p>		<p>S to L</p>			<p>S to L</p>	<p>Positive: linked to sustainable land management and possible crop diversity. Negative: Extreme weather events, drought, water scarcity, wildfires, floods, vector-borne disease. Cumulative impacts – Brexit, older people, infrastructure, access to services, mental wellbeing.</p>
<p>P6.6.Areas of multiple disadvantage</p>				<p>✓ to ✓✓</p>		<p>S to L</p>	<p>Negative: multiple pathways of increased vulnerability including low income, poor quality housing</p>

Summary of impacts on the determinants of health and wellbeing

Determinant of Health	Intensity i.e. minimal; moderate; major	Likelihood i.e. probable; possible; confirmed	Duration i.e. short/ medium/ long-term	Intensity i.e. minimal; moderate; major	Likelihood i.e. probable; possible; confirmed	Duration i.e. short/ medium/ long-term	Rationale i.e. positive / opportunity or negative / unintended consequence
Positive / Opportunities				Negative / Unintended negative impacts			
D1 Food Security and Nutrition							
Food utilisation: healthy eating	No evidence identified		S to L				Positive/opportunity: Increased awareness of climate change may influence the increasing adoption of a more healthy and sustainable diets
Food availability: production and security	No evidence identified		S to L	*** * *		S to L	Positive/opportunity: increase the production of sustainable, local food in Wales; potential for growing new crops in warmer temperatures. Negative: variability in access to food due to disruptions to the supply chain from arising weather events and climate hazards. Decreasing yields from extreme weather, rising temperatures, pests, water scarcity and ocean changes globally*.
Food accessibility: cost of food				*** * * (in particular cumulative with Brexit and Cost of Living Crisis)		S to L	Negative: Climate related shocks to the international food system are becoming more likely and can lead to food price spikes, which exacerbate inequalities in access to healthy food*.
Nutritional content of food	No evidence identified		No evidence identified	*** * *		S to L	Positive/opportunity: The introduction of new crops may improve nutrition*. Negative: high levels of carbon dioxide can reduce the nutrient content of some crops*.
Food Borne Disease				*** * * (Note: rated as High risk in CCRA3 but combined with food security)	 (Note: rated as low confidence in CCRA3)	Unknown	Negative: increasing air and water temperatures, variations in rainfall impact occurrence and persistence of food borne disease. Food safety risks during transport and storage.






D2 Behaviours affecting health							
D2.1 Physical activity and outdoor leisure activity	No evidence identified	(requires policy intervention)	but may be greater in short-term		/		<p>Positive: Increase in outdoor physical activity in green spaces possible due to warmer weather, but likely to be limited in warmer, wetter summers*</p> <p>Negative: Decreased physical activity Decreased active travel Decreased outdoor active play for children Increased risk taking in outdoor activity, including increased risk of injury, drowning and swimming in unsafe conditions Increased heat stress</p>
A1 Alcohol and substance misuse				No evidence identified		Unknown	<p>Negative: Substance misuse is a risk factor for heat related illness and mortality in heat waves. Possible increase in misuse of substances or alcohol due to stress and anxiety driven by social and economic impacts of climate change. Increase in alcohol due to increase in "outdoor lifestyle".</p>
D3 Social and Community Factor							
D3.1 Community resilience and cohesion	to			to	to		<p>Positive/opportunity: Collective community action to adapt/mitigate climate change and respond to extreme weather events/ natural disasters. Learning new skills for sustainable living.</p> <p>Negative: Loss of community assets due to extreme weather; conflict over resources; displacement; and disruption to communities</p>
D3.2 Population displacement, mobility and migration	No evidence identified		No evidence identified	for those affected	/		<p>Positive: When planned and supported, voluntary migration can be an adaptive response to climate change; Migrants can bring human capital and skills benefitting the economy and communities</p> <p>Negative: populations displaced temporarily or permanently by climate change internationally, and via flooding and coastal erosions in Wales*.</p>

