

Improving winter health and well-being and reducing winter pressures. A preventative approach.

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Improving winter health and well-being and reducing winter pressures in Wales

A preventative approach



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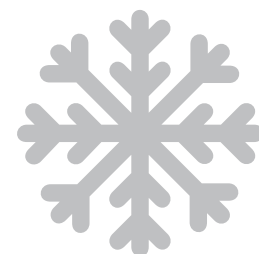
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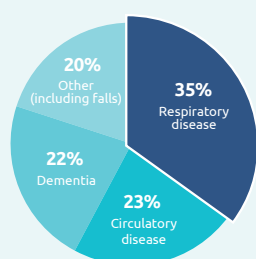
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Improving winter health and well-being and reducing winter pressures in Wales

Wales has higher levels of poor health and death during the winter months compared to the rest of the year. Understanding the health impacts of winter weather and actions required to mitigate poor health during this period can help policy makers, health and care services, third sector organisations and the public plan for winter, improving the health of current and future populations.

Health impacts of winter weather

3,400 excess winter deaths¹ in Wales during 2017/18



Respiratory disease² is a leading cause of excess winter death



30% of excess winter deaths are due to cold homes

Over **75%** of excess winter deaths are in those aged 75+ years



A 1°C temperature decrease during winter months is associated with a:



5%↑ in respiratory illness, including influenza



3%↑ in death from respiratory disease



2%↑ in death from cardiovascular disease in the over 65s

Prolonged³ cold weather can **x2** the risk of death from cardiovascular disease

Influenza transmissions

1 in 3 occur in schools and workplaces



40% of **hypothermia** deaths are linked to alcohol use and **22%** are linked to psychoactive drug use

Impact on Welsh services



Peaks in **emergency hospital admissions** are seen in the winter (by **3-5%** above average)



Emergency hospital admissions increase in younger people (**0-17 years**) and older people (**65+ years**) during winter

Groups most affected by cold weather

- Older people
- People with chronic diseases
- Pregnant women
- People living in deprived areas
- People living in cold homes
- People living in fuel poverty
- Homeless individuals
- People with unhealthy behaviours:
 - Smoking
 - Excess alcohol
 - Sedentary behaviour



¹Excess winter deaths are defined as the number of deaths that occur in the winter period compared with the average number of deaths occurring in the preceding August to November and the following April to July.

²Respiratory diseases are defined as ICD 10 codes J00 to J99. This includes respiratory infections, respiratory and lung diseases, and influenza and pneumonia.

³At least three consecutive days.

Cold homes are a risk factor for poor health



Indoor temperatures below **18°C** can harm health at any age

Among children, living in a cold home can:



x2 the risk of breathing problems



Contribute to **anxiety** and **depression**

Examples of what is happening in Wales to improve winter health



Influenza vaccination

868,668 people in Wales were vaccinated in 2018/19



Choose Well (national community pharmacy campaign)

Health advice & signposting for people with long term conditions



Nest (warm homes programme)

Energy efficiency measures for low income households



Ageing Well in Wales

Steady On, Stay Safe (falls prevention programme)

Risk assessment for falls in the home and exercises to improve strength & balance



Framework for action⁴



Strengthen prevention actions

- **Optimise public health interventions** e.g. supporting healthy behaviours
- **Prevent the spread of respiratory viral infections** e.g. maximising influenza vaccination uptake and providing handwashing advice
- **Prevent falls** e.g. through exercise programmes and home safety assessments
- **Help vulnerable individuals keep warm** e.g. through services for the homeless
- **Support households living in fuel poverty** e.g. by providing financial support
- **Increase warmth and energy efficiency of homes** e.g. through home improvements



Health and care service interventions

- **Support self management of people with long term illnesses** e.g. through help navigating through health and care services, and healthy behaviours interventions
- **Ensure support and continuity of care following hospital discharge**
- **Broaden winter planning to year round 'continuous preventative planning'** that is responsive to seasonal needs and extreme weather events
- **Ensure interventions are commissioned/delivered on an ongoing basis** to reduce demand on services
- **Address service barriers to managing winter pressures** e.g. by improving communication, supporting staff well-being and increasing staff capacity
- **Implement the Emergency Care Dataset**



Community approaches

- **Strengthen resilience within local communities** e.g. by increasing social networks
- **Optimise local services and networks for vulnerable groups**
- **Provide community based initiatives on an ongoing basis** to reduce demand on hospitals e.g. providing ambulatory care



Research priorities

- **Understand the links between winter and well-being** (including mental well-being)
- **Explore approaches/effectiveness for building community health, well-being and resilience**
- **Evaluate the impact of winter health campaigns**
- **Identify the impact of current approaches** and opportunities for scaling up best practice

⁴For more details about the framework please see the full report:
Improving winter health and well-being and reducing winter pressures in Wales. A preventative approach.

About this report

This report aims to describe the impact of winter and cold weather on health and well-being in Wales and the subsequent effects on health and care services, in a way that can inform strategic planning for the future. The report provides:

- current international evidence of the primary and broader determinants of ill-health in winter
- information on risk factors and vulnerable populations
- evidence-based solutions to reduce winter-related morbidity and mortality

- insights from key stakeholders
- and a framework to support a long-term preventative approach to reducing the impact of winter on health and well-being and care services.

This is the first report (that the authors are aware of) to take a preventative approach and to apply public health principles to improving winter health and well-being and reducing winter pressures in Wales.

An accompanying Technical Report is available to assist with further understanding of the evidence and methodology.



Executive summary

Winter is a challenging time in Wales. Like many other countries, our population experiences higher levels of poor health (morbidity) and death (mortality) during the colder months compared to other times of the year. During the 2017/18 winter season, there were 3,400 excess winter deaths in Wales¹, with hospital data showing peaks in emergency admissions (Section 6). The surge in demand for health and care services (winter pressures) across the winter months results in delays in patient care and negatively affects staff health and well-being. Wales is currently engaged in a range of actions to prevent, manage, and alleviate winter pressures (Section 7). By reviewing the international literature (Sections 3, 4 and 5), analysing data (Section 6) and seeking the views of expert stakeholders (Section 7), this report identifies how the well-being of the Welsh population and health and care services in Wales are affected during winter; and provides a framework for the actions required to mitigate winter morbidity, mortality and service pressures in future years (Section 9). This should result in better-informed insights and planning for winter by policy makers, health and care services, third sector organisations and other stakeholders, resulting in better well-being and health for current and future generations.

In the UK, around 10% of excess winter mortality is attributable to fuel poverty, and around 30% to living in a cold home.

Key conditions and vulnerable groups

In Wales, **respiratory disease** (including influenza) is the leading cause of excess winter deaths and a key contributor to winter pressures, for example by causing peaks in emergency hospital admissions over the winter months. Other key contributors are **circulatory diseases** (including cardiovascular disease) and **dementia** (both substantial causes of excess winter deaths; Sections 3 and 6). Literature suggests that unintentional injuries such as falls are also important (Section 3), particularly in older people, although improvements in emergency department (ED) data collection related to falls and injuries would help better understand this trend in Wales (Sections 6 and 9).

In Wales, as with other countries, **older people** are a key vulnerable group (Box 1), with those aged 85 years and over having the largest number of excess winter deaths (Section 6). Older people are more likely to have existing chronic diseases (Section 4), and are vulnerable to falls as well as mental well-being impacts such as loneliness and social isolation (Section 3 and 4), all of which increase the need for support from health and care services.

Box 1: Key vulnerable groups (Section 4)

- Older age (65+, but particularly 85+ years)
- Existing chronic diseases
- Pregnancy
- Living in a deprived area
- Less healthy behaviours (sedentary behaviour, chronic/irregular heavy alcohol consumption, smoking)
- Fuel poor
- Living in cold housing
- Homeless
- Socially isolated

While winter weather is an important direct cause of poor health, wider factors that exist all year round also play a fundamental role. Individuals living in **deprived areas** are more likely to have pre-existing illnesses that may be exacerbated in winter months (Sections 4 and 6). Also associated with winter morbidity and mortality is being **fuel poor** (being unable to afford to heat a home adequately) and living in **cold homes** (under a minimum indoor temperature of 18°C; Section 4). Homelessness is a further related risk factor, with homeless individuals being more exposed to cold weather and less able to access healthcare services (Section 4).

Mortality caused by hypothermia is often linked with alcohol (40%) and psychoactive drug (22%) consumption.

¹ Excess winter deaths are defined as the number of deaths that occur in the winter period compared with the average number of deaths occurring in the preceding August to November and the following April to July.

What works to reduce winter pressures

There are a range of interventions to prevent and alleviate winter pressures (Sections 5 and 8), although in some areas, further evaluation is needed (see Table 3, Section 8).

Interventions with evidence of a **positive impact for winter health** include: influenza vaccinations; hygiene advice and handwashing; Vitamin D supplementation; falls prevention for older people for example through exercise programmes and home safety assessments; prevention of chronic disease for example by promoting healthy behaviours; and winter road maintenance.

Research examining the direct health impact of housing and energy efficiency improvements is currently **mixed**.

Interventions with **limited evidence** for a direct impact on cold weather health/risk factors for poor health (e.g. behaviour/environmental conditions) include: winter specific healthy behaviour campaigns; advice to the public on energy efficiency, household warmth and clothing to keep warm; financial help to keep warm and healthy; health forecasting/winter weather alerts; anti-slip/winter footwear; interventions to tackle social isolation; services for the homeless; and gritting and keeping snow/ice from pavements.

Current challenges to preventing winter pressures in Wales

Interviews with stakeholders from a range of sectors in Wales highlighted a number of current and potential challenges to preventing and alleviating winter pressures that need to be addressed as part of future planning (Section 7). These include: the short-term nature of winter preparations (including planning and funding of interventions), which fail to consider the broader determinants of health and fail to create longstanding change; an increasing number of older people with complex health and care needs; communication gaps between and within sectors; staff recruitment and retention issues, accompanied by staff health and well-being concerns; and the increasing need to plan for other extreme weather events as a result of climate change.

"We're doing quite a bit of work looking at a strength-based approach in how we engage with communities, how we perhaps educate and help people to self-care when that's appropriate and build up social networks and then the community can support each other rather than, again, being very dependent on services."

Current approaches to reducing winter pressures in Wales

A range of interventions to prevent and alleviate increased winter demand on health and care services are already in place in Wales. Examples include: integrated winter planning involving health, social care and third sector organisations; healthy behaviour interventions to prevent chronic conditions; interventions aimed at vulnerable groups such as influenza vaccination, financial and practical support to help heat homes and increase their energy efficiency; interventions to support older people such as falls prevention, home safety interventions and advice on keeping warm; and interventions to build community resilience and develop supportive social networks.

Improving winter health and well-being and easing winter pressures: A framework

Through analysis of the international literature and views of expert stakeholders (Section 8), we have developed a framework for improving winter health and well-being and preventing winter pressures in Wales (Section 9).

This framework for action aims to support policymakers, the health and care system, community and third sector organisations, academia and other key stakeholders to take a long-term preventative approach to reduce the impact of winter on health and well-being and care services. The framework requires collaborative and integrated action at a national and local level, with adaptations by local areas to reflect the needs of their population and actions already underway.



A Framework for Action

Theme	Key Actions	Who should take action					
		Policy makers	Health & care	Public health system	Other public bodies	Community & 3rd sector	Academia
Strengthen prevention actions	Optimise public health interventions such as supporting healthy behaviours (e.g. smoking cessation, healthy diet, increased physical activity, maintaining a healthy weight and low risk alcohol consumption) and other evidence based interventions (e.g. lipid modification) to prevent the development and exacerbation of cardiovascular and respiratory diseases (the main causes of excess winter deaths).						
	Prevent the spread of respiratory viral infections , for example through maximising influenza vaccination uptake, employers encouraging sick employees to stay at home, hand washing advice.						
	Prevent falls and subsequent fractures among older people through interventions such as exercise programmes, vitamin D supplementation, home safety assessments, keeping pavements clear of ice and snow.						
	Help vulnerable individuals to keep warm e.g. through services for those experiencing homelessness, promoting the use of warm clothing and winter footwear.						
	Support households living in fuel poverty (particularly those with low income or who are vulnerable to the effects of cold) by providing financial and practical support.						
	Increase the warmth and energy efficiency of homes (alongside home ventilation) among vulnerable households e.g. through advice, financial help, home improvements, building energy efficient new homes.						
Health and care service interventions	Support those with chronic diseases to self-manage their condition, for example by facilitating effective navigation through health and care services, through healthy behaviours interventions and targeting of winter health campaigns.						
	Ensure ongoing support and continuity of care for vulnerable groups following discharge from hospital.						
	Broaden ' <i>winter planning</i> ' to year-round ' <i>continuous preventative planning</i> ' that is responsive to seasonal needs and extreme weather events and aims to reduce health inequity.						
	Ensure interventions and initiatives are commissioned/delivered on an ongoing basis , in order to achieve sustainable reductions in demand and utilisation of health and care services during winter.						
	Address barriers to managing winter pressures , for example by improving communication between health and care services on discharge processes, addressing staff health and well-being issues, and increasing staff capacity.						
	Progress plans to implement the Emergency Care Dataset to better understand the reasons for attendance and admissions.						
Community approaches	Support initiatives to strengthen resilience within local communities e.g. through increasing social networks to tackle social isolation.						
	Ensure vulnerable groups can access the support they need, for example through raising awareness of and timely signposting to services, and through greater integration of local services .						
	Provide/commission community based initiatives and projects, such as ambulatory care, on an ongoing basis, in order to reduce demand on hospitals and other health and care services.						
Research priorities	Improve understanding of the links between winter weather and well-being (including mental well-being) , particularly among the most vulnerable groups, for example through data linkage studies.						
	Explore methods, experiences and effectiveness of interventions for building community health, well-being and resilience .						
	Evaluate the impact of annual winter health campaigns on individual behaviours and health outcomes.						
	Map and identify the effectiveness of local and national interventions already in place in Wales, with scaling up of best practice across Wales.						

01 Introduction

Like many other nations, the Welsh population experiences higher rates of death (mortality) and poor health (morbidity) during the colder months compared to other times of the year. During the 2017/18 winter season, it is estimated that Wales experienced 3,400 excess winter deaths.

 **3,400 excess deaths during winter of 2017/18**

Historically, it has been generally assumed that the extreme effects of cold temperature (Box 2) and weather (ice and snow) are the primary hazards to population health during the winter months. For example, there are higher incidences of falls and hip fractures on days with or preceded by snow, strong wind, and rain in the winter months [Beynon et al., 2011; Ortiz et al., 2015]. Seasonal factors other than weather also contribute to adverse health outcomes in winter. For example, outbreaks of influenza and noroviruses are more prevalent in the winter season, and directly affect the health and well-being of the most vulnerable.

There is a growing body of evidence suggesting that a large proportion of excess cold-related mortality and morbidity are associated with, but not necessarily directly caused by, moderately cold temperatures (8°C and below). Exposure to moderately cold temperature is more likely to affect those who have underlying health conditions such as cardiovascular, cerebrovascular and respiratory problems or who are elderly (aged 75 years and older); leading to an increase in emergency hospital admissions and deaths (see Section 6). Additionally, there are many indirect health and psychosocial effects of cold weather, such as cold housing linked to worse mental health, depression and social isolation; reduced physical activity and mobility; and increased heating costs leading to fuel poverty.

Box 2: There is no universal definition of cold temperature

Public Health England's cold weather plan [Public Health England, 2016] identifies the majority of adverse health effects of cold temperatures beginning at relatively moderate outdoor temperatures of around 4-8°C (depending on the region), with alert services for severe cold weather being triggered after a 48-hour period when the mean temperature is 2°C or less.

Public Health Wales issues timely and proportionate public health advice when extreme or abnormally cold weather is forecast by Met Office Wales (www.wales.nhs.uk/sitesplus/888/page/94885). This advice is tailored to different audiences and scenarios, does not constitute an alert and is not a formal trigger for action by other public bodies.

Definition of winter

For this report, we use the term "winter" interchangeably with "cold weather", while recognising that the two are not synonymous. Winter is defined meteorologically as the beginning of December to the end of February, although the winter period used by most studies often refers to four months; December, January, February and March.

The association between temperature and mortality is mixed, with winter mortality affecting some populations disproportionately within and between counties, cities, and municipalities. There is a trend for adverse health outcomes from colder temperatures to be more pronounced in warmer climates. For example, UK, Spain, and Portugal have higher mortality rates from cold temperatures than many other European countries with colder climates [Gasparrini et al., 2015; Liddell et al., 2016]. This pattern may be due to physiological and behavioural adaptation, whereby populations acclimatise to the cold after sustained exposure (e.g. adapting clothing and behaviour) or better insulated housing in colder countries. Further, this pattern is affected by a broader set of demographic, health, socio-economic, built environment, and political factors that can vary between countries, such as pre-existing health conditions, level of household income, energy-efficiency of homes, and time exposed to cold conditions. Tables 1 and 2 compare the magnitude of excess winter mortality between Wales and other countries using the Excess Winter Mortality (EWM) Index (Box 3).

Each year, in Wales and the UK, the cumulative effects of cold weather and winter-related illnesses lead to a rise in demand for health and care services (**winter pressures**) (see Sections 6 & 7 and Box 4), across community and hospital settings including increases in emergency department (ED) attendances and emergency hospital admissions; exceeded bed occupancy rates and reduced bed availability; ambulance delays and diversions; longer waiting times for treatment (e.g. in ED, GP appointments); greater numbers of elective treatments and operations cancelled; and many medical staff working extra hours and experiencing work-related stress and exhaustion. These winter pressures are discussed further in Sections 6 and 7.

Welsh policies supporting and enabling a preventative approach to reducing winter pressures include:

- Well-being of Future Generations (Wales) Act 2015, which places a statutory duty on public bodies to improve the well-being of the people of Wales by thinking more about the long-term, working with communities, preventing problems and taking a more joined-up approach (Welsh Government, 2015).
- Social Services and Well-being (Wales) Act 2014, which aims to improve the well-being of people who need care and support, and carers who need support. One of the fundamental principles of the Act is prevention and early intervention, for example, through an emphasis on preventative community services.
- A Healthier Wales (Welsh Government, 2018a), the Welsh national strategy for health and social care has a preventative, community-focused approach, through an emphasis on increased joined-up working between the health and social care system.

Box 3: Key definitions

Excess Winter Deaths (EWDs):

This report uses the definition of excess winter deaths from the Office for National Statistics (ONS). EWDs are defined as the above-average mortality between December and March, comparing the number of deaths that occur in this winter period with the average number of deaths occurring in the preceding August to November and the following April to July. From 2019, winter mortality reports from the ONS will be published for Wales and England separately.

Excess Winter Mortality (EWM) Index:

This is the percentage of additional deaths that occur in the winter period, December to March. This is calculated by dividing the number of EWDs by the average non-winter deaths (including autumn, summer, and spring). An EWM index of 33 means that there were 33% more deaths in winter compared with the non-winter period.

Underestimation of EWDs in colder countries:

The winter period used to measure EWDs – December to March – may underestimate EWDs in colder countries. In warmer countries, cold-related deaths are more confined to this period and consequently have higher rates of EWDs compared to colder countries with more severe and longer winters. Table 2 takes account of the length of time homes need to be heated to be safely warm in each country using the Index of Heating Degrees Days (HDD), compared with EWDs (the EWM index to HDD index ratio). The smaller the ratio for any one country, the more likely it is that EWDs are directly attributable to cold temperatures.

More specific policies relevant to winter pressures include:

- A framework, accompanied by a planning template, issued by Welsh Government in September 2019. The framework is aimed at aiding local planning and delivery with the challenges of the winter period in mind. The framework includes seven themes:
 1. Optimising cross organisational and sector working to support resilience
 2. Urgent primary care/out of hours resilience
 3. Preventing unnecessary conveyance and admission to hospital
 4. Discharge to assess/recover (D2AR)
 5. Community step down capacity
 6. An enhanced focus on the respiratory pathway
 7. An enhanced focus on the frailty pathway
- The National Strategic Programme for Primary Care in Wales is the primary care response to “A Healthier Wales”. The Programme has six key strategic areas for further focus which include: prevention and well-being (with every contact with a citizen or their carer used to promote prevention and self-management opportunities); workforce and organisational development (with a focus on a multidisciplinary team approach); and communications and engagement.