A2 Violence				No evidence for Wales identified		No evidence for Wales identified		No evidence for Wales identified	Negative: International peer reviewed research has found that climate change in the form of increased heat, drought, heavy rainfall and other extreme weather events can result in increased conflict, violence (including domestic violence), crime and homicide. Negative: Extreme weather damages or limits natural resources, family and community facilities; differences in attitudes and perceived inequalities of impacts across the generations.
A3 Family and intergenerational relationships				No evidence for Wales identified		No evidence for Wales identified		S to L	
D 4 Mental Health and Wellbeing									
Mental wellbeing	No evidence identified		S to L			S to L		S to L	Positive/opportunity: Taking action to adapt or mitigate climate change such as learning new skills, community or political participation. Increase in outdoor physical activity in green spaces possible, but likely to be limited in warmer, wetter summers*. Negative: Loss of ecosystems and biodiversity/green and valued natural spaces; uncertainty and anxiety; increasing awareness and news about climate change related disasters. Political participation could also be adverse if political participation leads to negative consequences such as stigmatisation or criminalisation
Social isolation				No evidence identified		S to L		S to L	Negative: reduced social participation due to extreme heat and other extreme weather.
Mental disorder			 (evidence strong for flooding)	 (Flooding) (heat and other indirect impacts)	 	S to L		S to L	Negative: extreme heat, drought, extreme weather and natural disasters, and flooding are linked to rises in specific mental disorders. Indirect impacts such as displacement, post disaster adjustment, conflict over resources and environmental stress may also contribute to rises in mental disorder.

Suicide				No evidence for Wales identified	* Some evidence associated with heat in CCRA3)	No evidence for Wales identified	<p>Negative: evidence from international studies has found relationships between a range of climate change related factors, self-harm and suicidal behaviours Extreme weather events, disasters, drought and seasonally higher temperatures have all been observed to be associated with suicidal behaviour*. No specific evidence has been found in relation to the UK.</p>
D5 Living and Environmental Conditions							
D5.1 Housing			 to 	 to 	 / 	 to 	<p>Positive/opportunity: ability to keep homes warmer in winter due to warmer winters, reduced fuel poverty. Negative: Overheating in extreme heat; property damage due to extreme weather and floods; damp and mould due to wetter weather; reduced indoor air quality.</p>
D5.2 Air Quality (Outdoors)						 to 	<p>Positive: decarbonisation could improve air quality. Negative: Climate change is likely to affect air quality in both urban and rural areas* but is complex to predict</p>

<p>D5.3 Flooding</p>						<p>S to L</p>	<p>Negative: Death or injury Long-term and severe impacts on mental health and wellbeing including depression and Post Traumatic Stress Disorder Economic impacts on incomes, livelihoods and employment Disruption to education Loss of valued places leading to emotional distress ("solastalgia") Damage to homes Disruption to access to services Illness arising from contaminated water Loss of tourism, recreational and leisure amenity Damage to cultural and heritage sites Damage and disruption to transport and infrastructure Loss of and damage to possessions Disruption to social support Stress and disruption from temporary or permanent displacement</p>
<p>D5.4 Higher temperature and extreme heat</p>		(reduced cold related mortality)	<p>M to L</p>			<p>S to L</p>	<p>Positive: Reduced cold related morbidity and mortality in the long-term Negative Mortality from respiratory, cardiovascular, dementia related conditions, alcohol and substance misuse Dehydration Heat related illness Negative impacts on birth outcomes Increased injuries and accidents, including drowning Social isolation Worse symptoms of mental disorder Violence Suicide Food borne disease Increased demands on health services Reduced productivity Disruption and damage to infrastructure and transport</p>

<p>D5.5 Water Supply</p>	<p>*** but *** for people dependent on private water</p>	<p>*** / ***</p>	<p>S to L</p>	<p>Negative: 3 areas of Wales currently non-resilient to one in 200 drought – however plans are in place to mitigate this. No deficits are projected in Wales under a central population estimate, but high population growth could lead to impacts in Wales*. Recent evidence from 2022 of drought.</p>
<p>D5.5 Water Quality</p>	<p>*** long-term, *** linked to specific events, e.g., flood, wildfires, high rainfall etc.</p>	<p>***</p>	<p>S to L</p>	<p>Negative: Private water supplies pose more of a risk from low water quality than public supplies. Heavy rainfall leads to sewerage outflows. Adverse weather is one of the biggest risks to discolouration and interruptions public water supplies in Wales.*</p>
<p>D5.6 Natural environment and biodiversity</p>	<p>*** S to L</p>	<p>***</p>	<p>S to L</p>	<p>Positive/opportunity: Welsh policy context including the Environment Act and Biodiversity Duty could increase “green and blue infrastructure” Nature based solution for climate change mitigation. Increase access for physical and mental health in warmer weather. Negative: Loss and damage of biodiversity and the natural environment. Lost “ecosystems services” that are essential for life as well as cultural, aesthetic, social and wellbeing needs.</p>
<p>D5.7 Landslides and coal tip</p>	<p>*** when/where they occur</p>	<p>*** to *** (observed in 2020)</p>	<p>S to L</p>	<p>Negative: increasing intensity and frequency of rainfall projected as a result of climate change in Wales is highly likely to increase the risk of landslides in vulnerable locations*.</p>
<p>D5.8 Wildfires</p>	<p>*** in affected areas</p>	<p>***</p>	<p>S to L</p>	<p>Negative: It is likely that the frequency of moorland, grassland and forest fires may increase with regional differences. Forest fires emit particulate matter and toxic products and create extensive and long-lasting air pollution events.</p>

D5.9 Vector borne disease				<p>*** – short to medium term</p> <p>*** in long-term term*</p>		<p>S to L</p>	<p>Negative: Lyme disease cases may increase with climate change due to an extended transmission season and increases in person-tick contact. The risk of mosquito-transmitted diseases such as chikungunya and dengue is likely to increase in England and Wales as temperatures rise. The risk of Culex-transmitted diseases such as West Nile Virus could increase in the UK*.</p>
D6 Economic conditions							
D6.1 Working Conditions	No evidence identified		No evidence identified	<p>*** to *** for high-risk workforces</p>		<p>S to L</p>	<p>Positive/opportunity: possible reduced cold in winter could lead to less cold related Injury Negative: working conditions negatively impacted and reduced safety. Factors include increased heat; exposure to flood water; extreme weather and natural disasters; poorer air quality; skin damage due to increased ultra-violet B radiation; stress and mental health issues if responding to more frequent extreme weather events.</p>
D6.2 Economic Development and skills	<p>*** to ***</p>		<p>S to L</p>	<p>***</p>		<p>S to L</p>	<p>Positive: Expansion of tourism related opportunities New skills, industries and jobs created linked to a “green economy” / decarbonisation Development of a “circular economy” and associated opportunities Negative: Linked to productivity losses, infrastructure disruption; Disruption to supply chains and distribution networks Cost and availability of finance, investment, and insurance</p>

D7 Access and quality of Services							
D7.1 Access to health and care services				to in specified circumstances.	/		<p>Positive/opportunity: Reduced cold weather morbidity and mortality in the long-term. Develop new models of care</p> <p>Negative: risk of overheating in hospitals and care homes; disruption to access to services from extreme weather; health and social care estate exposed to flooding; increased demand on services; impacts on staff wellbeing</p>
D7.2 Education				to in some circumstances			<p>Positive / opportunity: Education can provide knowledge, skills and behaviours and capabilities to support climate change adaptation, sustainability and resilience. Education can empower and enable people to make choices and to take action on climate change as citizens</p> <p>Negative: Disruption to education from extreme weather events, including flooding. Damage to education infrastructure and service delivery.</p> <p>Disruption to school transport. Heat related illness and reduction in effective learning due to overheating in school buildings and residential facilities*.</p>
D8 Macro-economic, governmental and sustainability factors							
D8.1 Transport				to			<p>Positive/Opportunity: Active travel and reducing emissions</p> <p>Negative: Damage to transport infrastructure and networks. Disruption and delays to travel</p> <p>Disruption to delivery of essential goods. Disruption to access to services and education.</p> <p>Disruption to social participation leading to social isolation.</p> <p>Disruption to emergency services and health and social care delivery.</p> <p>Economic impacts.</p>