There are a number of other planned national and local actions in Wales to proactively manage and alleviate winter demand, protect staff, and ensure patient safety and care over the winter season. These actions are discussed further in Sections 5 and 7. However, even with these policies and planned actions, little is known about whether the current winter preparations and interventions are the best strategies available for alleviating winter pressures and cold-related mortality and morbidity in Wales.

Through this report, we seek to understand the latest evidence available, to gather insights from expert stakeholders and identify priority areas for action to reduce health burdens and winter pressures on health and care services in Wales. This should result in better-informed insights and planning for winter by policy makers, local authorities, health services, third sector organisations and other stakeholders in the coming years, resulting in better well-being and health for current and future generations.

Table 1. All-cause EWM index for Wales, 1991/92 to 2012/13

Country	Excess Winter Mortality Index (%)
Wales ¹	17.6

¹ Data sourced from Office for National Statistics, winter periods between 1991/92 to 2012/13

Table 2. International comparison of all-cause EWM index (1980-2013) and EWM index to HDD index ratio

Country	Excess Winter Mortality Index (%)	Excess Winter Mortality Index to Index of Heating Degrees ² Days Ratio
Malta ¹	29.4	2.4
Portugal ¹	28.0	5.7
Cyprus ¹	23.6	1.8
Spain ¹	20.6	5.1
The Republic of Ireland ¹	19.7	9.9
United Kingdom ¹	18.6	8.9
Greece ¹	17.9	3.0
Bulgaria ¹	17.8	3.8
Romania ¹	17.5	4.1
Italy ¹	16.0	3.6
Switzerland ¹	14.2	5.1
France ¹	13.8	4.2
Belgium ¹	13.6	4.7
Sweden ¹	13.3	5.9
Austria ¹	13.2	4.2
Slovenia ¹	13.2	3.6

² The index is derived from Heating Degrees Days (HDDs), and is an alternative method of measuring the impact of cold conditions on mortality. This index accounts for the length of time and amount of heating homes need to be safely warm in each country, providing a better reflection of the degree to which cold conditions affect mortality across different countries which typically have longer lengths of winter beyond December to March.

Hungary ¹	12.3	2.9
Denmark ¹	12.2	4.8
Norway ¹	12.1	6.1
The Netherlands ¹	11.8	4.1
Germany ¹	11.7	3.9
Poland ¹	11.7	3.7
Latvia ¹	11.5	4.0
Lithuania ¹	11.5	3.8
Luxembourg ¹	11.2	3.9
Estonia ¹	10.9	3.9
Czech Republic ¹	10.8	3.5
China ²	10.4	
Japan ²	9.8	
Finland ¹	9.5	4.0
Iceland ¹	8.4	5.6
Slovakia ¹	8.2	2.3
South Korea ²	6.9	
Australia ²	6.5	
The United States of America ²	5.5	
Canada ²	4.5	
Taiwan ²	3.9	
Thailand ²	2.6	
Average	13.1	4.4
¹ Data sourced from Liddell et al. (2016), winter periods between 1980 to 2013	² Data sourced from Gasparrini et al. (2015), winter periods between 1985 to 2012	

Box 4: Public Health Wales report series (2012/13) on drivers contributing to pressures on unscheduled care and performance in Wales

These reports examined the factors underlying 'unprecedented' demand and pressures on NHS Wales in 2012/13 and offered valuable evidence on the complexity and seasonality of these factors. Some of the main findings are as follows:

- Acute pressures on ED and the rest of the health and care system in winter were caused by **ongoing long-term system problems**, compounded by the usual predictable winter rise in demand; and seasonal factors, including events such as sudden drops in temperature in October 2012 to March 2013.
- From 2010 to 2012, changes in population age demographics did not explain a significant amount of the observed changes in ED attendance in the winter months. Evidence included in the report suggested that **population age structure changes explained at most 40% of the rise in emergency admissions** in England.
- In terms of annual attendance at major EDs in Wales in the winter period, most attendees were under 65 but the **65-84 age group accounted for most of the increase**. The **older age groups tended to wait longer, were frail and had complex chronic medical and social problems** – adding to the pressure on the health and care system.
- **Socioeconomic variables were related to around 45% of the variation in emergency admissions in winter** in Wales between GP practices, with deprivation more strongly linked to emergency than to elective admission.



02 Methodology

2.1. Literature reviews

A series of structured literature searches were undertaken using Medline and grey literature resources, such as the National Institute for Health and Care Excellence (NICE) guidelines on excess winter deaths, and search protocols by the Public Health Wales Evidence Service to identify a) health conditions associated with winter months and cold temperatures, b) the common risk factors associated with winter morbidity and mortality, and c) evidence for interventions that could protect against or prevent winter morbidity or mortality. The literature searches focused specifically on evidence relating to cold or winter weather and therefore some effective but non-seasonal interventions (e.g. general prevention of chronic diseases or falls) may not have been identified and included.

Full details of the search strategies, the methodology and the references for the literature review can be viewed in the Technical Report.

2.2. Epidemiology

Welsh health intelligence and data were obtained from the Office for National Statistics (ONS) (mortality data), Public Health Wales Observatory (emergency hospital admissions, emergency department data, and influenza surveillance data), the All Wales Injury Surveillance System at Swansea University (emergency hospital admissions for falls), Public Health Wales violence surveillance system for south Wales (police data, ambulance call-outs and emergency department data) and StatsWales (fire service data). These sources were analysed by week/month to establish trends across the year and identify any increases in winter months. Data sources were analysed by cause/condition, age group and deprivation where possible to help identify vulnerable groups within Wales.

2.3. Semi-structured interviews

Nineteen semi-structured telephone interviews were carried out throughout the winter period of 2018/19, November to March, involving representatives from:

- NHS Wales organisations (Betsi Cadwaladr University Health Board, Aneurin Bevan University Health Board, Powys Teaching Health Board, Cwm Taf Morgannwg University Health Board, Hywel Dda University Health Board, Cardiff and Vale University Health Board, Public Health Wales);

- Third sector and community organisations and health and care services (Care and Repair, Warm Wales, National Energy Action, General Practitioner, Pharmacist);
- Welsh Government (Energy and Carbonisation, Poverty); and
- Representatives from the housing sector (Community Housing Cymru, Building Research Establishment and Healthy Homes, Healthy People).

Participants covered a range of roles and responsibilities, including:

- Senior Emergency Care Nurse
- Consultants in Emergency Care
- General Practitioner
- Community Pharmacist
- Primary Care Services and Primary Care Nursing
- Pre-Hospital Services
- Planning and Service Development Manager
- Manager of Occupational Therapist team
- Care Home Manager
- Head of Third Sector Organisation
- Policy Officer
- Project Manager for Third Sector Organisation
- Hospital Director
- Hospital Medical Director
- Advisors for 1000 Lives and Scheduled Care

The interviews explored perceptions of winter periods and cold weather, including the range and causes of adverse health and well-being impacts; the adverse impact of winter on health and care services; the effectiveness of current preventative measures and responses; and suggestions for improving approaches to prevention and mitigation of health and service-related impacts. The interview questions can be found in the accompanying Technical Report. Interviews lasted 30 minutes on average. All responses from the interviews were recorded as audio files, and confidentiality and anonymity were ensured. The audio files were transcribed verbatim and coded thematically using the qualitative software NVivo Pro version 12.3, QSR International.

2.4. Evidence analysis

Evidence from the literature review, epidemiology data and semi-structured interviews were compared and used to identify a framework for improving winter health and well-being and preventing winter pressures in Wales. Detailed information on the methodology can be found in the accompanying Technical Report.

2.5. Embedding the sustainable development principle

In developing this report, we have applied the sustainable development principle through the 'five ways of working':



Prevention

This report seeks to prevent ill health and increased demand for services as a result of winter weather



Involvement

The report has been developed by involving representatives from organisations and sectors across Wales



Collaboration

Collaboration from experts from a number of organisations has been key in identifying issues and solutions



Integration

This report aims to identify and address the broader determinants of poor health due to cold and winter weather



Long-term

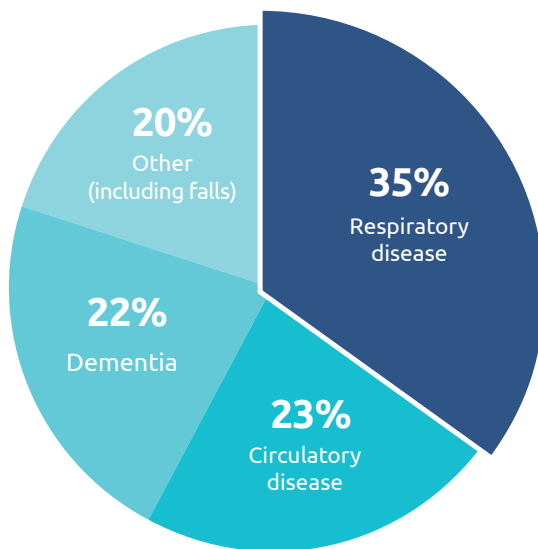
Advocacy for a long-term approach is a key recommendation of this report



03 The adverse impact of winter and cold weather on health and well-being

The winter months are associated with the exacerbation of several health conditions. This section explores and outlines what we know about these links.

Causes of excess winter deaths



Key Findings

- Respiratory and cardiovascular diseases account for over half of excess winter deaths; dementia accounts for over a fifth.
- Hypothermia and non-intentional injuries also show seasonal variations in hospital admissions and mortality, although they account for a small proportion of excess winter deaths.
- 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.

3.1. Respiratory disease (RD)

Respiratory diseases (RDs) include chronic disorders such as asthma and chronic obstructive pulmonary disease (COPD), and acute disorders due to infections (e.g. influenza, pneumonia). Temperature changes can have a direct affect on respiratory conditions, especially for those with asthma [Pike et al., 2018; Xu et al., 2012] and COPD [Hicks et al., 2018]. During winter months, a 1°C decrease in temperature is associated with increases in RD mortality (by 3%) and morbidity (by 5%) [Analitis et al., 2008; Bunker et al., 2016]. In England and Wales specifically, there were 85% more respiratory deaths in the winter months of 2017/18 compared to other times of the year, accounting for over a third (34.7%, 17,400) of all excess winter deaths (EWDs) [ONS, 2018]. The health effects of cold weather are more pronounced during prolonged periods of cold³, which can increase the risk of mortality from RDs by 20% [Ryti et al., 2015]. There is also a delayed affect on RD symptoms, with the greatest risk of exacerbations for respiratory conditions occurring more than 15 days after exposure to cold temperatures [Bunker et al., 2016].

Influenza transmissions

1 in 3 occur in schools and workplaces



³ Defined as an event below a temperature threshold lasting for a minimum of 2 days duration.

3.2. Cardiovascular disease (CVD)

Cardiovascular diseases (CVDs) are disorders of the heart and blood vessels and include hypertension, coronary heart disease (e.g. angina, heart attack), and cerebrovascular disease (e.g. stroke). In many countries, including the UK, the incidence of CVDs is highest during winter months [Fares, 2013; Stewart et al., 2017; Sartini et al., 2016], mainly due to the health effects of lower temperatures. A 1°C decrease in temperature during the cold months has been found to significantly increase the risk of mortality from CVD among those aged 65 and over by 1.7% [Bunker et al., 2016]. In England and Wales specifically, nearly a quarter (23%; 11,500) of all EWDs in 2017/18 were attributed to circulatory diseases [ONS, 2018].

Winter months are associated with a greater number of CVD-related hospitalisations from conditions such as heart failure and acute myocardial infarction (heart attack) compared to summer months [see Box 5; Levin et al., 2018; Ogbonor et al., 2018]. Prolonged periods of cold weather can increase the risk of mortality from CVD two-fold [Sartini et al., 2016]. In addition, cold temperatures can have a delayed impact on health following initial cold exposure, with the highest risk of CVD mortality being after a lag period of 7 to 14 days [Moghadamnia et al., 2017], and CVD morbidity after a more extended lag period of above 15 days [Bunker et al., 2016].

Box 5: The physiological impact of cold temperature on CVDs

Exposure to lower temperatures can cause blood vessels to constrict, which causes an increase in blood pressure, the concentration of fibrinogen (i.e. blood clotting) and cholesterol levels; all biological markers for CVDs [Modesti et al., 2018; Rytty et al., 2016]. Cold temperatures can also increase levels of blood glucose and atrial fibrillation (irregular heartbeat) which are additional biological markers for stroke mortality [Fares, 2013; Lichtman et al., 2016].

3.3. Dementia

In England and Wales during the 2017/18 winter season, around a fifth of all EWDs (10,800) was for Alzheimer's disease and other related dementias [ONS, 2018]. The reason for this is unclear, although there is emerging evidence that people with dementia may have greater vulnerability to RDs and falls, difficulties with self-care, and disturbances of temperature regulation with advancing age [Liddell et al., 2016; Gray et al., 2015]. People with dementia living at home tend to be exposed to the cold more often as they may not be able to make adaptive choices, for example they may have difficulties paying energy bills or dressing appropriately for weather conditions [Gray et al., 2015]. A study in Sweden found that dementia was the second-most common cause of hospital admissions for accidental hypothermia and frostbite, typically as a result of going outdoors inappropriately dressed for cold temperatures [Brändström et al., 2014].

3.4. Unintentional injuries

Two types of unintentional injury that increase during winter months are falls and road traffic injuries.

Colder temperatures can lead to behavioural changes, such as spending more time indoors and reduced physical activity [Hayashi et al., 2017]. For older adults, this has been associated with slower reaction times and reduced bone density [Atherton et al., 2005], which can lead to increased frequency and severity of falls [Chow et al., 2018]. In many countries, the number of falls or fractures recorded in hospitals increases in the winter months [Johansen et al., 2016; Modarres et al., 2012; Mazzucchelli et al., 2018]. Snow, rain and ice are thought to contribute to this increase, with higher incidences of falls and hip fractures on days with or preceded by snow, strong wind, and rain [Beynon et al., 2011; Hajat et al., 2016; Murray et al., 2011; Ortiz et al., 2015]. In addition, seasonality of wrist and forearm fractures during the winter months have been found among older people aged over 75 in Wales, although increased incidence was not apparent in other age groups [Wareham et al., 2003].

Snow events can increase the road traffic crash rate by 84% and the injury rate by 75%. Factors believed to contribute to this are higher levels of precipitation, snow, reduced daylight hours, and poorer visibility [Andersson & Chapman, 2011; Morgan & Mannering, 2011; Qiu & Nixon, 2008].

3.5. Mental health and well-being

Although mental health is believed to be affected by seasonal changes, studies generally report no significant relationships between winter (including low temperatures, high rainfall, and humidity) and mental health and well-being [Beecher et al., 2016; Phelan & Phelan, 2017]. Hospital admissions for common mental health disorders increase on days of higher temperature and peak in the spring and summer worldwide, rather than winter [Almendra et al., 2019].

It is essential to acknowledge that many aspects of human physiology and behaviour are adapted to a 24-hour light/dark cycle and have a major impact on health and well-being [Lockley, 2009]. As the days become darker and shorter in late autumn and early winter, reduced hours of natural light are associated with increased mental health distress and seasonal patterns in depressive symptoms such as seasonal affective disorder (SAD) [Beecher et al., 2016; Menculini et al., 2018; Rosenthal et al., 1984], often known as winter depression [Meesters & Gordijn, 2016]. Furthermore, shorter lengths of day and a lack of sufficient natural light in winter are associated with increased problems of disrupted sleep patterns, reduced sleeping efficiency and daytime fatigue, which can negatively affect mental health and mood [Anderson et al., 1994; Chen et al., 2016; Friberg et al., 2012]. These effects are greater for countries which are farther away from the equator [Anderson et al., 1994; Friberg et al., 2012].

3.6. Hypothermia

Hypothermia-related mortality occurs all year round, although there is a pronounced seasonal peak between December to February and on days with lower ambient temperatures ($\leq 1^{\circ}\text{C}$). Mortality caused by hypothermia is often linked with alcohol (40%) and psychoactive drug (22%) consumption, which affect thermoregulation, reducing an individual's perception and ability to adapt to cold temperatures, particularly when sleeping outdoors [Stares & Kosatsky, 2015]. Despite the common belief that hypothermia is a salient cause of death during cold conditions, there are 1-5 cases per 100,000 annually in Europe [Brändström et al., 2014; Kosinski et al., 2015]. In Scotland, which typically experiences colder daily conditions than other UK nations, there were 34 deaths involving hypothermia throughout 2017. Indeed, most cases of winter mortality are associated with cold exposure to milder moderate ambient temperatures [Gasparrini et al., 2015].

3.7. The potential impact of climate change

There is a consensus that global average temperatures will continue to rise over the next few decades, with the first decade of the 21st century the warmest ever recorded. The impacts of global warming are likely to reduce the severity and length of cold weather, and therefore, may reduce winter-related mortality worldwide [Ebi & Mills, 2013]. Although the UK is forecasted to experience milder and warmer winters, this may not directly affect cold-related mortality, with some climate change models projecting a 2% decrease by 2050 and 12% decrease by 2080 in the UK [Vardoulakis et al., 2014]. Figure 1 shows the anticipated steady decline of cold-related mortality across the UK from the 2000s to 2080s. Of note, Wales has higher rates of cold-related deaths compared to other UK countries [Vardoulakis and Heaviside, 2012].

Changes in the climate are also likely to lead to a substantial increase in extreme weather events, such as heatwaves, and subsequent heat-related deaths in the UK [Curtis et al., 2017]. Heat-related mortality is projected to rise steeply by 66% in the 2020s, 257% in the 2050s, and 535% in the 2080s. However, these projected changes may be overestimates as people acclimatise and make behavioural adaptations to rising temperatures such as the use of air conditioning [Vardoulakis & Heaviside, 2012].

Figure 1. Mean estimates of cold-related mortality⁴ in UK nations per year per 100,000 population, 2000-2080



Source: Data from the Health Effects of Climate Change in the UK (2012) Report from the Health Protection Agency

⁴ Cold-related mortality refers to the number of individuals that correspond to the proportion of mortality associated with cold temperatures.

04 Risk factors for winter-related morbidity and mortality

There are many individual, social-economic and environmental factors identified in the international literature that increase the risk of winter-related morbidity and mortality.

4.1. Individual factors

Age

There is a markedly higher rate of excess winter morbidity and mortality for those over the age of 65 [Bunker et al., 2016; Xu et al., 2013; Myint et al., 2007; Hajat et al., 2007, 2016]. Older people are more vulnerable to winter-related morbidity and mortality not just because they are more likely to have existing chronic diseases (Prince et al., 2015), but also due to:

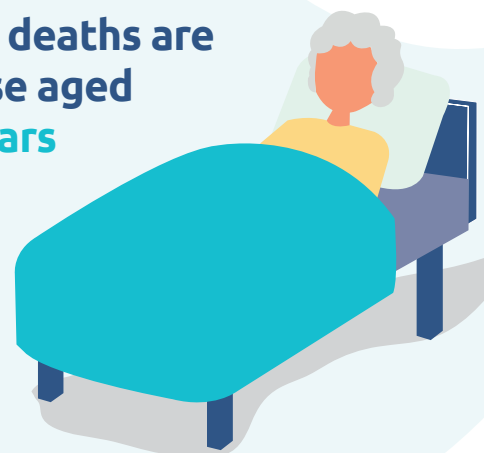
- Being less able to keep warm during winter (e.g. through natural reductions in thermoregulation, Castellani & Young, 2016; Szekely, & Garai, 2018), especially without social support [Tod et al., 2013].
- Being less likely to follow advice on heating the home and keeping warm [Day & Hitchings, 2011].
- Being less able to adapt to colder weather (e.g. using thermal clothing, preparing warm food, using modern heating technology to heat the home or pay fuel bills, Day & Hitchings, 2011).
- Holding attitudes around frugality (e.g. keeping fuel costs to a minimum) or stoicism (e.g. embracing the cold rather than heating the house adequately).
- Having a lack of awareness about the link between health and heating [Tod et al., 2013].
- Spending more time indoors in cold conditions and engaging less in physical activity. This reduces physical performance (e.g. grip strength, leg strength, and balance), which is a known risk factor for falls [Hayashi et al., 2017].



Key Findings

- Older people (aged 65+), those with existing chronic diseases, pregnant women, individuals living in deprived areas and those who are homeless are key vulnerable groups for winter-related morbidity and mortality.
- Living in a cold, damp house and being socially isolated are also key risk factors.
- A number of behavioural factors (sedentary behaviour, alcohol consumption and smoking) increase the risk of chronic conditions such as respiratory and cardiovascular disease more generally and should be considered important opportunities for preventative action.

Over 75% of excess winter deaths are in those aged 75+ years



Existing chronic diseases

Individuals with chronic conditions (e.g. asthma, COPD, arthritis, type II diabetes) tend to experience worsening physical health throughout the winter months, leading to more hospital admissions and longer length of stay compared to summer months [Argha et al., 2018; Hajat et al., 2016; Serra-Picamal et al., 2018; Shanley et al., 2015]. For example:

- COPD: Rates of COPD symptoms increase nearly twofold in winter (December to February) compared to summer (June to August) [Hicks et al., 2018]. Viral illnesses account for 48% of exacerbations [Papi et al., 2006].
- Musculoskeletal conditions: Worsening pain and joint stiffness are reported with falling temperatures and damp weather [Deall & Majeed, 2016]. Colder conditions can also increase negative perceptions of arthritic symptoms [Hawley et al., 2001].
- Diabetes: Diabetes is associated with a reduced ability to maintain body temperature during cold temperatures [Kenny et al., 2016], impaired vasoconstriction, and elevated blood pressure; all of which are associated with CVDs [Hampel et al., 2010; Li et al. 2014; Yang et al., 2016].

Pregnancy

Natural changes in the immune response during pregnancy can increase women's susceptibility to viral infections, such as influenza [World Health Organization (WHO), 2014]. Influenza during pregnancy can lead to many adverse severe health effects, with increases in the risk of miscarriage, premature birth and low birth weight [Mendez-Figueroa et al., 2011]. Pregnant women with influenza are eight times more likely to die from this infection than their non-pregnant counterparts [Pebody et al., 2010]. Colder temperatures can also contribute to adverse health outcomes, with peaks of premature birth, low birth weight and stillbirth in winter months [Strand et al., 2011]. This finding has also been identified for hotter temperatures during summer but to a more modest degree [Rylander et al., 2013].

Vitamin D levels

During the winter months in the northern hemisphere (November to March), shorter daylight hours and greater time spent indoors decreases vitamin D synthesis obtained from ultraviolet sunlight, resulting in an increased risk of vitamin D deficiency [Cashman et al., 2016; Chatfield et al., 2007; van Schoor et al., 2018]. Lower levels of vitamin D status are associated with increased cardiac risk and mortality [Abrignani et al., 2009], increased risk of severe complications from falls among older adults [Pludowski et al., 2018], COPD and asthma exacerbations [Jolliffe et al., 2018, 2019], and increased risk of viral infections in winter [de Gruijl & Pavel, 2012].

4.2. Individual factors relating to health behaviours

There are a number of behavioural factors that increase an individual's risk of developing health conditions that are known to contribute to excess winter mortality and morbidity (e.g. CVDs, RDs, see Section 1). Addressing these behavioural risk factors can help prevent the occurrence of these conditions more generally, and also prevent the exacerbation of symptoms in the winter months specifically.

Dietary changes, sedentary behaviour and weight gain

In the UK, adults are significantly more likely to spend a larger proportion of time being sedentary in the winter compared to other seasons [O'Connell et al., 2014]. Spending more time indoors while maintaining the same diet can lead to an imbalance of energy expenditure, leading to weight gain, raised blood pressure levels and increasing CVD risk over the winter period and afterwards [Shephard & Aoyagi, 2009]. Individuals consistently gain a small amount of body weight (i.e. 0.4kg to 0.9kg) during the holiday season, especially Christmas Day and New Year in the UK [Helander et al., 2016]. Behaviour and dietary changes during festive periods can increase the risk of cardiovascular mortality due to increased weight, blood pressure and cholesterol levels, and additional strain on the vascular system, particularly if these changes in behaviour persist after the winter months [Marti-Soler et al., 2014].

Alcohol consumption

Chronic and irregular heavy drinking (e.g. binge drinking) increases the risks of CVDs through weakening the heart muscle, increasing blood pressure and impacting negatively on vascular functions [Rehm & Roerecke, 2017]. Alcohol consumption can also increase the risk of unintentional injuries such as road traffic crashes and falls [WHO, 2007]. Alcohol consumption follows peaks and troughs depending on the day, season, and special occasion. For instance, in England, during festive occasions (e.g. Christmas and New Year's Eve), average weekly alcohol consumption increases by nearly a quarter (13.6 to 17.1 units) [Bellis et al., 2015]. Episodes of heavy drinking occasions can have a substantial immediate risk for CVDs such as ischemic heart disease [Roerecke & Rehm., 2014]. Moreover, colder temperatures and fewer sunlight hours have been associated with increased alcohol consumption, with greater levels of heavier alcohol consumption among populations living in colder countries worldwide [Ventura-Cots et al., 2019].

Smoking

Smoking is a risk factor for cardiovascular morbidity and mortality (Mons et al., 2015) as well as RDs [Jayes et al., 2016], two of the most common winter-related conditions. European studies suggest that current smokers experience more negative health effects in winter, such as increased RD hospital admissions [Jordan et al., 2008] and reduced levels of vitamin D [Kull et al., 2009].

4.3. Social, economic and environmental factors

Socio-economic deprivation

Direct links between socio-economic deprivation and adverse winter health outcomes are inconclusive. In the UK, evidence has shown deprivation to have only a minor direct effect on winter mortality, with little differences found in any of the 10 regions studied [Hajat et al., 2007]. Further, social-economic factors (e.g. material deprivation, poor housing) have been found to have little effect on the risk of winter hospital admissions, with medical factors (e.g. having COPD) being more important predictors among older adults [Jordan et al., 2008]. One notable exception comes from an ecological study in England, which found variations in excess winter mortality for the 2010/11 season which could be explained by income deprivation (3%) and by unemployment (5%) [Stacey & Pritchard, 2016], though these findings only reflect one winter season. The vulnerability of more deprived individuals to winter morbidity may depend on their pre-existing health status. For example, research from Scotland has shown a 30% increase in COPD exacerbations and related hospital admissions in the most deprived areas compared to the least deprived areas as temperatures fall [McAllister et al., 2013].

Globally, deprivation has been found to have a significant impact on winter health. In Portugal and New Zealand, socio-economic deprivation has been significantly associated with higher levels of excess winter mortality [Almendra et al., 2017, see Box 6; Hales et al., 2012]. In New Zealand, these findings may have been reflective of people with lower incomes living in poorer quality of housing [Howden-Chapman et al., 2008], and experiencing barriers in accessing and using healthcare services [Hales et al., 2012].

In summary, though populations living in areas of greater deprivation are more affected in winter as they are more likely to have pre-existing illnesses and health conditions, after taking existing illnesses into account, there is limited evidence for further direct impacts of deprivation on winter mortality.

Box 6: Case study of deprivation and winter mortality in Portugal

In Portugal, two indexes of socio-economic deprivation (socio-material and housing deprivation) were found to be significantly associated with higher levels of winter mortality at municipal level [Almendra et al., 2017]. Being in the highest quintile of socio-material deprivation (including unemployment and education level) and living in old and poor housing conditions (e.g. leaking roofs, poor insulation, and damp walls) was associated with a 71% and 82% increased relative risk of winter mortality respectively. However, 89% of homes in Portugal are thought to have no access to central heating [Almendra et al., 2017].

Fuel poverty

Fuel poverty is related to issues of affordability (see Box 7) [Li et al., 2014] and in Wales is defined as a household needing to spend more than 10% of net income on fuel to heat their home to an adequate standard of warmth. In the UK, **around 10% of EWDs are directly attributable to fuel poverty** [Hills, 2012]. Fuel poverty has also been linked to winter respiratory hospital admissions in those aged 65 and over, with poor energy ratings of dwellings a stronger predictor than deprivation [Rudge & Gilchrist, 2007]. Households that are relatively fuel poor are at significant risk of winter morbidity by living in a cold and damp dwelling, with limited means to afford adequate heating during the winter months. Households can be cold without falling into fuel poverty, and the coldest homes are not necessarily the poorest. Fuel poverty is solely related to the household's ability to afford to heat their homes adequately. The likelihood of a household falling into fuel poverty is dependent upon multiple factors including [Schleich, 2019]:

- Domestic energy prices: Rural households are more vulnerable to energy price increases than urban households. In rural areas, there are fewer households with access to the main gas network or other cheaper fuels. Households with no access will be more reliant upon expensive fuel types such as oil, LPG gas or electricity. [Roberts, 2008; Roberts et al., 2015].
- Household income: Households on low incomes are more likely to reside in low-priced dwellings or privately rented accommodation, with high fuel costs [Grosche, 2010].
- The energy performance of the home (see Box 8): Poor energy performance increases the amount of energy needed for heating the home and the risk of households falling into fuel poverty [Hills, 2012].



Box 7: Fuel Poverty in Wales and Europe

Across Europe, over 50 million Europeans (11%) cannot afford to properly heat or maintain satisfactory indoor temperatures of 18°C in their homes [Pye et al., 2015]. In Wales, 155,000 (12%) households are estimated to be in fuel poverty [Welsh Government, 2019a; Grey et al., 2017].

Box 8: Housing Performance in Wales

The Welsh Housing Conditions Survey [2018] reported that Wales has the oldest and least thermally-efficient building stock compared to other UK nations and northerly European counties, with 26% of dwellings built prior to 1919, and 52% of dwellings built prior to 1965. As expected, older dwellings (pre-1965) in Wales have poor energy performance (Band E and D) and lower indoor temperatures compared to dwellings built since 2002 (Band C).

Cold housing

Cold homes (as defined by Jevons et al., 2016 as under a minimum indoor temperature of 18°C) harm health. There is strong evidence to suggest that living in a cold home increases the risk of dying in winter, with residents in the coldest quarter of homes having 20% greater risk of winter mortality when compared with those in the warmest quarter [Dear & McMichael, 2011]. In the UK, around **30% of excess winter mortality is attributable to living in a cold home** [Guertler & Smith, 2018].

Exposure to colder indoor temperatures in the absence of suitable clothing can cause harm to cardiovascular, functional, and respiratory health, as well as impacting on other conditions such as influenza-like illnesses and arthritis [Dear & McMichael, 2011], particularly in vulnerable individuals such as the elderly. According to the English Longitudinal Study of Ageing 2012/13 [ELSA; Gale et al., 2017], older adults aged over 50 who reside in cold homes are more likely to have significantly higher blood pressure and cholesterol levels, lower levels of vitamin D, worse lung condition and reduced handgrip strength [Shiue, 2016].

Cold housing can affect health at any age, with children living in cold homes over twice as likely to suffer breathing problems such as asthma and bronchitis [Barnes et al., 2008]. Living in cold homes can also contribute to poor mental health and well-being, with as many as one in four adolescents living in cold housing in England experiencing multiple mental health problems such as anxiety and depression, compared with one in twenty living in warm homes [Dear & McMichael, 2011].

Carbon monoxide poisoning

Carbon monoxide is a colourless odourless poisonous gas produced when fuels such as gas, oil and wood do not fully burn. The incidence of carbon monoxide poisoning increases in winter months, with 49 deaths from accidental poisoning in 2016 in England and Wales [ONS, 2017]. Causes include the incorrect installation or maintenance of appliances such as central heating boilers, heaters and cookers [Zorbalar et al., 2014].

Rural living

The effect of rurality on winter-related health is inconclusive. Some studies suggest that compared with rural areas, older people living in urban areas are at a greater risk of respiratory-related hospital admissions [Jordan et al., 2008; England] and excess winter mortality [Hales et al., 2012; New Zealand]. Other studies from Taiwan have found that living in a rural area contributes to increased mortality from CVDs [Chen et al., 2010; Wu et al., 2011]. Some of the effect of rural/urban living is likely related to differences in the distance to and accessibility of medical and health-care services, and other factors (e.g. poor housing quality and fuel poverty), rather than a general susceptibility to cold-related exposure [Tanner et al., 2013]. As rural homes are likely to be detached, older, and larger than urban homes, they often tend to be more difficult and expensive to heat, and more challenging to improve in terms of energy efficiency [Dear & McMichael, 2011].

Homelessness

People who experience homelessness (see Box 9) are exposed to cold weather during the winter months. In Poland, people experiencing homelessness are 13 times more likely to die from hypothermia than those who are not [Romaszko et al., 2017], whilst in Paris, 85% of emergency hospital admissions due to hypothermia are estimated to be from the homeless population [Rouquette et al., 2011]. In England and Wales, there is no clear seasonal pattern of deaths in homeless people [ONS, 2018b]. People experiencing homelessness have less protection against the cold, leading to increased risks of elevated blood pressure [Kellogg & Horn, 2012], cold-related injuries [Zhang et al., 2019], and cold-related deaths - which are often in public areas rather than in hospital beds [Vuillermoz et al., 2016]. As well as the direct effects of cold weather on health, people experiencing homelessness have less ability to access health care.

Box 9: Homelessness in Wales

An estimated 347 people were sleeping rough on the streets of Wales in October 2018 [Welsh Government, 2019b], while as many as 11,277 households were accepted as homeless in spring 2018 [Welsh Government, 2018b]. Homelessness is related to personal vulnerabilities, such as mental ill health, adverse experiences and addictions, as well as wider adverse social and economic conditions, such as worsening housing market conditions, unemployment rates, and (childhood) poverty [Bramley & Fitzpatrick, 2018].

Social isolation

Loneliness and social isolation (see Box 10) are associated with a wide range of adverse physical and mental health outcomes and can increase the risk of premature mortality. Older people experiencing social isolation are more likely to be admitted to hospital for heart failure [Cene et al., 2012] and RDs in winter [Jordan et al., 2008] and are at increased risk of physical frailty, functional decline, and a variety of adverse physical health outcomes [Gale et al., 2017; Courtin & Knapp, 2017].

Box 10: Experiences of loneliness in Wales

Younger people aged 16 to 24 years are more likely to be lonely than older adults [Statistics for Wales, 2018a]. Older people are particularly vulnerable to loneliness and social isolation due to worsening physical health, increased likelihood of living alone, the death of spouses and partners, and having fewer relationships [Victor & Bowling, 2012]. Further, older people living with loneliness often find it difficult during winter, with adverse weather conditions and shorter, darker days resulting in spending more time indoors and having less social contact with other people.



05 Interventions to improve health and well-being during cold weather and prevent winter pressures

There are a range of interventions provided by health and care services and partner organisations to help improve health and well-being during colder and winter months and prevent resulting winter pressures.

5.1. Health-related interventions

Health forecasting and winter weather alerts

Health forecasting uses predictions of severe winter weather and health surveillance data to prompt timely preventative actions by health and social care services [Bakerly et al., 2011; Laaidi et al., 2013]. There is currently no clear evidence of its effectiveness in reducing health care utilisation, illnesses or mortality during winter. One of the earliest applications of health forecasting alert services by the UK Met Office targeted patients with COPD, who received an automated telephone call alerting them to periods of cold weather [Wedzicha, 2011]. Alerts were associated with fewer COPD exacerbations, visits to the general practitioner and use of out-of-hours services, but not with respiratory hospital admissions [Bakerly et al., 2011; Halpin et al., 2011]. However, the average number of home visits by primary care providers and health care utilisation increased, leading to an average cost increase per patient [Bakerly et al., 2011]. The Met Office has since withdrawn this health forecasting service, although a new collaborative health forecasting intervention has been introduced in England - the Cold Weather Plan (CWP) for England.

The Cold Weather Plan combines cold weather alerts and public health actions taken by the NHS (primary, secondary, and community health care), local authorities and other stakeholders, to prepare for cold weather and protect people most at risk [Chalabi et al., 2016]. Although the service has been active since 2011, the Cold Weather Plan has yet to undergo a formal evaluation. An early report indicated that the cold weather alerts were a useful tool to prompt service providers about the health impact of cold weather and the actions that should be taken, particularly within emergency care [Hughes et al., 2014]. It was concluded that **long-term interventions** (e.g. improved housing and general winter preparations) **were more relevant and useful than the acute interventions triggered by the alerts** [Hajat et al., 2016].



Key Findings

- Interventions with evidence of a positive health impact include: influenza vaccinations; hygiene advice and handwashing; vitamin D supplementation; falls prevention for older people for example through exercise programmes and home safety assessments; prevention of chronic disease for example by promoting healthy behaviours; and winter road maintenance.
- Evidence for the direct impact of housing and energy efficiency improvements on health is currently mixed.
- Interventions with limited evidence for direct impacts on health, or evidence for impact on risk factors for health (e.g. behaviour/environmental conditions) include: winter specific healthy behaviour campaigns; advice to the public on energy efficiency, household warmth, and clothing to keep warm; financial help to keep warm and healthy; health forecasting/winter weather alerts; anti-slip/winter footwear; interventions to tackle social isolation; services for the homeless; and gritting and keeping snow/ice from pavements.

In Wales, when extreme cold weather or considerable snowfall is forecasted by the Met Office, Public Health Wales issues proactive timely and proportionate advice, which is tailored to different audiences and scenarios, and is available all-year round. However, this action does not constitute as an alert and is not regarded as a formal trigger for action by other public bodies.

Influenza vaccination

Influenza vaccinations are considered one of the most effective measures to prevent influenza circulation, transmission and infection and reduce its severe health outcomes [WHO, 2012]. Influenza vaccine effectiveness varies year to year and depends on the extent to which the vaccine matches the circulating influenza virus strains [Lukic et al., 2013; Tricco et al., 2013; Costantino & Vitale, 2016]. The effectiveness of vaccination programmes will also depend on the level of uptake achieved among vulnerable population groups, with greater uptake leading to fewer people becoming infected. Influenza vaccinations offer cost-effective protection against circulating influenza B viruses [WHO, 2018], lead to a reduced risk of time-off work [Demicheli et al., 2018; Tricco et al., 2013], and are associated with reduced rates of transmission, health service use and mortality among vulnerable groups. Such groups in Wales include:

- Pregnant women and their infants (<6 months) [see Box 11; Benowitz et al., 2010; Rasmussen et al., 2012].
- Children (e.g. via universal childhood influenza vaccination programmes [Sanchez-Ramoz et al., 2017; Damm et al., 2015; Pebody et al., 2015; Pebody et al., 2018]).
- People aged 65 years and older.
- Those with existing chronic conditions [de Diego et al., 2008; Huang et al., 2013; Lall et al., 2016].
- Patients of health and social care workers [Ahmed et al., 2013], although some reviews suggest inconsistent findings [Kliner et al., 2016; To et al., 2016].

Box 11: Effectiveness of influenza vaccinations for pregnant women and their infants (<6 months)

Influenza vaccinations during pregnancy has been shown to decrease the frequency of influenza infection in mothers (by 30-70% depending on region; Fell et al., 2017) and adverse birth outcomes (e.g. lower birthweight) in infants up to 6 months old [Rasmussen et al., 2012]. Furthermore, influenza vaccines given to pregnant women have been found to be highly effective (>90%) in preventing hospitalisation of their infants for influenza [Benowitz et al., 2010].

Across Europe, one in three influenza transmission events occurs in schools and workplaces [Edwards et al., 2016]. Social interventions encouraging sick individuals to stay home can help reduce the spread of infections.

Box 12: Pharmacist-led influenza vaccination service delivery

Considering the need to reach large proportions of the population each flu season, community pharmacies play a vital role in providing influenza vaccinations alongside GPs. For example, community pharmacies providing influenza vaccinations have reported higher uptakes among at-risk adults aged under 65 compared to communities not providing the same service [as cited in Kirkdale et al., 2017; Deslandes et al., 2019]. Further, community pharmacies are well placed to support influenza vaccinations as they are typically open longer and mostly located in convenient and accessible venues [Murphy et al., 2012; Todd et al., 2015]. One US study reported that over 30% of all vaccinations delivered in pharmacies were during the evening, weekend and holidays [Goad et al., 2013].

In 2018/19, community pharmacies across Wales administered 53,883 influenza vaccinations through the NHS community pharmacy influenza service, an increase from 36,130 in 2017/18 [Deslandes et al., 2019]. This is an estimated 7.0% of all influenza vaccinations given to those aged 65 years and older and people aged six months to 64 years in a clinical risk group [Public Health Wales, 2019].