<p>D8.2 Infrastructure</p>				<p> when extreme weather events occur</p>	<p></p>	<p> to </p>	<p>Negative: Increasing frequency and severity of damage and disruption to critical infrastructure including transport, internet, energy and water Injuries and accidents arising from damage to infrastructure Disruption to energy supply, internet and telecommunications impacting the functioning of essential services</p>
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*Included in UK Climate Change Risk Assessment 3

Appendix D: Examples of adaptation interventions

- Faculty of Public Health (UK): [Adaptation to climate change briefing](#)
- [The UK Adaptation Inventory](#): this is a database of UK based adaptation interventions alongside a [systematic review](#) and case studies of actions in practice to inform decision-making in different sectors.
- [Climate – ADAPT](#): A European resource with [case studies](#), potential adaptation options and [tools](#) that support adaptation planning
- [W.H.O. Climate change and health toolkit](#): a range of resources on adaptation and health services resilience
- [Local Climate Adaptation Tool](#): still in development and currently in a prototype format the Local Climate Adaptation Tool (LCAT) brings together complex climate models, adaptation options and health impact evidence to help the user understand the health implications of climate change in their local area. LCAT also generates recommendations for appropriate adaptation approaches, based on the best available evidence
- [BRACE: CDC Building Resilience Against Climate Effects](#): a resource from the Centers for Disease Control and Prevention in the USA with a five-step process that allows health officials to develop strategies and programs to help communities prepare for the health effects of climate change. Detailed evidence base on health impacts, tools, guides and case studies
- [Climate Adaptation Knowledge Exchange](#): wide range of evidence, tools and evaluation of adaptation interventions (USA based)

Appendix E: Evidence sources on climate change mitigation interventions that have co-benefits for health

- [W.H.O. Climate change and health toolkit](#): contains a range of evidence and social return on investment tools the health benefits of climate change mitigation, for example, in the transport, housing and green economy sectors.
- Marmot, M; Munro, A and Boyce, T (2020b) [Sustainable Health Equity: Achieving a Net-Zero UK](#) provides key policy levers for health and climate change are listed in full alongside the associated health benefits:
 - Reduce fossil fuel combustion
 - Support a just transition that minimises air pollution
 - Improve energy efficiency of housing (with ventilation)
 - Enable and encourage sustainable food production and consumption
 - Reduce red meat consumption
 - Reduce food waste
 - Support and enable transport systems that promote active travel and road safety, and which minimise pollution
 - Invest in public transport and connectivity with walking and cycling routes
 - Move towards a sustainable economic model that values health and well-being

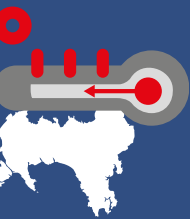
Climate Change in Wales: Health Impact Assessment

Infographics



Health and wellbeing impacts of increased heat

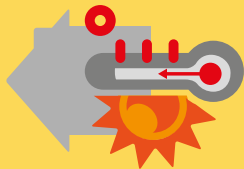
Climate change means that heatwave events are likely to occur more often in Wales.



By the 2050s annual temperatures are projected to rise by 1.2°C in Wales

The 2021 Independent Assessment of UK Climate Risk says:

- Heat risk in homes and buildings is a top priority for action in the next 2 years
- More action is needed to address risks to human health, wellbeing and productivity



Cross sector action is needed

We need to plan and adapt



Schools and other educational settings:

- Heat related illness
- Loss of concentration
- Reduced ability to learn



Workplaces:

- Heat related illness
- Reduced productivity
- Decreased safety



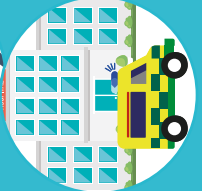
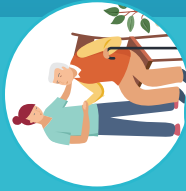
Homes:

- Heat related illness
- Sleep disturbance
- Potential long term reduced heating costs



Hospitals and care homes:

- Thermal discomfort of patients/residents and staff
- Heat related illness of patients/residents and staff
- Sleep disturbance
- Negative impacts on conditions such as mental health problems, cardiovascular and respiratory diseases
- Failure of equipment and IT systems
- Disruption to laboratory equipment
- Damage to medicines