Hygiene measures to prevent the transmission of influenza

Hygiene is an important measure to control and reduce the transmission of viral and infectious diseases, particularly influenza [Smith et al., 2015]. Advice can be given to the public on frequent handwashing; using hand sanitisers; and staying at home during an illness [Smith et al., 2015; Wong et al., 2016]. This type of advice has been shown to reduce the spread of influenza-like illnesses. For instance:

- Taking part in web-based sessions on the role of handwashing in influenza infections significantly reduces the number and severity of influenza-like-illnesses for both participants (by 8%) and other household members (by 5%) in the following 4 months [Little et al., 2015].
- Staff educational programmes on viral transmission and the value of handwashing in day-care centres (among senior adults and children) is effective in significantly reducing infection rates among staff [Falsey, 1999; Krilov, 1996].
- Multi-faceted interventions comprising of educational programmes, timely reminders, and feedback show the greatest improvement in hand hygiene practice in clinical and healthcare settings [Kingston et al., 2016].
- Electronic devices which automatically count and monitor hand hygiene compliance are particularly useful within hospital wards [Koff et al., 2011].
- Improving routine handwashing behaviours among younger children, who are the least capable of hygiene behaviour and have greater social contact, results in the greatest effect on influenza virus transmission [Jefferson et al., 2011].

- In the US, modelling work suggests that encouraging sick employees to stay home and seek health advice could reduce influenza infections in the workplace by up to 40% [Edwards et al., 2016].

Pneumococcal vaccination

Pneumococcal disease describes infections caused by the bacteria *Streptococcus pneumoniae*, and is the commonest cause of community acquired pneumonia, as well as causing septicaemia and meningitis. Pneumococcal disease is known to peak in winter months and particularly affects children, the elderly and those with an impaired immune system. Pneumococcal vaccination is recommended for infants (as part of the childhood vaccination programme), adults over 65 years (as a one-off vaccination) and 'at risk' groups aged over two years [Department of Health, 2018].

Vitamin D supplementation

Supplementing diets with vitamin D can play a role in improving health during the winter months. Higher levels of vitamin D can improve protection against influenza infections and are beneficial to respiratory health [Bergman et al., 2013; Martineau et al., 2017]. Positive effects have been reported across all ages [Martineau et al., 2017], including infants [Zhou et al., 2018] and children [Urashima et al., 2010]. Those with vitamin D deficiency experience the most benefits [Martineau et al., 2017]. The National Institute for Health and Care Excellence has issued a guideline on vitamin D supplement use to prevent deficiency among specific groups including children, pregnant women and people over 65 years [NICE, 2017].

Falls prevention in older adults

Exercise programmes for older adults aim to reduce the risk and rate of falls, incorporating exercises for balance, co-ordination and muscle strengthening [Gillespie et al., 2012]. Exercise interventions can reduce the rate of falls and risk of hip fractures among older people [Gillespie et al., 2012], and effects can be long-lasting, with one review finding a 21% average reduction in the rate of falls up to 24 months later [Finnegan et al., 2019]. Interventions that have shown the greatest benefit are those that:

- Contain multiple exercise types (e.g. Tai Chi group classes or individually conducted at home) [Taylor, 2012; Hwang et al., 2016]
- Include moderate to high challenge balance exercises (more than 3 hours/week) [Sherrington et al., 2017]
- Are delivered over a longer duration (e.g. six months to a year).

Exercise programmes often do not aim to reduce winter falls per se, although the benefits are likely to be seen during the winter months when fall-related injuries are most prevalent.

Interventions such as home assessments and modifications for personal care (e.g. walking aids) and for communication, information and signalling (e.g. eyeglasses, personal alarm systems) to improve home safety are effective in reducing the rate and risk of falls. Home safety interventions are most effective when they are carried out by occupational therapists [Gillespie et al., 2012].

Vitamin D supplementation has been tested among older people as part of falls prevention interventions. Evidence has shown that vitamin D could lead to fewer falls among older adults if given in high doses [Bischoff-Ferrari et al., 2009], with the greatest benefit appearing in those with vitamin D deficiency [Gillespie et al., 2012], or those also receiving calcium supplements [Murad et al., 2011]. However, other studies suggest that while supplementation could lead to improvements in balance and mobility, there are often no significant improvements in fall prevention and physical function [Rosendahl-Riise et al., 2017]. Vitamin D supplementation may be beneficial when combined with other intervention types. For instance, exercise and vitamin D combined over 2 years led to a 40% reduction in falls among home-dwelling older women [Uusi-Rasi et al., 2019].

Multifactorial interventions assessing an individual's risk of falling and fall history, and then carrying out interventions to reduce the identified risks, has been shown to reduce the number of falls in older people.

The effectiveness may be dependent on multiple factors and personal situations [Gillespie et al., 2012].

Box 13: "Steady On, Stay Safe" national falls prevention programme in Wales

Steady On, Stay Safe is the primary falls prevention programme in Wales. It includes raising awareness that many falls are preventable and supports collaborative working between NHS Wales health boards, public bodies, and third-sector organisations (e.g. Age Cymru, Care and Repair Cymru, Age Connects) to develop and standardise community based activity. *Steady On, Stay Safe* is built around identifying falls history, increasing strength and balance through exercises, and identifying falls hazards where people live. Work is ongoing in all three areas with increasing levels of engagement across sectors.

Protective clothing and footwear

Wearing appropriate clothing (e.g. hats, gloves, scarves, thermal clothing) during winter months is a simple and effective way to conserve body heat, which may benefit older people and those with pre-existing health conditions [Tanner et al., 2013]. Geographical variations in cold-related mortality are significantly correlated with the outdoor clothing worn, with key clothing items (e.g. combined use of gloves, hats, and scarves) offering greater thermal protection than several layers [Donaldson et al., 2001].

While providing advice on the use of clothing and providing clothing to vulnerable groups may, therefore, be beneficial in winter months, more evidence is needed. An Australian study found no clear health benefits for the provision of thermal clothing and hats for older patients (>50 years) with pre-existing cardiovascular conditions [Barnett et al., 2013]. While patients who wore thermal clothing rated a small improvement in sleep at night, there was little difference for emergency hospital or GP visits, self-rated measures of quality of life, and biological markers of CVDs throughout winter. Thermal tops were well used, but the hats were only worn by 30% of the patients, suggesting that motivation to use protective clothing is also needed.

Encouraging the use of winter footwear and/or anti-slipping devices⁵ that can be mounted on shoes may be useful strategies in the prevention of falls in icy or snowy weather conditions. Although evidence is limited, using appropriate footwear with anti-slip devices during winter conditions has been found to reduce the risk of a slip and fall accident in countries such as Sweden [Berggard & Johansson, 2010], the US [McKiernan, 2005] and New Zealand [Parkin, Williams, & Priest, 2009].

Healthy behaviour interventions

Interventions that encourage physical activity, healthy nutrition, smoking cessation and low risk alcohol consumption are critical for the prevention of chronic conditions such as CVD, stroke and dementia (Katz et al, 2018). Specific interventions within winter and around festive periods such as Christmas and New Year may be beneficial in reducing the sedentary behaviour, over-eating and heavy alcohol consumption that arise more often at these times and can play a role in exacerbating chronic illnesses over winter months, particularly for CVDs [Shah et al, 2016; Mohammad et al, 2018]. For instance, heavy alcohol use has been associated with higher CVD risk the following day [Mostofsky et al., 2016].

In many cases, weight gained during the holiday period is not subsequently reversed in the following months, accounting for up to 50% of annual weight gain [Diaz-Zavala et al., 2017]. While acute weight gain may not directly increase risks that winter season, continuous weight gain may increase risks in winter periods. One behavioural intervention over the Christmas holidays, which included advice on weight management and nutrition, resulted in an average reduction of weight (-0.13kg) following Christmas, preventing up to 0.5kg weight gain compared to those who did not participate in the intervention [Mason et al., 2018]. Sedentary behaviour and time spent indoors (including in bed) has been consistently reported to significantly increase during winter [O'Connell et al., 2014], especially among children [Atkin et al., 2016]. However, further research is needed on the impact of actively encouraging routine and regular exercise throughout the winter period on winter weight gain and overall health.

In the UK, there have been several alcohol campaigns promoting sensible alcohol consumption over Christmas and New Year periods (e.g. BBC, 2012). However, no evaluations of their effectiveness in reducing alcohol consumption or improving health (e.g. reducing heart attacks or injuries) have been conducted.

Box 14: The prevention of chronic conditions

Prevention of chronic conditions that increase during winter (e.g. cardiovascular disease, respiratory disease) will help to reduce pressures on health and other services over the winter months regardless of when they are implemented. Healthy behaviour interventions (smoking cessation, healthy diet, increased physical activity, maintaining a healthy weight and low risk alcohol consumption) and lipid modification therapy can be successful in preventing cardiovascular events among high risk individuals [Willis et al, 2012]; and preventing respiratory conditions such as COPD [Ambrosino and Bertella, 2018].

5.2. Community interventions

Tackling social isolation and loneliness

Several interventions have been established to tackle social isolation and loneliness and to improve well-being among older people in the winter. These interventions help support individuals to reconnect and maintain existing relationships through the use of technology, transport and financial support and help to foster and enable new connections. In many cases, interventions involving social interaction have been successful in reducing social isolation and loneliness, although the effectiveness of some approaches, such as group activities or one-to-one social support, have been inconsistent [Cattan et al., 2005; Cohen-Mansfield & Perach, 2015]. It is also unknown whether interventions can improve well-being and subsequent health in the wintertime specifically. However, approaches include:

- Using technology [Khosravi et al., 2016] such as telephone [Cattan et al., 2011], videoconferencing [Tsai et al., 2010] and the internet.
- Developing skills and engaging in productive activities, for instance, computer training courses [Blazun et al., 2012].
- Interacting with animals [Krause-Parello, 2012; Banks & Banks, 2005] or robotic dogs [Banks et al., 2008; Robinson et al., 2013].

⁵ Anti-slip devices are personal protective equipment which improve individual walking capability and safety by increasing friction and reducing slipperiness during weather conditions such as snow and ice.

In England, NHS England and Public Health England have established the *Stay Well This Winter* campaign, which raises awareness of simple actions the public can take to build social connectedness and community health resilience over winter, such as encouraging people to check in on their elderly friends, neighbours or relatives to help alleviate loneliness and ensure they are keeping well. In Wales, *Spread the Warmth* is a national winter health and well-being campaign established by Age Cymru, raising awareness of the health impact of cold weather and encouraging the elderly to keep well and safe during cold weather. As part of the campaign, Age Cymru offers a one-off grant of up to £150 for social events for groups of older people at wintertime (November to February) through their Winter Celebration Grant programme. The impact of these two campaigns is currently unknown.

Gritting and clearing snow/ice from pavements

Global studies suggest that the main location for falls outdoors is roads and pavements. Preventative actions of removing snow and gritting pavements have therefore been recommended to reduce unintentional injuries during winter weather [Gyllencreutz et al., 2015; Kojima et al., 2008; Morency et al., 2012]. However, evaluations of such preventative measures have not been found, with one systematic review conducting an extensive search and identifying no relevant studies [Atenstaedt & Rees, 2013]. In the UK, local authorities are responsible for gritting and salting public roads and only some pavements. It is perceived as a civic duty for UK homeowners and businesses to clear their pavements of snow and ice [Winterman, 2010]. In some areas (e.g. York), local authorities encourage community collaboration in clearing pavements using volunteer residents as community snow wardens [City of York Council, 2019]. In other European countries, like Germany, Austria and Switzerland, there are strict regulations that require citizens to ensure pavements outside their houses are cleared of snow. As part of Age Cymru's *Spread the Warmth* campaign, advice on helping to prevent falls includes gritting steps and paths outside and around the homes of older people during icy weather.

Services for the homeless

Services for homeless individuals can protect them against winter-related morbidity and mortality. For instance, in a 10-year longitudinal study of mortality among the homeless in Finland, there was no increase in winter mortality, reportedly as many people who were homeless entered shelters during the cold and winter months [Stenius-Ayoade et al., 2017]. Housing interventions for homeless individuals and other disadvantaged groups are associated with decreased emergency care utilisation, reduced criminal activity and substance use, and improved ratings of quality of life (not specifically for winter months; e.g. Housing First) [DeSilva, Manworren, & Targonski, 2011; Larimer et al., 2009]. In Liverpool, evaluation of a *Housing First* intervention reported that offering sufficient accommodation for homeless people with

coordinated ongoing support would lead to significantly and sustainably fewer people experiencing homelessness, with potential annual savings of £3-5 million for avoiding costs of shelter, hospitalisation, and criminalisation [Blood et al., 2017].

5.3. Housing-related interventions

Advice on energy and keeping warm

Providing advice is a simple, low-cost intervention that aims to help households understand and reduce their energy use, find the best deals from energy suppliers, increase awareness of the health consequences of severe weather, and understand how to use heating technology to keep warm. Advice is often targeted at older people, where there is evidence that there can be a lack of knowledge of cold weather-related risks to health [Grey et al., 2017; Tod et al., 2013; Chalabi et al., 2015]. Although more research is needed on the health impacts, in the UK, provision of a booklet providing practical advice during cold weather led to many older people changing their behaviours, such as wearing more clothing layers and fitting draught excluders [Gascoigne et al., 2010]. However, there was still a universal preference for turning the heating off at night (for comfort and cost constraints) and keeping the window open while sleeping, based on the conviction that fresh air is beneficial [Grey et al., 2017]. Furthermore, some advice was resisted (e.g. having a blanket) because it symbolised undesirable old age [Day & Hitchings, 2011].

Across England and Wales, the *Warm and Healthy Home Fund* aims to identify households with cold-related illnesses and fuel poverty/risk of fuel poverty and provide them with: a) advice on health, financial support, warm housing and energy and b) improvements to heating and/or insulation for those who are most vulnerable. Although the health impact of this advice is unknown, the intervention supports energy-efficient behaviour that can reduce the number of vulnerable households living in cold homes [National Energy Action, 2017].

Housing and energy efficiency improvements

The installation of energy efficiency and insulation measures, as well as other energy-saving technologies (e.g. smart meters), central heating and boilers can increase indoor temperatures and reduce the energy demand (and costs) of housing [Hong et al., 2009; Poortinga et al., 2018a]. Subsequent health impacts of these interventions are less clear, with research showing mixed results. However, some studies have suggested small improvements in physical health [Maidment et al., 2014; Osman et al., 2010; Thomson et al., 2013, Thomson et al., 2015; Howden-Chapman et al., 2007] as well as mental well-being [Green & Gilbertson, 2008; Gilbertson et al., 2012; Liddell & Guiney, 2015].

In Wales, the Government's *Warm Homes programme* aims to improve the energy efficiency of existing homes for vulnerable groups via two different schemes. Under the *Arbed* scheme (2010-15), nearly 5,000 homes in areas of severe fuel poverty received at least one energy efficiency measure. While the scheme raised indoor temperatures, reduced energy use, and improved resident subjective well-being and some psychosocial outcomes, there were no changes in physical health or emergency hospital admissions during the winter months [Poortinga et al., 2018b]. Under the *Nest* scheme (2011 onwards), energy efficiency measures and advice have been provided to around 18,000 low-income households. Residents who received home improvements experienced 13.7% fewer general practitioner visits for respiratory conditions and 18.5% fewer asthma events compared to residents in homes who had not yet received measures [Morrison-Rees, 2017]. Additionally, there was a small positive impact on emergency hospital admissions, with fewer admissions for respiratory conditions compared to the winter before receiving energy-efficient measures [Morrison-Rees, 2017].

A similar scheme in England (*The Warm Front Scheme*, 2003-2013) involved providing new heating systems or significant heating repairs, insulation or both as part of a national initiative to address fuel poverty. While there was no evidence of changes in physical health, improvements were seen in mental health and psychosocial outcomes such as better financial security, more disposable income and higher thermal satisfaction/comfort [Gilbertson et al., 2012; Liddell & Guiney, 2015].

Improving ventilation (air quality) alongside energy efficiency appears to be beneficial to health, particularly for children with asthma [Howden-Chapman et al., 2008; Woodfine et al., 2011]. In a modelling study of the health impacts of adding ventilation alongside energy efficiency improvements, there was a predicted 30% reduction in annual energy demand and a gain of 2,241 quality-adjusted life years (QALYs) per 10,000 people aged over 50. The model suggested that having no ventilation would increase indoor sources of air pollution and have a negative impact on health in the winter [Hamilton et al., 2015].

Financial help to keep warm and healthy

Financial support can be given to vulnerable groups to help with the costs of heating a home during the winter. The UK government has several policies that cover Wales and which deliver financial support and energy savings to elderly and vulnerable populations:

- The *Winter Fuel Payment* (WFP) provides an unconditional annual cash payment (£200 to £300) between November and December to help with increasing fuel expenditure for UK households with an older person (>65 years as of 2019).
- The *Warm Home Discount Scheme* [Stockton & Campbell, 2011] covers Great Britain and provides a fixed annual discount of £140 on energy bills to help a core group of low-income households with elderly residents and a broader group of vulnerable populations.

Fuel Poverty Awareness Day (15th February)

Each year in the UK, there is a nationally recognised day to raise public awareness of fuel poverty and the importance of living in a warm and safe home, as part of the Warm and Safe Homes campaign. The campaign is led by National Energy Action (NEA) with local authorities and other public bodies. Support is expressed across social media channels and there is a video series and guides offering advice and information on how to access support.

- *Cold Weather Payments* are cash transfers paid to UK households that are already entitled to certain benefits (e.g. Income Support, income-based Jobseeker's Allowance) when there have been periods of cold temperatures [Foster & Kennedy, 2018]. These households receive a fixed payment of £25 a week when the average temperature is 0°C or less for seven consecutive days by a local weather station.

Only WFP has been evaluated so far, with differing outcomes. For example, different studies suggest:

- WFP may independently correlate with a 46% reduction in excess winter mortality [Iparraguirre, 2014]
- No consistent evidence linking the WFP to warmer homes or specific health and well-being benefits [Angelini et al., 2019], with benefits unlikely to be large at a population level

WFP could reduce the adverse health impact of severe cold conditions (e.g. temperatures of $\leq 2^{\circ}\text{C}$) on mortality [Angelini et al., 2019]. However, future research is needed to affirm the magnitude of the relationship between WFP and its actual effects on home temperatures and health outcomes.

5.4. Transport-related interventions

Winter road maintenance

Winter road maintenance can include gritting roads or clearing snow by ploughing. Few studies have attempted to quantify the benefits of winter road maintenance, although there is evidence from Canada that it can lead to reductions in road traffic crashes [Fu & Perchanok, 2006]. Many factors contribute to road hazards during winter weather including poor visibility, low air temperature, high wind speed, poor road surface conditions, and a lack of driver safety behaviours [Usman et al., 2012], all of which may contribute to the effectiveness of winter road maintenance.

Reducing speed limits

Reducing the speed limit (by 20kmph) has been shown to be a useful strategy in Finland during the winter months (November to March), where there was a reduction in road crashes by 15% and related fatalities by 29% [Peltola, 2015]. Further research is needed in other countries. Public Health Wales [2018] has published a statement supporting the reduction of the default speed limit to 20mph, from the current 30mph in Wales, as it would save lives and reduce injuries particularly during the winter months. In May 2019, the First Minister for Wales, Mark Drakeford, announced the Welsh Government position that 20mph should be the default speed limit for residential areas⁶.

Encouraging the use of winter tyres

The use of winter tyres⁷ is widely recommended and/or mandatory in colder countries, particularly in Scandinavian countries, Russia and Canada. When road conditions are slippery, winter tyres significantly improve driver safety by reducing the braking distance and enhancing driving performance, as long as winter tyres are fitted to all four wheels [Woodrooffe, 2016]. In Canada, legislation making winter tyres mandatory for all vehicles during the winter months led to a 36% reduction in serious road traffic injuries and fatalities [Transports Québec, 2011]. Winter tyres are not a legal requirement in the UK, and the benefit of winter tyres in the UK is likely to be very different compared with countries with long periods of settled snow.



⁶ <https://www.bbc.co.uk/news/uk-wales-politics-48188233>.

⁷ Tyres specifically developed to provide added safety and improved driving performance (better vehicle grip, handling, and shorter braking distances) on wet, slushy, snowy, icy and dry cold surfaces.

06 Epidemiology of winter pressures in Wales

This section utilises a range of data sources to provide a general picture of how winter impacts upon the health of the Welsh population and services more generally. Additional data is available in the accompanying Technical Report.

6.1. Mortality

In Wales, there were an estimated 3,400 EWDs in 2017/18. This was 32.8% more than the average number of deaths recorded in non-winter months, also known as an Excess Winter Mortality (EWM) Index of 32.8. This was slightly higher than the EWM Index for England (30.1; 46,600 excess winter deaths) and Scotland (26; 4,800 excess winter deaths) for the same year. The number of EWDs was the highest recorded since 1991/92 but similar to peaks seen in previous years (Figure 2). Consequently, the EWM index for 2017/18 reported here is considerably higher than the EWM index for 1991/92 to 2012/13 reported in Table 1 (17.6; Section 1). Within England and Wales, RDs were the leading cause of EWDs in 2017/18 (35% of deaths; an estimated 1,010 excess winter deaths in Wales). Other leading causes were circulatory diseases (23%; an estimated 661 excess deaths in Wales) and dementia and Alzheimer's disease (22%; an estimated 631 excess deaths in Wales)⁸.

Based on 2016/17 data⁹, the number of EWDs, and the EWM index were both highest among females and older people, particularly amongst those aged 85+ years (Figure 3). There were also local authority level variations in the EWM index across Wales (ranging from no increase in Anglesey to a 34% increase in Powys, compared to non-winter deaths). However, although local authority level variations have been reported in previous data (1991/2 to 2015/6), rankings fluctuate (i.e. no local authority shows consistently higher or lower levels of EWDs).



Key Findings

- In Wales, there were an estimated 3,400 EWDs in 2017/18. The Excess Winter Mortality Index in Wales (32.8) was slightly higher than for England (30.1) and Scotland (26) (see Table 1 and 2 for a longitudinal international comparison).
- For 2015-2017, there were winter peaks in emergency hospital admissions with admissions for respiratory diseases increasing substantially. Although emergency admissions for falls generally decreased in winter months, a winter peak was observed for those aged 65+. Winter peaks for all deprivation quintiles were observed, with a more pronounced pattern for those living in the most deprived quintile.
- ED attendances (2015-2018) among those aged over 85 years showed winter peaks, although for other age groups, attendances were highest over spring and summer months.
- Winter peaks were seen for influenza-like illnesses.
- NHS Digital are due to introduce an Emergency Care Dataset across UK emergency departments, which aims to improve data quality to support health care planning.

⁸ Welsh analysis not available separately. Estimates have been calculated crudely from England and Wales data based on mid-2017 population data (0-64, 65-74, 75-84 and 85+) for England and Wales (ONS, 2018) <https://www.ons.gov.uk/peoplepopulationandcommunity/populationandmigration/populationestimates/bulletins/annualmidyearpopulationestimates/mid2017>.

⁹ Excess winter death data for 2017/18 was not available by sex or geography.

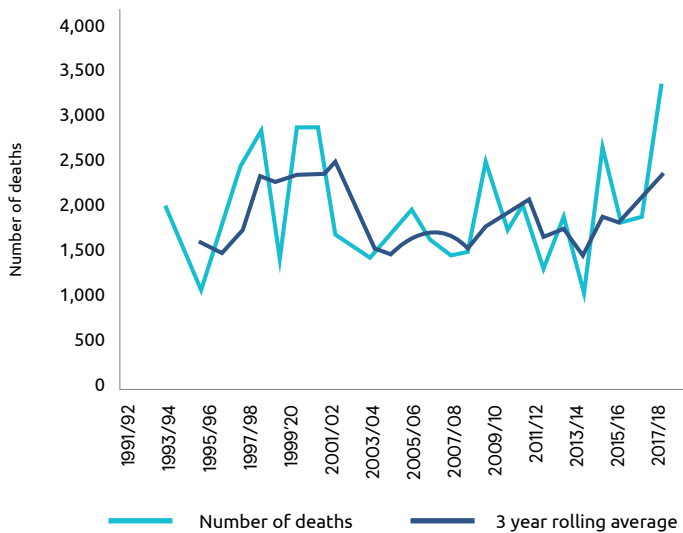


Figure 2: Number of EWDs and 3-year rolling average for Wales, 1991/92 to 2017/18

Source: ONS

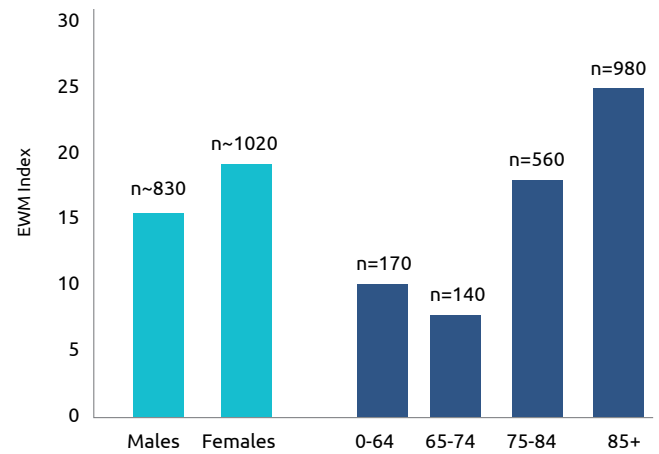


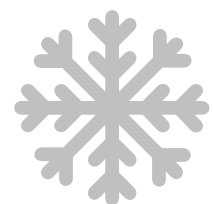
Figure 3: EWM index (and number of excess winter deaths) for Wales by age group and sex, 2016/17

Source: ONS; Male and female EWDs calculated from mortality data

6.2. Emergency hospital admissions

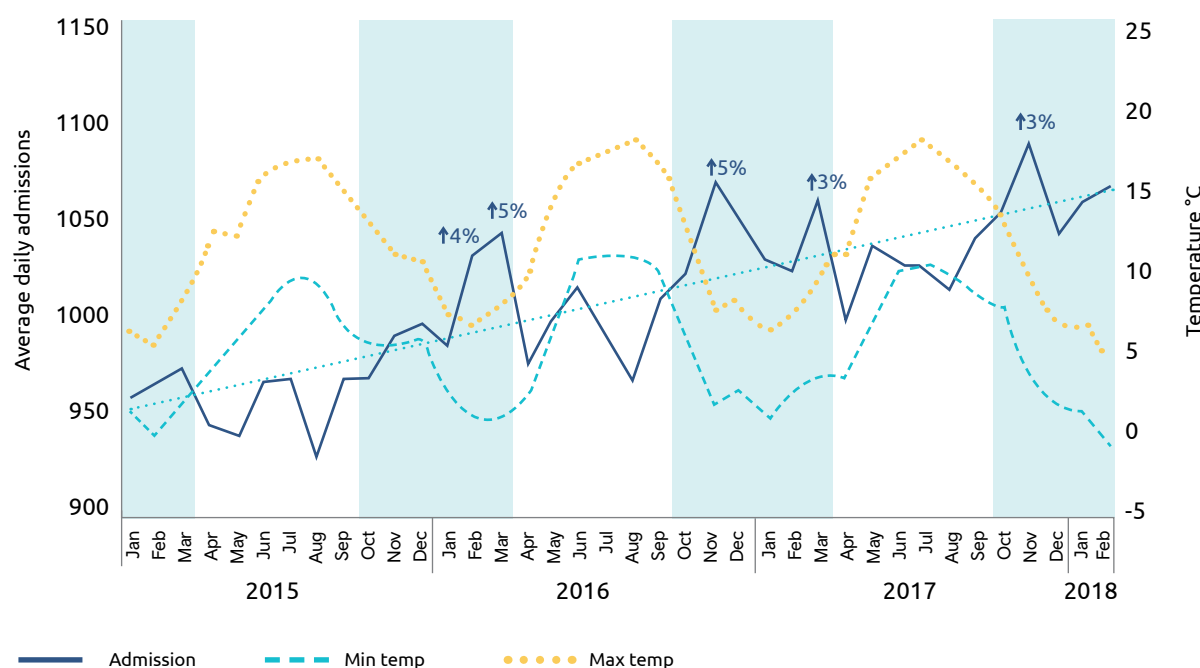
Emergency hospital admissions are urgent admissions to hospital that are unplanned, often occurring via EDs. They do not include attendances to the ED that are discharged home (see Section 6.3 – ED attendances). In Wales for 2015-2017, there was a general increase in the average daily number of emergency hospital admissions over time. Peaks in admissions were apparent during the winter months, particularly during November and March, during which average daily admissions were between 3% and 5% higher than the trend line over the period of 2015-17 (Figure 4).

Data was broken down by a number of broad ICD¹⁰ categories, which allowed us to explore the seasonality of relevant conditions. Average daily admissions for RDs showed the greatest variability with the season (Figure 5), increasing substantially over the winter months and decreasing in the summer months. These conditions are likely to be a large contributor to the winter peaks in admissions seen overall in Figure 4. Injuries and poisonings also had a clear seasonal effect, with peaks of admissions occurring in summer months and troughs in the winter months (Figure 5).



¹⁰ International Classification of Diseases. Data was available for the following classifications: Diseases of the circulatory system; Diseases of the respiratory system; Infectious diseases; Diseases of the digestive system; Mental and behavioural disorders; Injury, poisoning and certain other consequences of external causes; Neoplasms; Symptoms, signs and abnormal clinical and laboratory findings not elsewhere classified.

Figure 4. Average daily hospital emergency admissions, by month, 2015-2017



Source: Patient Episode Database for Wales, Public Health Observatory

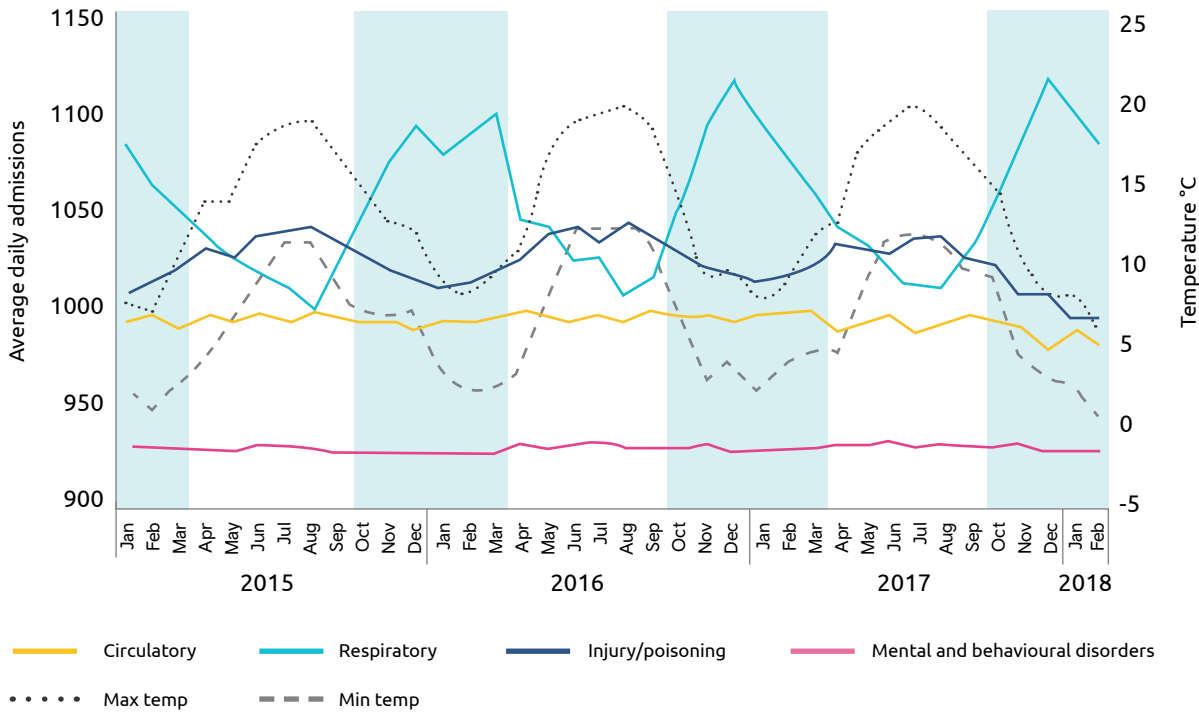
We also explored emergency hospital admissions for falls^{11 12}. For all ages, falls-related admissions decreased over the winter months. However, for those aged 65+, a peak in admissions was also observed in December (See Section 4, Technical Report). The seasonality of other major classifications was less clear. For circulatory diseases, peak months varied across the three years and included peaks in spring/summer months as well as winter months, possibly related to periods of hot weather. For mental and behavioural disorders, although overall admissions levels were lower in comparison to other conditions, peaks of admissions tended to be in the summer months with dips in the winter months. Further information is available in Section 4 of the Technical Report.

There were seasonal variations in average daily emergency admissions for different age groups. Winter peaks were seen for those aged 0-17 years, 65-84 and 85+, with greatest seasonal variability observed for those aged 0-17 years of age (Figure 6). In contrast, for those aged 18-64, higher average daily emergency admissions were observed over the summer months. Although the number of emergency admissions was lowest for those aged 85+, these patients often have complex medical needs, may require longer hospital stays and may experience more challenges with discharge/plans for on-going care.

¹¹ This included injury-related emergency admissions with a fall-related external cause code (ICD 10: W00-W015, W17-19) in the diagnosis fields.

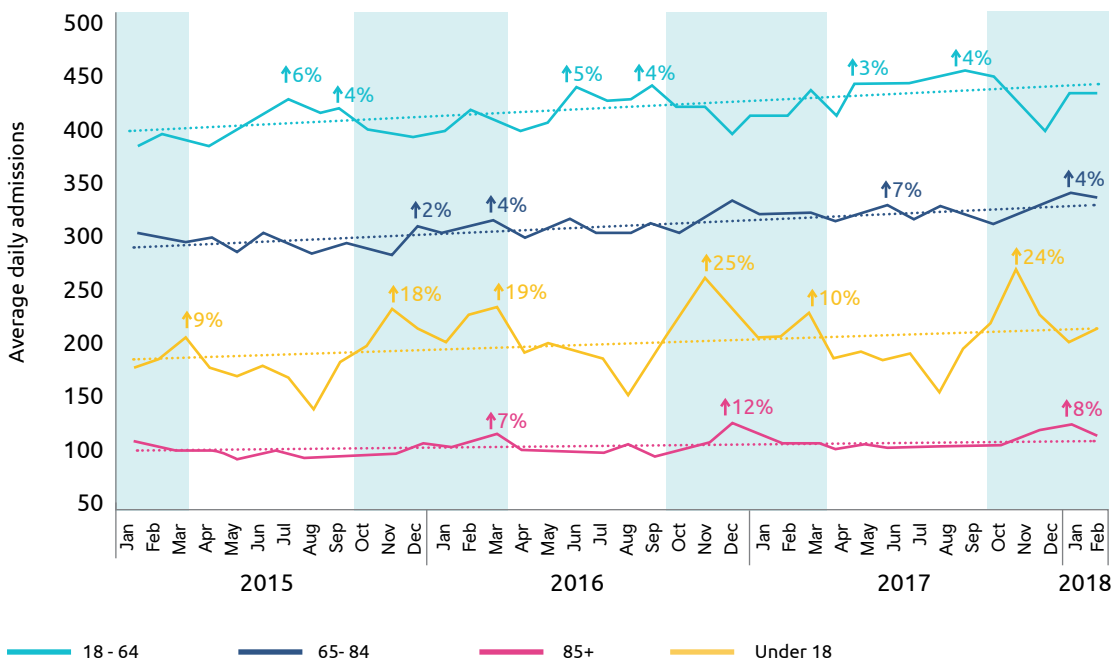
¹² Many cases relating to falls and mental health are treated in EDs only (i.e. are not admitted to hospital). If cause of attendance was reliably recorded, ED data would therefore allow for a more accurate examination of seasonal trends for these two conditions.

Figure 5. Average daily hospital emergency admissions by major ICD-10 code categories, by month, 2015-2017



Source: Patient Episode Database for Wales, Public Health Observatory

Figure 6. Average daily emergency admissions, by month and age group, 2015-2017

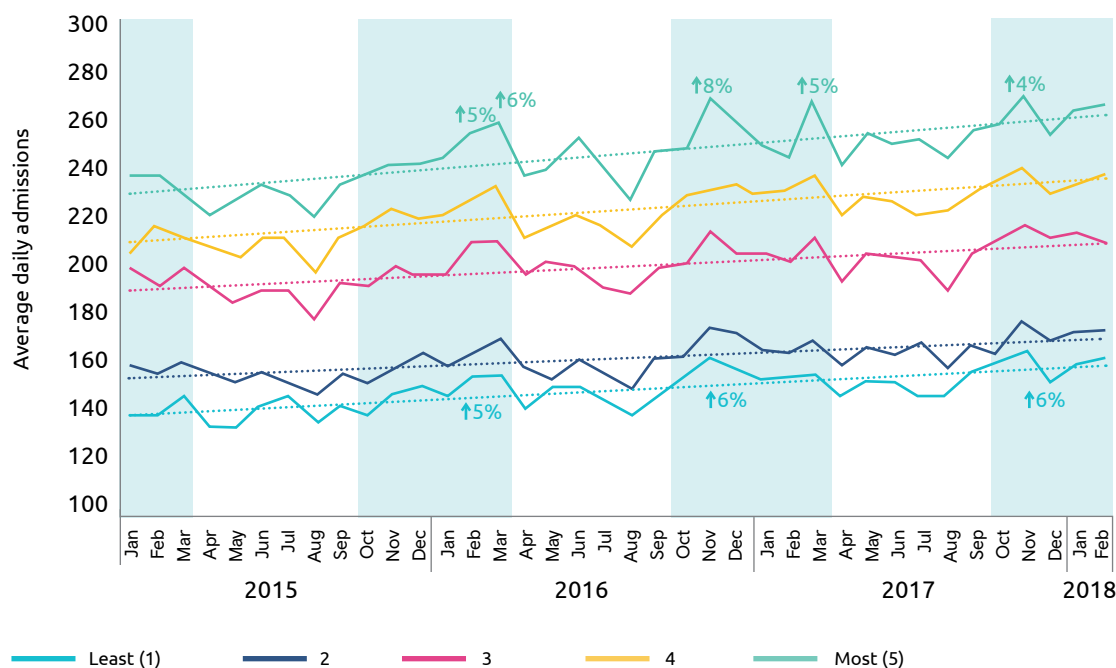


Source: Patient Episode Database for Wales, Public Health Observatory

Average daily emergency admissions were highest for individuals living in the most deprived areas of Wales (quintile 5; Figure 7). Patterns of admission were generally consistent across deprivation quintiles, with all quintiles observing winter peaks. Peaks were slightly more

pronounced for those living in the most deprived quintile, compared to the least deprived (Figure 7). Further detail on emergency admissions across deprivation quintiles for respiratory conditions, injuries/poisonings and CVDs can be found in Section 4 of the Technical Report.