Factors affecting heat in buildings include:

- Building design and materials
- Type of building
- Location and positioning
- Room occupancy levels
- IT and electrical equipment generating heat
- Insulation
- Ventilation
- Outdoor shade
- Type of activities

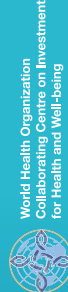


More action is needed across sectors to plan for increased heat:

- New schools, homes, hospitals and care settings need to be designed to prevent health impacts from increased heat
- There is a need to increase incentives for retrofitting existing homes
- Well planned tree planting can provide shade to reduce exposure to heat in urban areas, care settings, homes, schools, and playgrounds

Extreme Weather Advice

- Public Health Wales Environmental Health Protection Team provide extreme weather advice for the public and organisations across Wales on how to protect health during extreme weather, heatwaves and flooding. Find out more at: [Extreme Weather Events - Public Health Wales \(nhs.wales\)](https://www.nhs.uk/health-wales/extreme-weather-events)



Taken from: Health Impact Assessment of Climate Change in Wales (Public Health Wales, forthcoming), Kovats, S. and Brisley, R. (2021) [Health, Communities and the Built Environment](https://www.nhs.uk/health-wales/extreme-weather-events). In: The Third UK Climate Change Risk Assessment Technical Report.

Health and wellbeing impacts of climate change



Climate change means that extreme weather, flooding and heatwave events are likely to occur more often in Wales.
Climate change affects all parts of Wales. Some examples of health impacts for specific groups are shown below



Climate change is happening in Wales

Children and young people

- Extreme weather and flooding**
 - Disruption to education, outdoor sport and play
 - Displacement from their homes, friends and community
 - Stress and anxiety for themselves and their families
- Mental wellbeing**
 - Anxiety about how climate change will impact their future
- Air quality**
 - More susceptible to poor air quality and wildfire smoke
- Positives**
 - Have a positive role in reducing carbon emissions and adaptation to climate change
 - Can be positive agents of change
 - Practical and creative ideas to help communities recover from disasters
- Increased heat**
 - Higher risk of heat related illness

Climate change affects us all

Older adults

- Extreme weather and flooding**
 - Disruption to access to health, social care and support services
 - Displacement from their home and support networks
 - More vulnerable in emergency situations such as flooding
 - Increase in mental distress
- Increased heat**
 - Higher risk of heat related illness and mortality
 - Social isolation may increase during heat waves
- Air quality**
 - Older adults are more susceptible to poor air quality and wildfire smoke
- Positives**
 - Warmer winters are projected to decrease cold related deaths

People with disabilities and long-term health conditions

- Extreme weather and flooding**
 - Disruption to access to health, social care and support services
 - Increase in mental distress
 - More vulnerable in emergency situations such as flooding
- Increased heat**
 - Negative impacts on some conditions such as mental health problems, cardiovascular and respiratory disease, and diabetes
 - Some medications can increase vulnerability to heat related illness
 - Social isolation
 - Sleep disturbance
- Air quality**
 - Those with respiratory conditions are more susceptible to poor air quality and wildfire smoke

People on low income

- Extreme weather and flooding**
 - Less resources to prepare, respond and recover from floods or other extreme weather
 - Less likely to be fully insured
- Air quality**
 - Air pollutant concentrations are currently higher in areas of socioeconomic disadvantage
- Food and nutrition**
 - Potential for increase in food costs
- Positives**
 - Potential in the long term for reduced heating costs

Planning and preparing for climate change needs to include action across sectors to promote and protect the health and wellbeing of different population groups and places in Wales.



Taken from: Health Impact Assessment of Climate Change in Wales (Public Health Wales, Forthcoming), Kovats, S. and Brialey, R. (2021) Health, Communities and the Built Environment. In: The Third UK Climate Change Risk Assessment Technical Report. Netherwood A. (2021) Third UK Climate Change Risk Assessment Technical Report: Summary for Wales.