Figure 7. Average daily emergency admissions (all diagnoses), by month and quintile of deprivation, 2015-2017



Source: Patient Episode Database for Wales, Public Health Observatory

6.3. ED attendances

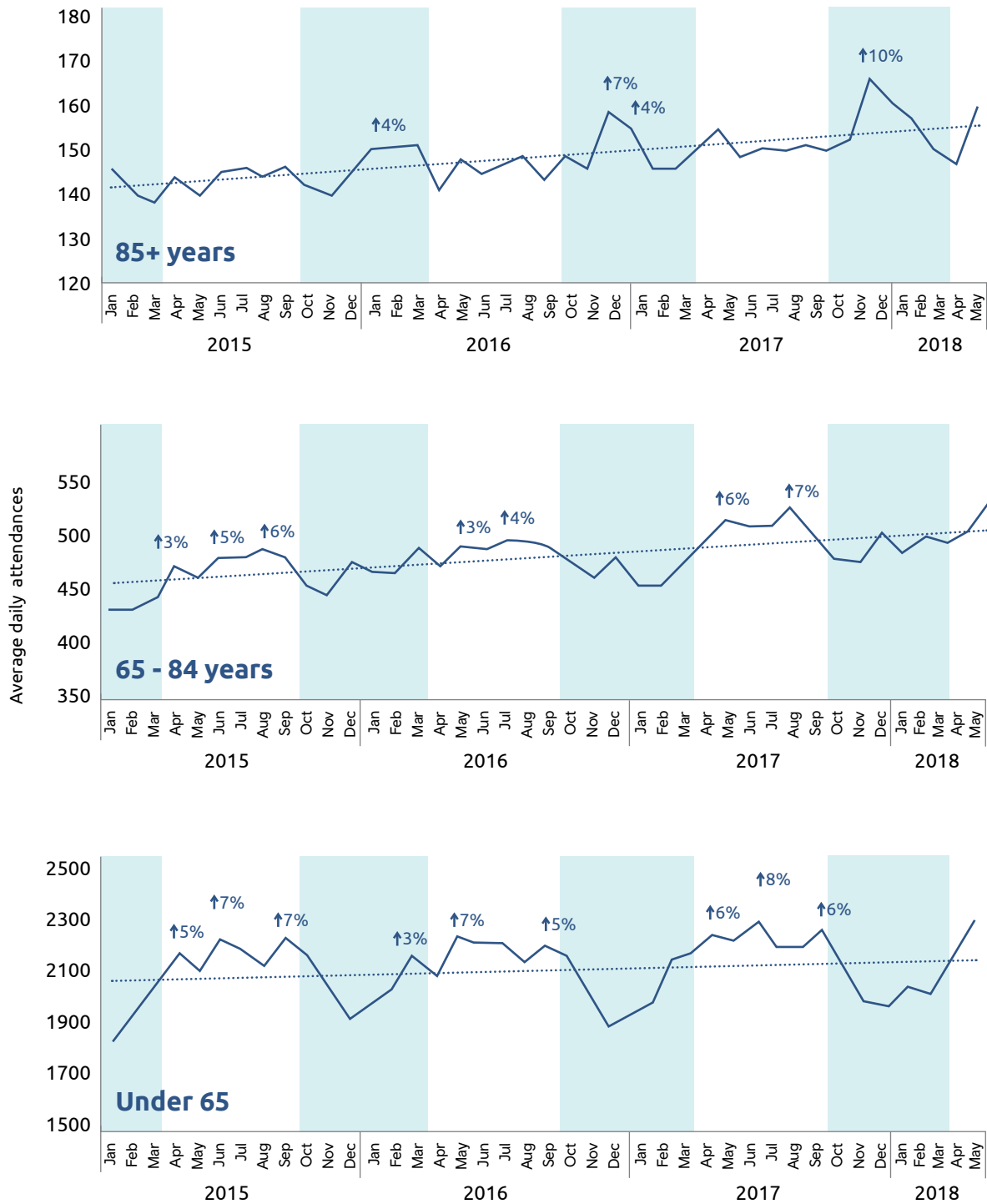
ED attendances refer to patients seeking treatment at emergency departments, who may subsequently be discharged, referred to other services, or admitted to hospital (as an emergency hospital admission). There was a clear seasonal pattern for attendances, with peaks seen in spring/summer months (by between 3 and 7% higher than the trend line) and decreasing in the winter months (see Figure 8, Section 4 of the Technical Report). Different patterns were found for different age groups (Figure 8). For those aged 85+, winter peaks in ED attendances were observed, with attendances generally decreasing in the spring/summer months. The timing of these peaks largely matched those for emergency hospital admissions (Figure 4). This age group often have multiple medical co-morbidities, increasing the likelihood of hospital admission from an ED attendance. Conversely, for those

aged 64-85 and under 65, attendances increased over the spring and summer months and decreased over autumn and winter.

Over half of attendances over this period were classed as having an unknown diagnosis, so it was not possible to explore seasonal trends in diagnoses (although assault attendances are included within violence surveillance for south Wales, see Section 6.5). Incomplete and inaccurate recording of diagnoses in the current Accident and Emergency commissioning data set is a well-recognised problem¹³. Consequently, **NHS Digital is in the process of introducing the Emergency Care Dataset cross UK EDs. Once implemented, this should lead to improved quality of data to support health care planning.**

¹³ <https://digital.nhs.uk/data-and-information/data-collections-and-data-sets/data-sets/emergency-care-data-set-ecds>

Figure 8. Average daily attendances to emergency departments, by month and age group, 2015-2018



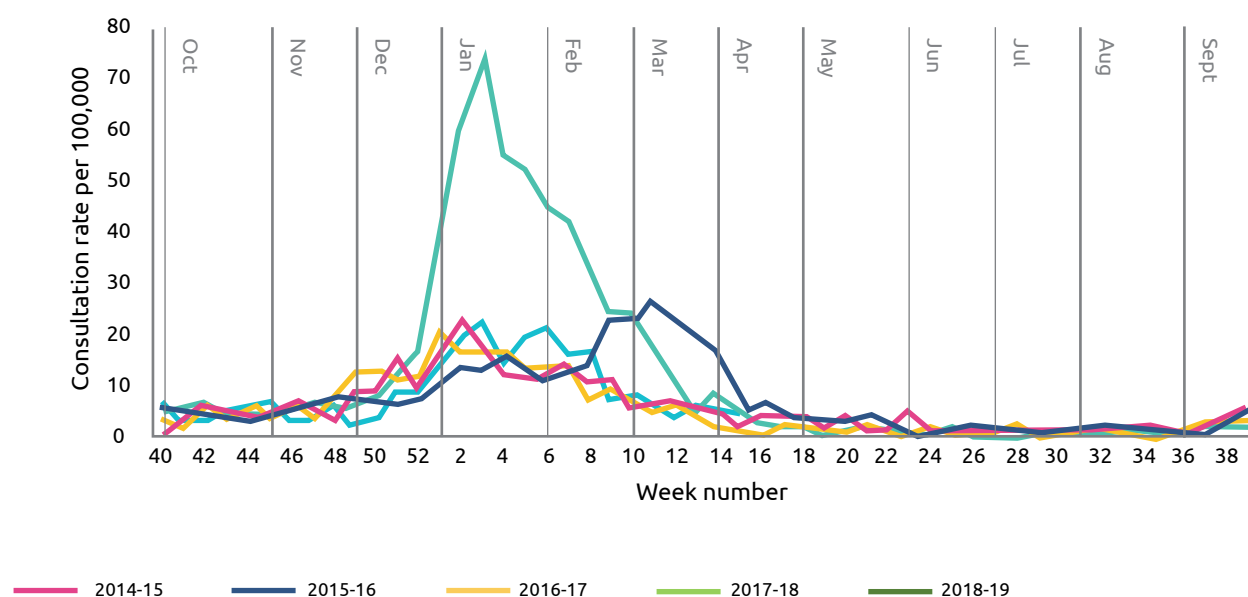
Source: Emergency Department Data Set, Public Health Wales

6.4. GP consultations for influenza-like illnesses

Weekly GP consultation data is available for influenza-like illnesses as part of GP surveillance of infections in Wales¹⁴. This data shows increases in consultation rates from around week 50 (December) to week 16 (April); see also Box 15 on uptake rates of influenza vaccinations.

Although the increase occurs consistently between these weeks, the size and timing of peaks vary from year to year (Figure 9). In 2018/19, consultation rates reported by general practices for influenza-like illnesses were highest among patients aged 25 to 44 years (520 per 100,000 for the season)¹⁵, whilst in 2017/18, consultation rates were highest among patients aged 45 to 64 years (837 per 100,000).

Figure 9: GP consultation rates per 100,000 for influenza-like illnesses in Wales, 2014-15 to 2018-19.



Source: GP surveillance of infections in Wales

Box 15: Influenza uptake in Wales

In 2018/19, influenza vaccination was offered free of charge to vulnerable groups, including those aged 65+, those aged 6 months to 64 years with a clinical risk, health/social care workers in contact with patients and service users, members of voluntary organisations involved in emergency first aid, and children aged 2/3 and those in school year reception to year 4. The percentage uptake is improving each year among vulnerable groups and the total population. In 2018/19 uptake was: 68.3% for people aged 65 and over, 44.1% for people aged 6 months to 64 years with a clinical risk, 49% for children aged 2 and 3 and 70% for school-aged children, 33% for asthmatics and 60% for people with COPD. An estimated 28% (868,668) of the total population of Wales were vaccinated against influenza.

Source: Public Health Wales (2018)

6.5. South Wales routine surveillance for assault with injury

In south Wales, a routine surveillance system collates information on assaults with injury reported within EDs (number of attendances), ambulance services (number of callouts) and the police (number of recorded assaults with injury). Trends are fairly consistent across the three data sources, with larger peaks seen in the summer months (July, August), and smaller ones in autumn/early winter (October-December). Further information is available in Section 4 of the Technical Report.

6.6. Fire service callouts

Monthly data from Welsh Fire Services shows that the average number of fires (any accidental or deliberate fire) per day is lowest during the winter months compared with other times of the year. However, there appears to be a different pattern for accidental dwelling fires, which peak in December and are generally lower during the spring and summer months. Further information is available in Section 4 of the Technical Report.

¹⁴ Surveillance also includes measles, mumps, rubella, shingles, chickenpox and pneumonia. Surveillance covers a volunteer sample of 44 Welsh practices that covers approximately 355,000 patients. <http://www.wales.nhs.uk/sites3/page.cfm?orgid=457&pid=27918>.

¹⁵ Based upon the Public Health Wales Annual Report "Seasonal Influenza in Wales 2018/19". [http://www2.nphs.wales.nhs.uk:8080/CommunitySurveillanceDocs.nsf/\(\\$All\)/E3F7BE45AAB413658025841700552272/\\$File/Seasonal%20Influenza%20in%20Wales%20201819_v1a\(final\).pdf](http://www2.nphs.wales.nhs.uk:8080/CommunitySurveillanceDocs.nsf/($All)/E3F7BE45AAB413658025841700552272/$File/Seasonal%20Influenza%20in%20Wales%20201819_v1a(final).pdf)

07 Interview findings

Stakeholder interviews focused on four core themes: the experience of winter pressures; the current plans and preparations to mitigate winter pressures; the challenges and issues of the current approach; and changes for the future. Further details of findings from interviews can be found in Section 5 of the Technical Report.



"Obviously, we've got excess winter deaths but [if] you take it right back, we've got poverty. From the poverty, we've then got fuel poverty which means they're going to struggle and the impact this has on their health and well-being for families, their children, school attainment..."

*Representative from
Healthy Homes, Healthy People*

7.1. Experience of winter pressures in Wales

Pressures experienced are broader than wintertime

- All sectors recognise that winter pressures are not only attributable to winter weather or seasonal illnesses (e.g. influenza) but are a reflection of existing "grassroots problems" and the same demographic, financial, and demand pressures that exist all-year-long. Ongoing issues such as cold and damp housing, poverty including fuel poverty, and loneliness, are key contributing factors.
- For the housing sector, **fuel poverty** and limited access to affordable heating for homes (particularly for rural areas) is seen as substantially contributing to the winter health burden.
- There are challenges associated with the **increasing number of frail and older people** in Wales who are more prone to develop health complications in winter, resulting in longer lengths of hospital stay and increased long-term care needs.



Key Findings

- A broad set of factors influence health and well-being in the winter months, including cold and damp housing, poverty (including fuel poverty), an increasing number of frail and older people, and loneliness.
- Integrated winter planning helps to build resilience in the health system and supports the development of new collaborations and partnerships. However, winter planning is viewed as a short-term approach that fails to consider the broader determinants of health. Planning for winter needs to be part of a long-term and continuous approach responsive to changing seasonal demands.
- Challenges to reducing winter morbidity, mortality and service pressures include: communication barriers within and between sectors; the late timing and short-term nature of funding; a lack of awareness of support and advice services available; and problems with staff recruitment and retention.
- Prevention interventions have an integral role in reducing winter morbidity, with opportunities for the public to have a more active role in their own health and care, particularly throughout the winter months. Current prevention approaches include population wide interventions (e.g. building community networks and social connectedness) and targeted interventions for specific vulnerable groups (e.g. falls prevention, and housing and energy efficiency programmes).



"It is an all-year-round pressure rather than traditionally what we think of people being poorly in the winter (...) the seasons don't seem to matter anymore; it just seems to be relentless right through the year."

General Practitioner

Impact on health and care services

- The winter months are a challenging time for all service providers. Healthcare staff struggle to cope with the **volume of patients** presenting to emergency departments, often leading to overcrowding and lengthy waiting times and knock-on effects on operational performance, such as delays in patient flow and escalation.
- Bank holidays and festive periods can result in significant pressure across the system as *"nothing happens on bank holidays"*, with fewer available staff, breaks in service delivery (e.g. elective surgery), and challenges of discharging patients home.
- There is a shared concern that inappropriate attendance at emergency departments, for example by those with non-urgent health problems that could be managed by primary or community services, results in avoidable additional pressure on services. Inappropriate use is thought to be primarily due to a lack of public understanding of the alternative services available or what constitutes an emergency.
- With increased demand and constant stressful conditions, the winter months are perceived as **damaging to staff health and emotional well-being**. The majority of healthcare respondents report feeling *"exhausted and demoralised"*, partly due to tight resources and longer shifts, and partly because of *"relentless"* pressure. Staff burnout is felt to be endemic throughout the workforce, affecting productivity and resulting in staff taking sickness or holiday leave.
- There is a clear sense that there is a lack of medical and nursing staffing and resources (e.g. hospital beds, to successfully meet the growing demands during winter. Rising levels of sick leave in winter result in understaffing. This often leads to an *"over-reliance"* on a temporary workforce, where employers use expensive alternatives of agency and locum staff to fill **workforce gaps**.

7.2. Current approaches and winter preparations in Wales

Integrated winter planning

- Planning for winter is undertaken in a timely and collaborative manner across multiple agencies, including health, social care and the third sector, to ensure a coordinated approach to anticipated pressure in the healthcare system and community. The process for winter planning is guided by Welsh Government priorities, usually following annual conferences, with each health board leading on the development and delivery of their own integrated plans every winter.
- Such integrated winter planning is a **valuable tool to support and strengthen planning**; incorporate new schemes, models of care, and service delivery improvements at an early stage; and to build resilience in the system and ease anticipated demand.
- **Formal collaborations** between agencies often result in more insightful and detailed winter plans. Collaborations also lead to opportunities for new partnerships and integration among services and the development of community pathways.
- Although there is a responsibility for health boards to have an integrated winter plan, the absence of one is not a cause of winter pressures. Winter planning is felt to be reactive, *"narrowly focused"* and *"short-sighted"* with a focus on key performance targets and short-term budgets. Current winter planning also fails to consider the broader determinants of health, such as living in cold homes or the need to respond to other inclement weather (e.g. summer heatwaves).
- There is a consensus that planning for winter needs to be part of a long-term and continuous approach responsive to changing seasonal demands.



"It's a real challenge to staff the wards, and to open extra beds is also very challenging. We deliberated about opening a winter ward for much longer than we normally do because we were unsure whether we could get nursing staff to staff it, even if we've opened it."

Consultant; Health Board



“For the last couple of years, the feedback coming is that winter planning is pointless because spending money every two years for over the winter is pretty pointless. (...) We are not good at focusing on the right things – we do not realise that some of the simplest and most ordinary ways of looking after your population are actually the most profound and the most available.”

Advisor; NHS Trust

Positive role of prevention

- Prevention interventions have an integral role in reducing winter morbidity among the general population and specific vulnerable groups (e.g. the frail and elderly, those living in cold homes).
- There is further need to **engage with the population** on being more accountable for their own health and care (e.g. through healthy behaviour campaigns, information packs, care navigation) and on making winter preparations, for example by providing advice on boiler care in advance of cold and severe weather.
- Keeping those who are the most vulnerable safe and well in winter is a priority and most organisations provide support for such individuals. For example, as part of a campaign introduced in Wales in 2018/19 ‘My Winter Healthcare Plan’, community pharmacists engage with vulnerable people, particularly those with chronic conditions and older people, and provide individual winter healthcare advice and referrals to services.
- Engaging with people who may become **vulnerable** in the winter is an important and sensible approach and there should be more contact with vulnerable individuals following discharge from hospital, with attention to their living environment and medication adherence.
- Building community networks and social connectedness are recognised as important preventative approaches that support **community resilience**.
- **Home safety and falls prevention** is a priority concern, with opportunities for action including home adaptations (e.g. handrail installations). The assets of housing and third sector organisations can be better utilised as part of a comprehensive approach to falls prevention. Better communication and collaboration between sectors and health and social care services could lead to fewer falls-related admissions and improve healthcare service efficiency.

- **Admissions from care homes** could be reduced by educating care home staff on early recognition of potential crises and by identifying those individuals who are frequently admitted to hospital or who frequently present to Emergency Departments.
- **Targeted energy efficiency interventions** that address individual needs (i.e. the Nest Scheme) have a greater impact on physical health and well-being, as opposed to blanket approaches for vulnerable areas (i.e. the Arbed Scheme).
- Although influenza is well recognised as a significant destabilising factor for winter welfare, **influenza vaccination coverage** is felt to be comprehensive for most eligible groups. Community pharmacies are seen to play an integral role in delivering vaccinations.



“We’re doing quite a bit of work looking at a strength-based approach in how we engage with communities, how we perhaps educate and help people to self-care when that’s appropriate and build up social networks and then the community can support each other rather than, again, being very dependent on services (...) I think then you free up GPs to do the bit that only they can do, which is perhaps more complex medical problems, which then frees up appointments and time for those people that need to get in, particularly around winter pressures.”

General Practitioner



“There’s a hospital to home [pilot] service in Bridgend. It’s very innovative. And what that does, it’s able to get to the problem quicker because the housing service is co-located with the hospital. It just improves the speed of things, because speed is an important thing. Every day saved, every bed saved is so important when you’re under pressure (...) You talk to senior health professionals and [they] said if it wasn’t there, there’d be queues of ambulances outside.”

General Practitioner

7.3. The main issues in Wales: reflections on current approaches

Timescales and funding issues

- There is inadequate time after receiving winter funding to implement and create longstanding change effectively. As a result, most **financial support is spent on "quick fixes"** and extra capacity. While this helps with peak winter periods, providing smaller amounts of permanent funding earlier in the year may lead to more certainty with winter planning.
- There is a need to **invest in community services**, which are felt to be insufficiently funded to deliver the care that meets the needs of the system. Community services are often only funded on a short-term (e.g. for one winter season) and non-recurrent basis, with one third sector organisation reporting that at least *"half the agencies run out of money in the last [winter] quarter of the year"*.



"..... there is an obsession in putting in short term transformation funding and expecting it to pay regard really quickly..... If we don't really nail down and support and nurture community alternatives, then we have no hope of keeping the system alive here, it's just going to collapse."

Medical Consultant; Health Board



"Staffing's under pressure, as we know. We know that the UK are short in tens of thousands of clinical staff, 40,000 nurses and 10,000 doctors. But Wales is just about the most under-doctored nation in the EU currently."

Medical Consultant; Health Board

Issues related to staff recruitment

- There are concerns about staff recruitment and retention, with shortages widespread across all areas of care, including general practice, community nursing, and social care services. The current model is viewed as *"jam-packed and ... not sustainable"*. Shortages are compounded by an **ageing workforce**, for example amongst nursing in primary and community care, where many individuals are due *"to retire in about two years"*.
- **Barriers to staff recruitment** in healthcare include:
 - A lack of job security for staff;
 - Tighter and stricter financial budgets;
 - Problems of commuting in rural Wales;
 - Lack of unique selling points for professional posts in Wales compared with other locations in the UK; and
 - Negative perceptions about the work culture in some health boards.



"One of the biggest challenges is the fact that the winter resilience funding comes too late, and it's for too short a period. I'll give you an example. One of the things that we are really keen to do is to increase capacity within our third sector, who are very good at providing 24/7 care when we need it in the community. In order for them to increase, they have to recruit more staff. We give them money in December and say, "You can only have it for three or four months." So, that doesn't enable us to do anything sustainable."

Locality Manager; Health Board



Challenges in communication

- Some healthcare professionals believe there is a lack of consideration of frontline staff views in winter preparations and planning, with reports of staff *"frustration"* and feeling *"undervalued"*, and **feedback not being heard** in their organisations. However, this is not the case for all health boards, with examples of one-to-one conversations between frontline staff and executives having a positive impact such as fostering better staff communication.
- Some healthcare professionals describe social care services as not having the same understanding of the importance of a **speedy discharge**: *"people come to harm in community hospitals if they stay there for long periods. I'm not sure that, despite the conversations with social care, that they see that. I think their view is if a patient is at a community hospital, that they are safe"*. Specific issues include difficulties securing packages of care and delays in transferring patients out of care.
- From the perspective of a care home manager there is no *"easy"* flow of communication regarding **patient discharge** from hospital. Despite being proactive, they still struggle to contact hospital wards about the patient and the discharge, with concerns including *"little follow-up for patients"*.



"You've got the problem that ambulances work in minutes, emergency departments work in hours, the hospitals work in days, and social workers work in weeks. So, in order to maintain flow, which is what the performance and safety of both ambulance and ED rely on, we've got to get social work responding in hours rather than weeks."