Climate change impacts on access to healthy food

A healthy, nutritious diet is essential for:

- Healthy growth and development in children
- Good physical and mental health and wellbeing
- Preventing obesity, cardiovascular disease and cancer

Changes to how we eat can promote health and help the planet:

- Eating less meat and dairy products
- Eating more fruit, vegetables and legumes
- Cutting down on food waste



Food is essential for life

Healthy eating is already a public health priority in Wales because:

- 61% of adults are overweight or obese
- 27% of children aged 4 to 5 years are overweight or obese
- 25% of people eat the recommended five portions of fruit or vegetables a day

Poverty and the cost of food were already barriers to a healthy diet in Wales before 2020:

- 10% of households had low or very low food security and another 10% had weak food security
- Families with children under 16 were less likely to have high food security
- Low income families would have needed to spend 42% of their after-housing income on food to meet the costs of healthy eating guidelines

More action is needed to develop resilient food systems to protect health in Wales in response to climate change

- More investigation and improved data are needed to plan for present and future climate risks to food systems to ensure vulnerable groups are protected and the impacts to health are minimised.
- Food security for health and wellbeing can only be achieved by a wide range of sectors including health, environment, government, civil society, farmers, trade and food producers / retailers working together.

Our planet is essential for food

Climate change is likely to impact on access to healthy food in Wales in a number of ways:

- Extreme weather can disrupt food production and supply in the UK and internationally, leading to food price spikes in the UK
- Increased risk of pests, invasive species and diseases impact on crop yields and livestock health
- Poorer soil quality and less water impact on crop yields
- Higher water temperatures and ocean acidification impact on the availability of fish



Taken From: Health Impact Assessment of Climate Change in Wales (Public Health Wales, Forthcoming). Rising to the Triple Challenge of Brexit, COVID-19 and Climate Change for health, wellbeing and equity in Wales Spotlight on: Food Security (PHW, 2021). Kovats, S. and Briley, R. (2021) Health, Communities and the Built Environment. In: The Third UK Climate Change Risk Assessment Technical Report.

Nature supports our health and wellbeing

Physical wellbeing

Keeping active in green and natural spaces like beaches, forests, parks and the countryside by walking, running, cycling, conservation work and playing

- Health outcomes:
 - General physical health
 - Cardiovascular health
 - Healthier immune systems
 - Healthier weight
 - Mental wellbeing




Cut down on waste

Reduce, repair, reuse and recycle

[Reuse more | Wales Recycles](#)



Switch to active travel

Walk or cycle for your short distance journeys instead of going by car. All local authorities in Wales are producing active travel maps to help people plan car free journeys



Taking care of yourself and others

Mental wellbeing

Peaceful places; keeping active; taking notice of nature; feeling connected to nature; appreciating beauty

- Health outcomes of access to green and natural spaces:
 - For children and young people:
 - Better emotional wellbeing
 - Reduced stress and hyperactivity
 - Improved resilience
 - For adults:
 - Lower stress, depression and anxiety;
 - Higher positive emotions and mental wellbeing



Taking care of nature

Reduce energy use

Save money on your bills at the same time as reducing your carbon footprint

[Nest Wales](#)



Support nature and biodiversity

Make your garden wildlife friendly

[Nature on your Doorstep – Wildlife-friendly Gardening | The RSPB](#)



Volunteer for a local environmental charity

You could be food growing, fundraising, litter picking or conserving nature

[I want to volunteer.](#) -WCVA



Work together

Find out how communities across Wales are tackling climate change and helping nature together

[Renew Wales](#)



Social wellbeing

Places to meet with others; shared activities and experiences

- Health outcomes:
 - Reduce social isolation
 - Sense of belonging
 - Improved mental wellbeing