Medical Consultant; Health Board



"..... number of people still don't have proper, full heating systems ... that are relying on a form of heating in one room.... we can assist. But again, it all goes back to people being aware of what is out there ... what help, and assistance are available"

Healthy Homes; Healthy People

Lack of awareness about services

- Low levels of public **awareness and knowledge of available services** can lead to situations such as vulnerable households experiencing distress, as they are not aware of locally available support and advice services. Some households find accessing services complicated, for example, due to *"a low level of IT proficiency"* or lack of internet access and who therefore *"end up poorer for it"*¹⁶
- Better knowledge of local services amongst healthcare professionals could help them to navigate patients to more appropriate services, particularly for social and mental health-related issues.

¹⁶ Public Health Wales have published a report "Population health in a digital age" which emphasises more than 1 in 10 people in Wales do not have access to the internet at home, with access lowest amongst older adults, those living in deprived areas, and those with poorer health: <https://phw.nhs.wales/files/research/population-health-in-a-digital-age/>

7.4. Areas for improvement in Wales: changes for the future

- There needs to be **closer integration and increased collaboration** both within and outside the health service. Better integration can improve productivity, efficiency, and quality of care, and make best use of existing resources.
- **Strengthening services across the community** has a “*knock-on effect*” of refocusing the spotlight in winter away from the hospital front door and potentially improving service efficiency across the whole system.
- Utilising community interventions and pathways that provide patient support following discharge from acute care could lead to greater staff confidence and enable **earlier patient discharge**. Examples include the ‘*Discharge to Recover then Assess*’ hospital discharge pathway, the ‘*Every Day Counts*’ project and the *Hospital to Home* service in Bridgend.
- Inappropriate attendances at emergency departments could be prevented with stronger efforts to re-direct patients to more appropriate primary or community services.
- Current winter preparations and weather forecasting policies are not “*fit for purpose*”, in part due to the increasing number of **extreme weather events**. Future preparations will need to routinely incorporate other seasonal weather and temperature changes.
- The focus should **move away from planning and funding short-term changes** to having a broader set of measures and actions across the whole year that can be adapted, dependent on seasonal needs. Longer-term strategies also need to address the current challenges facing services in Wales, such as meeting the care needs of an ageing population, growing financial pressures, and a stressed and stretched workforce.

Further suggestions of improvements to address winter pressures, which either focus on sector-specific issues or require further investigation (outside of the scope of this project) are detailed in Appendix 3 of the Technical Report.



“Last year, the temperature was so extreme and so long-lasting, there were examples of rough sleepers suffering from dehydration, heat stroke, sunstroke, to an extent which we hadn’t really seen before. So, that really made us realise that our policies really probably weren’t fit for purpose because it was only talking about winter, cold weather, frostbite and hypothermia and it wasn’t looking at the extreme weathers from the other side.”

Representative from Third sector

Prevention as a means of easing winter pressures

- There is cross sector awareness of the benefits and need for prevention, and in many cases, it is already part of winter preparations. However, prevention may mean different things to different sectors.
- From a health and social care perspective, strengthening individual resilience through **community-centred approaches** is a high priority. Working with local authorities, the third sector and public health to build community networks can foster a sense of social connectedness and help develop key support services to address winter-related issues such as falls and loneliness.
- Engaging with **vulnerable people on wider determinants** of health and well-being, for example through living-environment assessments for older people, can improve home safety and well-being, resulting in fewer hospital admissions.
- All sectors acknowledge the need to move further towards a prevention approach but making such a shift requires “**bravery**” in terms of time and funding.



“How do we get GPs to manage that demand? to do that, we need to take some of the demands off them... If you can reduce demand at the front of house, it then has that knock-on effect of freeing up people back to the system.”

Locality Manager; Health Board



"It's moving things much more to the preventative end. It's about really improving our community resilience, and that's not just statutory services. We're looking to try and do things like use [smartphone] apps to help people keep active... there's a whole range of things that we would really like to try and implement... I think everyone's really is on board now with the whole prevention agenda. I think we've talked about it for a long time."

General Manager; Health Board



"I think it is very cost effective and more ethical to reduce demand rather than reacting to incidents or illnesses. It is about being preventative, and preventing poverty in the first place, which is a better solution than reacting to it afterwards during hospital admissions."

Locality Manager; Health Board



08 Evidence analysis: identifying areas for further action

An analysis of the international literature (Sections 3, 4 and 5), epidemiology (Section 6), along with findings from expert stakeholder interviews (Section 7) was carried out to:

- Understand the causes of winter pressures and winter mortality and morbidity in Wales;
- Describe the range of evidence based interventions available; and
- Identify potential options for further action in Wales.

A summary of findings is provided in Table 3, with more detailed findings available in the accompanying Technical Report. Of note, Table 3 includes content drawn from extensive stakeholder interviews, the details of which can be found in both Section 7 of this report and Section 5 of the Technical Report.

Although the focus of this report is to support the prevention of winter related morbidity, mortality and winter pressures, expert stakeholder interviewees frequently discussed options for managing and responding to increased demands placed on services, along with barriers and suggestions for improvement. For this reason, we also include this information in Tables 4 and 5 below.

Due to the breadth and local nature of activities and services in place to reduce winter morbidity, mortality and winter pressures, a full mapping of current services in Wales (both type and scale) was outside the scope of this project, as was the appraisal of their effectiveness and impact. As a result, it was not feasible to conduct a full gap analysis to identify specific interventions for implementation.

Box 16: Coding of evidence

In Table 3, interventions have been colour-coded to reflect the outcomes and availability of evidence on the impact on health or the determinants of health (e.g. behaviour, environmental conditions):

Green

Evidence of positive impact (from systematic reviews, meta-analyses or multiple academic studies).

Yellow

Mixed evidence of impact (from systematic reviews, meta-analyses or multiple academic studies).

Blue

Limited evidence of impact (few research studies); more research in this area is required.



Table 3. Prevention and early intervention of winter morbidity and mortality and winter pressures - summary

Area	Causes and epidemiology of winter morbidity and mortality and winter pressures (sections 3, 4 and 6)	Evidence based interventions (sections 5)	Expert stakeholder views (section 7)	Examples of interventions in place in Wales
Chronic diseases	Chronic disease exacerbations cause increased hospital admission and length of stay (section 4 and 6). Respiratory diseases, circulatory diseases and dementia are the main causes of excess winter deaths (section 3 and 6).	Prevention of chronic diseases e.g. through healthy behaviour interventions. Prevention of winter exacerbations of chronic diseases - further research and evaluation are needed on the reach, scale and impact of winter specific healthy behaviour campaigns.	Engage with and support individuals to self-manage their condition. Telehealth/ telecare services to monitor people with chronic diseases (see Technical Report).	<ul style="list-style-type: none"> Public health interventions to promote healthy behaviours Self-care and management of chronic diseases <i>My Winter Health Plan</i> Influenza vaccination Occupational therapist services
Behaviours increasing the risk of winter morbidity and mortality	Sedentary behaviour, alcohol consumption (chronic and increased over festive periods), and smoking are linked to: <ul style="list-style-type: none"> Increased cardiovascular and respiratory disease risk (section 4) Increased frequency and severity of falls (physical inactivity) (section 3) Unintentional injuries (alcohol) (section 4) Respiratory disease hospital admissions (smoking) (section 4) 	Prevention of winter morbidity and mortality e.g. falls prevention and chronic disease exacerbations - further research and evaluation are needed on the reach, scale and health impact of winter specific campaigns to promote healthy behaviours.	Public campaigns , leaflets & internet advice to promote healthy behaviours and with wider advice on hand washing, use of blankets, socialising and social activities, appropriate thermal clothing including anti-slip footwear (see Technical Report).	<ul style="list-style-type: none"> Programmes to promote healthy behaviours: <ul style="list-style-type: none"> Public health campaigns, including smoking cessation and healthy eating campaigns Making Every Contact Count (see Technical Report) Early identification and intervention of chronic diseases e.g. stroke, obesity, diabetes, cardiovascular disease Community health champions (see Technical Report) Promoting and ensuring access to leisure and physical activity (see Technical Report) Influenza vaccination
Respiratory viral illnesses	A major cause of respiratory disease exacerbations (section 4).	Influenza vaccination can prevent influenza transmission. Handwashing (especially in younger children), care staff education and encouraging sick employees to stay at home can reduce transmission.		<ul style="list-style-type: none"> Comprehensive influenza vaccination programme delivered by primary care (GPs and pharmacists), health boards and health and care employers
Hypothermia	Increased mortality during winter (section 3). Hypothermia is linked to alcohol and psychoactive drug use (section 3).	Advice to the public , including maintaining household warmth (and reducing energy bills), and wearing gloves, hats, and scarves - evidence of health benefits is unclear.		<ul style="list-style-type: none"> Advice on ideal home temperatures and how to keep warm in winter provided in <i>Spread the Warmth</i> campaign (e.g. using gloves and hats outside, keeping the face covered, wearing layers, use of blankets)

Vitamin D deficiency	Associated with increased cardiovascular risk and mortality, respiratory exacerbations, falls complications, and viral infections (section 4).	Vitamin D supplementation can reduce falls in older people, particularly in those with deficiency or when combined with exercise falls prevention interventions.		<ul style="list-style-type: none"> • Vitamin D advice as part of <i>Spread the Warmth</i> campaign • NICE guideline on vitamin D supplementation throughout the year, including the winter months
Falls	Increased emergency hospital admissions and deaths from falls in winter. Falls and hip fracture incidences are higher on days with or preceded by snow/strong wind/rain. Increased wrist and forearm fractures in those aged over 75 during winter months (section 3).	<p>Exercise programmes in older adults can reduce the risk of falls, particularly if they include multiple exercise types and are carried out over a longer duration. Home safety assessments and modifications can reduce the risk of falling in older adults.</p> <p>Anti-slip/winter footwear – evidence of health impact is limited.</p>	Falls prevention , interventions, utilising assets of housing and third sector.	<ul style="list-style-type: none"> • <i>Steady On, Stay Safe</i> campaign • Falls brief intervention training • Fall prevention programmes including home modifications such as <i>Care and Repair</i> home visits • Community physical activity classes to improve fitness and dexterity
Mental well-being	Reduced sunlight hours may increase mental health distress e.g. seasonal affective disorder (section 3).		Adding mental health practitioners to out-of-hours services (see Technical Report).	<ul style="list-style-type: none"> • <i>Spread the Warmth</i> - includes a grant for older people to stay connected
Cold homes and fuel poverty	Fuel poverty contributes to 10% of excess winter deaths; around 30% is attributable to living in a cold home (section 4).	<p>Advice on energy efficiency/keeping warm - impacts on health are unknown.</p> <p>Housing and energy efficiency improvements - may improve physical and mental health and well-being, and reduce healthcare use, particularly if targeted at households in greatest need.</p> <p>Schemes providing financial help to keep warm – may reduce health impacts of severe cold. Further research needed.</p> <p>Improved ventilation (air quality) improves respiratory health of children.</p>	<p>Improve home warmth and energy efficiency, with targeted interventions.</p> <p>In the short term, tackle fuel poverty and focus on keeping people warm (e.g. use of blankets). Longer term focus on improving the energy efficiency of homes (see Technical Report).</p>	<ul style="list-style-type: none"> • <i>Warm and Healthy Homes Fund</i> • <i>Spread the Warmth</i> • <i>Arbed scheme</i> • <i>Nest scheme</i> • <i>Winter Fuel Payment/Warm Home Discount scheme</i>
Travel and transport	Snow events can increase the road traffic crash rate by 84% and the injury rate by 75% (section 3).	<p>Use of winter tyres (Canada) can reduce road traffic crashes (although relevance to Wales is unclear).</p> <p>Reducing speed limits (Finland) may also reduce road traffic crashes.</p> <p>Keeping pavements clear of snow/ice - no formal evaluations, although this is the main location for falls outdoors.</p>		<ul style="list-style-type: none"> • Local Authorities grit and clear major roads during icy/snowy weather • <i>Spread the Warmth</i> includes advice on gritting paths at the homes of older people

Social isolation in older people	Associated with increased winter hospital admissions for heart failure and respiratory diseases, increased risk of physical frailty and functional decline (section 4).	Interventions to tackle social isolation and loneliness in winter - impact on health and well-being is unknown.		<ul style="list-style-type: none"> • <i>Spread the Warmth</i> includes a grant for social events for older people • Community activities including exercise and art classes • Social prescribing referral services • Befriending schemes (in care homes)
Health forecasting		Health forecasting - no clear/limited evidence of impact on morbidity, mortality or health care utilisation.		<ul style="list-style-type: none"> • COPD Health Forecasting Pilot previously in Rhondda Cynon Taff Health Board (see Section 5)

Supporting vulnerable groups

Older people	Higher winter morbidity and mortality (section 4), emergency hospital admissions and emergency department attendances (section 6).	Most interventions identified are relevant to older people e.g. falls prevention.	Cross-sector action e.g. tackle social isolation, support and advice services, home adaptations.	<ul style="list-style-type: none"> • <i>Warm and Healthy Homes</i>. • <i>Spread the Warmth</i> • <i>Winter Fuel Payment/ Warm Home Discount scheme</i> • <i>Care and Repair</i> home visits • <i>Steady On, Stay Safe</i> • Influenza vaccination
Pregnant women	More susceptible to viral infections , with worse health outcomes (section 4). More vulnerable to extreme temperatures (section 4).	Maternal influenza vaccination reduces influenza - associated adverse outcomes in infants.		<ul style="list-style-type: none"> • Influenza vaccination • <i>Warm and Healthy Homes</i>
People living in deprivation and poverty	More likely to have pre-existing illness and live in poor quality housing . Impact of deprivation on winter mortality unclear (section 4).		Poverty identified as a “grassroots” problem contributing to winter pressures.	<ul style="list-style-type: none"> • <i>Warm and Healthy Homes</i> • <i>Arbed and Nest</i> • <i>Warm Home Discount scheme, Cold weather payments</i>
People experiencing homelessness	Increased morbidity and mortality due to direct cold effects and reduced ability to access healthcare (section 4).	Services for homeless individuals - can reduce winter morbidity and mortality (Finland). Housing support - can reduce health care use.	Target integrated interventions at those who are homeless (see Technical Report).	<ul style="list-style-type: none"> • <i>Housing First</i> • <i>The Community Care Hub</i> (Wrexham) • Third sector support services
Rural populations	Differences between rural/urban areas may be due to variation in access to services, housing quality, fuel poverty (section 4).		More vulnerable due to fuel poverty and limited access to affordable heating for homes.	



Table 4. Expert stakeholder views on reducing demand and improving winter preparedness of services

Area	Intervention (see Section 7 and Technical Report)
Prevention	<ul style="list-style-type: none"> Improved understanding of effective preventative measures to reduce demand on services. Support for vulnerable people e.g. through routine living-environments assessments for older people.
Planning	<ul style="list-style-type: none"> Ongoing integrated long-term planning, building on <i>My Winter Healthcare Plans</i>, responsive to seasonal needs, extreme weather events and climate change. Remove focus on reactive, short term winter planning/projects. Longer term strategies, with broader measures, focusing on addressing current and future challenges e.g. ageing population, increasing financial pressures, stressed workforce.
Timely funding	<ul style="list-style-type: none"> Funding to support winter pressures provided earlier in the year, with adequate time to implement plans and create long-standing change.
Appropriate utilisation of health and care services	<ul style="list-style-type: none"> Support effective care navigation by the public e.g. through increased public awareness and signposting to appropriate services, removing barriers to services e.g. IT literacy, internet access.
Community focused approaches	<ul style="list-style-type: none"> Community services, with ongoing funding, delivered at sufficient scale and reach. Community centred approaches, fostering community networks, social connectedness and individual resilience.
Schemes to reduce avoidable admissions	<ul style="list-style-type: none"> Extended access to primary and community care. Improved clinical support to care homes, increased awareness of care home staff regarding early recognition of crises and system infrastructure to prevent admissions from care homes e.g. anticipatory care plans.
Staff capacity and well-being	<ul style="list-style-type: none"> Adequate health and care professional staffing levels. Improved staff recruitment and retention, across all areas of care, with reduced reliance on a temporary winter workforce. Address barriers to recruitment e.g. more flexible budgets. Support for staff health and emotional well-being, all year round and particularly over winter months.
Improved data and evidence	<ul style="list-style-type: none"> Improved availability and utilisation of population data to understand local health needs to support planning. Improved evidence of effectiveness of impact of interventions.

Table 5. Expert stakeholder views on responding to increased demand on health and care services

Area	Intervention (see Section 7 and Technical Report)
Improved ways of working	<ul style="list-style-type: none"> Increased integration and collaboration both within and outside the health system to improve efficiency, productivity and quality of care.
Graduated care models and discharge	<ul style="list-style-type: none"> Timely and efficient patient discharge e.g. through input from multi-disciplinary teams (with safeguards to prevent repeat admissions).
Improved communication within and between health and care services	<ul style="list-style-type: none"> Between services over winter months to support positive relationships. With frontline staff, listening to concerns and recognising the impact of additional pressures. Between hospitals and care homes to improve patient hospital discharge – all year round, not just during winter. Improved understanding of different perspectives and concerns between sectors, particularly health and social care.

09 Discussion and framework for action

The impact of winter on health and well-being and health and care services utilisation is well recognised within the international literature (Section 3) and was observed in the analysis of Welsh health data (Section 6). In this section we discuss the themes and key messages identified in this report; present a framework for action for policy and decision makers, and those involved in planning, preparing for and delivering services to improve winter health and well-being in Wales; and provide messages that could be given routinely to citizens by all organisations to promote health and well-being during winter months.

Themes	Key messages
Strengthen prevention actions	
<p>There are a variety of factors that contribute to health problems in winter, including influenza and exacerbations of pre-existing chronic diseases, and wider factors such as poverty, social isolation and poor housing quality that exist regardless of the time of year.</p> <p>In line with other countries, there are more pronounced increases in acute health problems related to both RDs and CVDs in the winter months. The prevention of RDs and CVDs (the main causes of EWDs) through interventions such as promoting healthy behaviour is important for reducing winter pressures in future years. This was highlighted by health professionals in interviews (Section 7), who mentioned engaging with and supporting people on keeping healthy throughout the year. Respiratory viral infections are a major cause of RD exacerbations, with a significant proportion of influenza transmission events taking place in the school or workplace. Evidence-based interventions to prevent the spread of viral infections include influenza vaccinations, improving handwashing and encouraging sick individuals to stay at home.</p> <p>Health and other professionals recognised that poverty (and more specifically fuel poverty) and deprivation had an important role to play in the health burden of winter (Section 7). Financial help to keep warm is provided to low-income groups (as well as other vulnerable groups) across Wales, with the most effective approaches being those that address individual needs (target-based) rather than whole areas (blanket-based). Interviewees also recognised the importance of increasing the energy efficiency of homes as a longer-term approach to tackling fuel poverty and ensuring warm homes for vulnerable populations. There was concern about the lack of awareness amongst the public regarding support services available to them. Potential solutions include improved signposting to services by all sectors (including health) and the provision of a single point of contact for housing within local authorities.</p> <p>Literature evidence shows that there are increased hospital emergency admissions and deaths as a result of falls during winter months. There are already a range of falls prevention programmes in Wales that incorporate evidence-based interventions such as exercise programmes and home safety modifications.</p>	<p>Causes of health inequity also exacerbate the health impact of winter. Reducing inequity is therefore integral to improving winter well-being and reducing winter pressures.</p> <p>Individuals with RDs and CVDs are particularly at risk over winter. There needs to be a strong emphasis on primary disease prevention, particularly in younger age groups, and interventions to prevent disease exacerbations such as optimising uptake of influenza vaccinations, and promoting handwashing to reduce the spread of viral infections.</p> <p>Financial help to low-income and vulnerable groups needs to be target-based and address needs throughout the year.</p> <p>Improving housing energy efficiency provides a longer-term solution to fuel poverty and cold homes.</p> <p>A Health and Housing Collaboration Checklist has been developed to support integration and collaboration between sectors (see Technical Report, Appendix 4).</p> <p>Evidence-based falls prevention programmes carried out at scale could reduce winter morbidity, mortality and health and care service pressures.</p>

Health and care service interventions

It is apparent that **planning** for winter could have a greater impact with a more **widely focused and longer-term approach**, which takes place **continuously throughout the year**. Findings suggest that such planning could be improved by addressing current and anticipated challenges in Wales such as an ageing population, growing financial pressures and a stretched workforce, and with a **greater focus on prevention** alongside plans for managing demand. Aligned funding allocations need to enable long-term change rather than short-term solutions and include preparations for climate change and other extreme weather events such as prolonged periods of intense summer heat. Building a greater understanding of the demographic, socioeconomic, and environmental factors that are associated with cold-related health and care service use and deaths in Wales will enable opportunities for a holistic and preventative approach and mitigate pressures on the health and care system.

Individuals with **chronic conditions** are currently supported to manage their conditions over the winter, for example through campaigns such as *Stay Well in Winter* and the *My Winter Health Plan* scheme. Interviews with professionals (Section 7 and Technical Report) identified that encouraging more use of telehealth services and support would allow patients to better monitor and manage their condition and signpost to other health support when needed.

Findings from interviews (Section 7) indicate that risk groups (e.g. those who are elderly or who have chronic diseases) are a priority for intervention in Wales. A range of organisations **engage with vulnerable groups**, for example by enquiring about housing conditions and improving home safety. There are opportunities to strengthen this support for vulnerable people **following discharge from the hospital with better continuity of care**, for example as part of community 'step-down' models and by ensuring that living environments are adequate and warm. An area for consideration and investigation is providing routine home assessments for older people generally as part of a population-level intervention, rather than only those individuals considered to be at risk.

Our research highlights a number of **barriers** to implementing interventions to reduce winter pressures in Wales that need to be addressed. These included addressing barriers to **staff recruitment and retention**, improving **communication** between front line staff and managers responsible for planning, and improving communication between health care and other sectors, particularly around discharge and referral to services. Creating opportunities to improve communication cross-sector would also be beneficial for both patients and professionals involved in their health and care.

The concept of '*winter planning*' should no longer be used. There should be year-round '*continuous preventative planning*', focusing on understanding and addressing population needs and underlying health problems.

Supporting self-care is a core component of enabling winter well-being for those with chronic diseases.

Strengthening tertiary prevention measures, for example following discharge from hospital, provides an opportunity to support those who are vulnerable.

A continuous preventative approach to planning needs to enable sustainable staffing of services and cross-sector communication.

Community approaches

Social isolation is associated with increased hospital admissions, as well as increasing physical frailty. Interventions to build **community resilience** appear to be emerging, yet important, approaches to addressing winter pressures, identified both in the international literature (Section 5) and interviews with health professionals (Section 7). Examples of initiatives in Wales include building supportive social networks, and developing community well-being networks through integration and collaboration between local public bodies, third sector organisations and communities.

Initiatives focusing on strengthening resilience in communities are increasingly viewed as supporting both individual and community well-being and connectedness and a potential solution for reducing health and care demand.



As part of preventing winter pressures, there is significant activity in Wales to reduce avoidable admission to urgent and unscheduled care, smooth the transition of patients through the healthcare system and achieve timely and efficient patient discharge. Encouraging the use of alternative services, such as ambulatory care, community services, and interventions provided by third-sector organisations has been shown to reduce the need for hospital admissions and may help speed up patient discharge. This could be an important factor in **reducing winter demand for health and care services** in Wales, although a short term funding model for community interventions over winter is likely to reduce the impact of these services.

The ongoing provision of alternative interventions in the community can help to reduce demand on unscheduled care services and reduce excess winter demand on health and care services more broadly.

Research priorities

Literature findings show the population groups affected most over the winter months are older people aged 65+ years (particularly those living in cold homes and those who are socially isolated), those with existing chronic conditions, people living in deprived areas or on low incomes, and individuals who are homeless (Section 4). These groups are somewhat reflected in data available for Wales, which finds that the risk groups are those aged 85+ and those living in deprived areas (Section 6). Further detailed analysis of available data sources, including linked data sources, could aim to explore and **better understand risk groups** for Wales in more detail.

Further research is required to better understand the groups most at risk of winter morbidity and mortality in Wales. This could be achieved through data linkage studies exploring the association between age, disease and health inequalities.

Current emergency department data is insufficient for monitoring seasonal trends in activity e.g. for attendances due to falls or chronic disease exacerbations. **More complete emergency department data** would allow this relationship to be explored further and better understood within Wales.

Incomplete emergency department data is impeding planning for the prevention of emergency department attendance. Implementation of the Emergency Care Dataset is imperative to address this.

Health problems associated with **dementia** are known to increase during winter months (Section 3). However, within Wales, hospital admissions show higher levels of mental-health admissions in the summer months (Section 5). This may not be the case for less severe forms of mental health and well-being related issues, as health and social care respondents from the interviews identified higher levels of social isolation, depression, and anxiety among older individuals in the winter months (Section 7). Having access to more detailed data from mental health care and support services could help identify mental health-related trends for Wales more accurately.

Increased research is required to understand how winter affects mental well-being issues, particularly in the elderly.

Interviewees recognised that the population are not adequately prepared for winter and less resilient to cope with the effects of colder temperatures (Section 7). Annual **winter campaigns** can increase awareness of these risks, particularly for those with chronic conditions. However, the effectiveness of these campaigns is currently unknown. A better understanding of reach and impact would help to improve the potential of these campaigns to make real health improvements.

Further research is required to understand and improve the health impact of annual winter campaigns.

Whilst there is increasing emphasis on supporting community resilience, there is limited evidence on the impact of interventions aimed at tackling **social isolation and loneliness** in winter.

More research and evaluation is required to understand how to tackle loneliness and isolation and understand the impact on health and well-being.

The majority of intervention types mentioned in the international literature (Section 5) are either being currently used or have been used previously within Wales (Section 7). However, it is difficult to ascertain from the interviews and literature how much **variation** there is across local areas. Further research could be conducted to map out intervention types currently being used across different local areas, including evaluations of interventions where possible. This could enable wider developments and scaling-up of best practice across Wales.

Further research and evaluation is required to map out and identify the effectiveness of local interventions across Wales.

A Framework for Action

This framework for action aims to support policymakers, the health and care system, community and third sector organisations, academia and other key stakeholders to take a long-term preventative approach to reduce the impact of winter on health and well-being and care services. The framework requires collaborative and integrated action at a national and local level, with adaptations by local areas to reflect the needs of their population and actions already underway.

Theme	Key Actions	Who should take action					
		Policymakers	Health & care	Public health system	Other public bodies	Community & 3rd sector	Academia
Strengthen prevention actions	Optimise public health interventions such as supporting healthy behaviours (e.g. smoking cessation, healthy diet, increased physical activity, maintaining a healthy weight and low risk alcohol consumption) and other evidence based interventions (e.g. lipid modification) to prevent the development and exacerbation of cardiovascular and respiratory diseases (the main causes of excess winter deaths).						
	Prevent the spread of respiratory viral infections , for example through maximising influenza vaccination uptake, employers encouraging sick employees to stay at home, hand washing advice.						
	Prevent falls and subsequent fractures among older people through interventions such as exercise programmes, vitamin D supplementation, home safety assessments, keeping pavements clear of ice and snow.						
	Help vulnerable individuals to keep warm e.g. through services for those experiencing homelessness, promoting the use of warm clothing and winter footwear.						
	Support households living in fuel poverty (particularly those with low income or who are vulnerable to the effects of cold) by providing financial and practical support.						
	Increase the warmth and energy efficiency of homes (alongside home ventilation) among vulnerable households e.g. through advice, financial help, home improvements, building energy efficient new homes.						
Health and care service interventions	Support those with chronic diseases to self-manage their condition, for example by facilitating effective navigation through health and care services, through healthy behaviours interventions and targeting of winter health campaigns.						
	Ensure ongoing support and continuity of care for vulnerable groups following discharge from hospital.						
	Broaden ' <i>winter planning</i> ' to year-round ' <i>continuous preventative planning</i> ' that is responsive to seasonal needs and extreme weather events and aims to reduce health inequity.						
	Ensure interventions and initiatives are commissioned/delivered on an ongoing basis , in order to achieve sustainable reductions in demand and utilisation of health and care services during winter.						
	Address barriers to managing winter pressures , for example by improving communication between health and care services on discharge processes, addressing staff health and well-being issues, and increasing staff capacity.						
	Progress plans to implement the Emergency Care Dataset to better understand the reasons for attendance and admissions.						
Community approaches	Support initiatives to strengthen resilience within local communities e.g. through increasing social networks to tackle social isolation.						
	Ensure vulnerable groups can access the support they need, for example through raising awareness of and timely signposting to services, and through greater integration of local services .						
	Provide/commission community based initiatives and projects, such as ambulatory care, on an ongoing basis, in order to reduce demand on hospitals and other health and care services.						
Research priorities	Improve understanding of the links between winter weather and well-being (including mental well-being) , particularly among the most vulnerable groups, for example through data linkage studies.						
	Explore methods, experiences and effectiveness of interventions for building community health, well-being and resilience .						
	Evaluate the impact of annual winter health campaigns on individual behaviours and health outcomes.						
	Map and identify the effectiveness of local and national interventions already in place in Wales, with scaling up of best practice across Wales.						

Messages for citizens

Cross-sector organisations and their staff who have contact with citizens can promote winter health and well-being by providing consistent messages:

Keep warm	<p>Even moderately cold outdoor temperatures of 8°C and below can cause health problems, particularly for those with lung, heart and circulatory health problems. People with dementia are also at risk.</p> <p>Older people and those with long term health problems are more vulnerable to worsening health as a result of cold weather.</p> <p>Wearing clothes appropriate for the weather, particularly hat, scarf, gloves, thermal garments and using blankets can help conserve body heat.</p> <p>Temperatures below 18°C in the home can harm health. Cold homes are also linked to depression and reduced mobility. Advice on keeping the house warm (alongside improving home ventilation), reducing energy use, getting the best deals from energy suppliers and information on financial support available can be obtained from a number of sources.</p> <p>Appliances such as heaters, central heating boilers and cookers should be properly installed, maintained and regularly tested to prevent accidental carbon monoxide poisoning.</p> <p>Those who are elderly and vulnerable can access financial support during winter to help with the cost of heating their home.</p> <p>Drinking alcohol and taking recreational drugs is linked to a significant proportion of deaths from hypothermia.</p>
Prevent the spread of infections	<p>Influenza vaccination is one of the most effective methods of preventing the spread of influenza and preventing illness and death, particularly among those who are vulnerable and at most risk of complications e.g. the elderly, people with long term health problems, children and pregnant women.</p> <p>Hand washing is particularly important for children and those who work in care settings to reduce the spread of infections.</p> <p>Staying away from work or school when unwell prevents the spread of influenza.</p> <p>Pneumococcal vaccination protects vulnerable individuals such as the elderly against pneumonia, meningitis and septicaemia.</p>
Support those who are vulnerable	<p>Older people who are socially isolated are more likely to be admitted to hospital with heart and lung problems during winter. Checking on elderly relatives, friends and neighbours can promote social connections and alleviate loneliness.</p>
Take action to prevent falls	<p>Improving home safety e.g. removing trip hazards and taking part in a strength and balance exercise programme reduces the risk of falls amongst the elderly.</p> <p>Roads and pavements are the main location for falls outdoors. Wearing winter footwear can reduce falls in icy or snowy weather conditions. Removing snow and gritting paths at the homes of the elderly can help reduce isolation and prevent falls.</p>
Stay well through health promoting behaviours	<p>Exercise and healthy eating can prevent weight gain over the winter months, which is one of the main reasons for weight gain over the year. Keeping active also helps to maintain mobility and fitness in older people.</p> <p>Smokers are more likely to experience a worsening of their breathing and be admitted to hospital during cold weather.</p> <p>Vitamin D supplementation for children, pregnant women and older people aged over 65 years can prevent vitamin D deficiency. Vitamin D can protect against influenza infections, lung problems and falls in older people.</p>

Specific advice to promote winter health and resilience in older people is available through the *Spread the Warmth* campaign: www.ageuk.org.uk/cymru/our-work/spread-the-warmth

Abbreviations

COPD	Chronic obstructive pulmonary disease
CVD	Cardiovascular disease
CWP	Cold weather plan for England (Public Health England)
ED	Emergency department
ELSA	English Longitudinal Study of Ageing
EWD	Excess winter death
EWMi	Excess winter mortality index
ICD	International Classification of Diseases ('ICD-11': 11th revision)
NEA	National Energy Action
NICE	National Institute for Health and Care Excellence
PHE	Public Health England
ONS	Office for National Statistics
RD	Respiratory disease
SAD	Seasonal affective disorder
WFP	Winter fuel payment
WHO	World Health Organization



Glossary

Anti-slip device:

Anti-slip devices are personal protective equipment which improve individual walking capability and safety by increasing friction and reducing slipperiness during wintertime and related weather conditions such as snow and ice.

Community health resilience:

Community health resilience is the ability of a community to use its assets to strengthen public health and healthcare systems and to improve the community's physical, behavioural, and social health to withstand, adapt to, and recover from adversity.

Energy efficiency:

Energy efficiency is a measure of energy used for delivering a given service. Improving energy efficiency means getting more from the energy that is used.

Excess Winter Deaths (EWD):

The above-average death rate from December to the end of March, comparing the number of deaths that occur in this winter period with the average number of deaths occurring in the preceding August to November and the following April to July.

Excess Winter Mortality Index (EWM index):

The percentage of additional deaths that occur in the winter period, December to March. This is calculated comparing the number of excess winter deaths divided by the average non-winter deaths (including autumn, summer, and spring).

Fall:

A fall is an event of unintentional or unexpected loss of balance which results in a person coming to rest on the floor, the ground, or other lower-level/object.

Fuel poverty (Wales):

In Wales, a household is defined as being in fuel poverty if it needs to spend more than 10% of its income on fuel and energy costs on keeping the home at a reasonable temperature (a minimum of 18 degrees).

Hypothermia:

Hypothermia occurs when there is a dangerous drop in body temperature below 35 degrees.

Integrated winter planning:

Planning for winter is undertaken in a timely and collaborative manner across multiple agencies, including health, social care and the third sector, to ensure a coordinated approach to anticipated pressure in the healthcare system and community. The process for winter planning is guided by Welsh Government priorities, largely orientated following annual multi-organisational conferences, with each health board leading on the development and delivery of their own integrated plans every winter.

Seasonal Affective Disorder (SAD):

Seasonal affective disorder is characterised by periodic depression during the same season annually, with symptoms including changes in energy level, sleep duration and appetite, reduced social activity, suicidal thoughts, and loss of interest in activities.

Severe winter weather:

Severe winter weather can be defined as a mean temperature of 2°C or less and/or heavy snow and widespread ice.

Winter:

Winter is defined meteorologically as the beginning of December to the end of February.

Winter pressures:

Winter pressures is defined as the seasonal increase in volume of illnesses and injuries (morbidity), patient contact, consultations, and hospital admissions during the winter months, compared to other times of the year, interplayed with existing structural, financial, and demand pressures in the NHS healthcare system.

Winter tyres:

Tyres specifically developed to provide added safety and improved driving performance (better vehicle grip, handling, and shorter braking distances) on wet, slushy, snowy, icy and dry cold surfaces.



Appendix 1: List of the main initiatives mentioned in the report

Initiative	Description
Arbed scheme	The area-based, supply-led part of the Welsh Government's Warm Homes programme. The scheme took place in two separate phases and aimed to improve the energy efficiency of existing homes in low-income areas across Wales.
Choose Well campaign	The aim of the national Choose Well campaign is to provide support for NHS Wales' services in unscheduled care and to alleviate demand on frontline services, particularly in the winter months (November to March). The Choose Well campaign encourages and informs people to think about and choose the right health service for their illness or injury, including self-care where appropriate.
Choose Well – National Community Pharmacy public health campaign	As part of the Choose Well campaign, the aim of the national community pharmacy campaign is to support pharmacy customers in preparing themselves to avoid illness and or injury during the winter months (November to February) and to know where best to seek advice and treatment if required.
Cold Weather Payments	Cash transfers paid to households that are already entitled to certain benefits (e.g. Income Support, income-based Jobseeker's Allowance) when there have been periods of cold temperatures. These households receive a fixed payment of £25 a week when the average temperature is 0°C or less for seven consecutive days by a local weather station.
Cold Weather Plan for England (Public Health England)	The Cold Weather Plan (CWP) for England combines the Cold Weather Alert forecasting service from the Met Office and a series of public health actions taken by the NHS (primary, secondary, and community health care), local authorities and other public health bodies, to prepare for cold weather and protect people most at risk.
Community Care Collaborative Hub (Wrexham)	Community Care Hub is a one-stop hub of a range of organisations and service agencies that aim to work and engage with rough sleepers and people experiencing homelessness in one place, on a weekly basis. People can access advice and support around mental health, physical health, substance misuse, housing, benefits, domestic violence and probation services.
Energy Company Obligation (ECO) scheme	The ECO scheme is a government energy efficiency scheme to help reduce carbon emissions and tackle fuel poverty. Under the scheme, the ECO policy is entirely formed from one obligation, the Home Heating Cost Reduction Obligation (HHCRO). Under HHCRO, obligated UK energy suppliers must mainly promote measures which improve the ability of low income, fuel poor and vulnerable households to heat their homes.
Hospital to Home pilot service (Care & Repair)	The Hospital to Home service involves clinicians and nurses working directly with Care & Repair staff to identify the needs of older patients before they are discharged. Once a discharge date has been established by health professionals, Care & Repair staff work directly with patients to assess and modify their homes to ensure they are suitable for the tenants to return to.
Housing First scheme	Housing First is a recovery-orientated approach to ending homelessness that prioritises providing permanent and independent housing to people experiencing homelessness, thus ending their homelessness and then serving as a platform providing additional support and services as needed, from which they can pursue personal goals and improve their quality of life.

Met Office COPD Health Forecasting Pilot Service (Rhondda Cynon Taff Health Board)	The COPD Health Forecasting service provided patients with Chronic Obstructive Pulmonary Disease (COPD) with information on how to proactively manage their condition. The service seeks to identify individuals most at risk of becoming ill or of their condition deteriorating due to changes in environmental conditions, using information gathered by the Met Office.
My Winter Health Plan scheme	As part of the Choose Well campaign, the Winter Health Plan scheme helps people with long-term physical or mental health problems, older people with health needs or anybody who may need support from health staff over the winter period (and beyond) to share key information about their condition, the support they receive, and the advice they have been given with health and care staff who may need to visit their home.
Nest scheme	The demand-led part of the Welsh Government Warm Homes programme. The scheme offers free advice and support to low-income households with energy-efficient homes and free home energy.
Spread the Warmth campaign (Age Cymru)	Spread the Warmth campaign is Age Cymru's national campaign to raise public awareness of the health risks that cold weather and a drop in temperature can have on older people.
Stay Well This Winter campaign	The Stay Well This Winter campaign, developed by NHS England, aims to ensure that people who are most at risk of preventable emergency admission to hospital are aware of and, wherever possible, are motivated to take those actions that may avoid admission during the winter months via behaviour change. The desired behaviour changes were for influenza vaccinations, self-care, prompt seeking of medical help at the first sign of illness via pharmacies, warm homes and falls prevention.
Steady On, Stay Safe campaign	Steady On, Stay Safe is a national falls prevention campaign to raise awareness of falls and how to avoid them, and focusing on primary falls prevention and management with the ambition to reduce the number of falls experienced by older people in Wales.
Warm Front scheme	The Warm Front scheme (England) was a programme designed to help vulnerable households, including those in fuel poverty, to benefit from energy efficiency improvements such as home heating and loft insulation measures, to help make homes more energy efficient and heating bills to become more affordable.
Warm Homes programme (Welsh Government)	Warm Homes is a Welsh Government energy efficiency programme, which includes the Arbed and Nest schemes, and provides funding for energy efficiency improvements to low-income households.
Warm Home Discount Scheme	A fixed annual discount of £140 on energy bills to help a core group of low-income households with elderly residents and a broader group of vulnerable populations.
Winter Fuel Payment (WFP)	A UK government scheme providing a labelled but unconditional annual cash payment to households (£200 to £300) containing an older person above the female pension age (>65 years).

Our Priorities 2018-2030

**Building
and mobilising
skills** to improve
health and well-
being across
Wales

**Influencing
the wider
determinants
of health**

**Improving
mental well-being
and resilience**

Working to Achieve a Healthier Future for Wales

Supporting
the development of a
sustainable **health and
care system focused on
prevention** and early
intervention

**Promoting
healthy
behaviours**

**Protecting
the public** from
infection and
environmental
threats to
health

Securing a
healthy future
for the next
generation

Our Values:

*Working
together with
trust and respect
to make a difference*

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Centre on Investment for Health & Well-being**

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