Essentials for life

Clean air Water Food

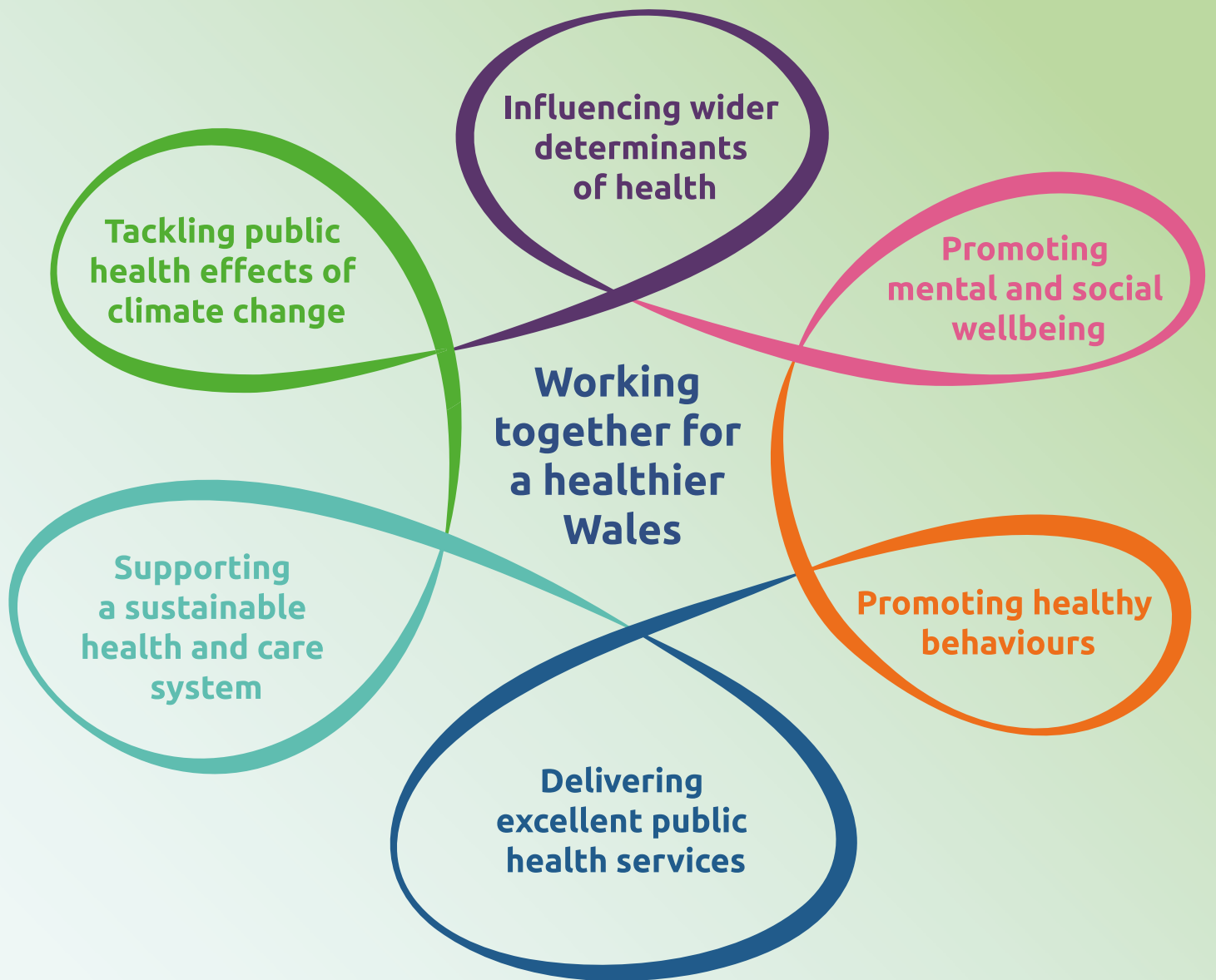


In the UK, **40% of species are in decline,** and **25% of mammals are at risk of extinction**



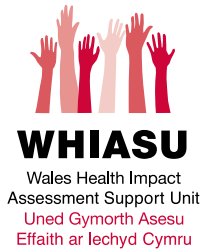

Taken from: Health Impact Assessment of Climate Change in Wales (Public Health Wales, forthcoming). Public Health England (2020) Improving Access to Greenspaces: a New Review for 2020. JNCC (2021) Nature Positive 2030.

Our Priorities 2023-2035



We are Public Health Wales.
We exist to help all people in
Wales live longer, healthier lives.

Our values are **working together**
with **trust and respect** to **make a difference**.



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