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

A preventative approach

Technical Report

GIG CYMRU NHS WALES

Iechyd Cyhoeddus Cymru

Public Health Wales

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01 Introduction

This Technical Report provides a full description of the methodology used for developing *'Improving winter health and well-being and reducing winter pressures in Wales. A preventative approach'*.

This includes information about the literature review, analysis of Welsh data, and stakeholder interviews. Additional data and intelligence not included in the main report is also provided.

02 Methodology

This research was carried out between November 2018 and August 2019. This section describes the methodological approach taken and who was involved.

2.1. Literature reviews

The literature review identifies international evidence for three research questions:

- What does the literature say about the impact that winter has on health and well-being and other wider determinants of health?
- What are the common risk factors associated with winter morbidity and mortality, and which population groups are the most vulnerable?
- What is the international evidence for interventions that prevent winter morbidity and mortality, and subsequent pressures on health and care services?

Search topics

Search topics were identified through an initial scoping of international literature and discussions among the research team. Topics relating to winter pressures that support a broader preventative approach include:

- Age and gender
- Environmental factors: temperature (indoor and outdoor), climate change, snow/ice, air pollution
- Physical health factors: respiratory disease, circulatory disease, accidental falls/injuries, chronic conditions, vitamin D levels
- Mental health, well-being, and neurodegenerative disorders
- Healthy behaviours: alcohol, weight gain, physical activity, smoking
- Influenza, influenza-like illnesses, and noroviruses
- Economic conditions, deprivation and income e.g. fuel poverty, housing
- Government policy

Review team

The review team consisted of:
- Lead researcher & evidence analyst: Thomas Jones
- Co-reviewers: Sara Wood, Sumina Azam, Louise Woodfine and Emily Bebbington

Methods

A series of literature searches were undertaken using Medline and grey literature resources in November 2018, following a protocol from the Public Health Wales Evidence Service. The details of the search strategies and their results are shown in Appendix 1. The literature review included the following steps:

Stage 1: Scoping of published literature and evidence via an internet search, including specialist websites e.g. https://www.nice.org.uk/guidance/ng6, and reference checking for relevant material.

Stage 2: A series of systematic searches of peer-reviewed journals using the Medline database.

Stage 3: Included studies (see below for inclusion criteria) were extracted into a bibliography (including author, reference, topical keywords) and screened by title and abstract. Duplicate records were removed.

Stage 4: Full text was reviewed, and articles were included based on relevance and quality.

Stage 5: All included sources were thematically analysed by topic areas i.e. the health impact of winter; risk factors for winter related morbidity and mortality (including vulnerable populations); and interventions to improve health and well-being during winter and prevent winter pressures.

Stage 6: Internal peer review of interim literature review findings by co-reviewers.

Stage 7: Appraisal of literature findings.

Inclusion criteria

Articles which met the following criteria were selected for inclusion:

- Published within the last 10 years (2009-2019);
- From high-level (i.e. systematic reviews, meta-analyses) AND/OR recognised (e.g. professional bodies) sources;
- Quantitative or qualitative research papers reporting evidence on factors related to the health and psychosocial implications to cold temperatures and weather (e.g. chronic diseases, injuries and falls, mental well-being);
- Studies reporting evidence on wider determinants and risk factors related to vulnerability to winter or cold-related mortality/morbidity (e.g. housing conditions, socioeconomic status, fuel poverty);
- Studies reporting evidence on the effectiveness and health benefits of preventive interventions addressing winter or cold-related mortality/morbidity.

2.2. Epidemiology

Welsh data sources were analysed to provide insight into the impact of colder months on population health and subsequent health care utilisation such as attendances to Emergency Departments (EDs) and emergency hospital admissions. Data sources were analysed by age groups, gender, diagnoses categories, and geography where available.

Research team

Lead researcher & evidence analyst: Sara Wood
Co-reviewers: Thomas Jones, Sumina Azam, Emily Bebbington and Louise Woodfine.

Data utilised

These included:

- Excess winter mortality index
- Emergency hospital admissions
- ED presentations
- General Practice consultations for influenza-like illnesses
- Fire service call outs
- South Wales routine surveillance system for assault with injury

2.3. Interview process

A series of semi-structured telephone interviews took place through the winter period of November 2018 to March 2019. Participants representing a range of sectors from across Wales were recruited through an email invitation and were invited to take part in a short telephone interview. Before each interview, participants were provided with information about the project, the purpose of the interview, and the semi-structured questions/topics to be covered in the interview (see Appendix 2).

Participants were asked about their perceptions and experiences of their roles and sector and more specifically about: factors contributing to winter pressures experienced in Wales; the current plans and systems implemented to manage and reduce winter pressures; the challenges and issues of the current systems and approach; and potential changes and improvements for the future to help reduce and/or manage winter pressures.

Nineteen interviews were carried out and each lasted between 15 and 75 minutes. 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.

Review Team

Lead researcher, interviewer, and evidence analyst: Thomas Jones
Co-reviewers: Sara Wood, Sumina Azam, Emily Bebbington and Louise Woodfine

03 Literature review findings

This section presents additional findings of the literature review not included in the main report.

3.1. The health impact of winter and cold weather

Respiratory Diseases

- According to the World Health Origanisation, there are more than 1 billion people currently suffering from chronic respiratory conditions globally.
- Respiratory diseases (RDs) are a group of conditions including asthma (the most common chronic disease in children), bronchiolitis, chronic obstructive pulmonary disease (COPD; 4th leading global cause of death), respiratory tract infections (e.g. pneumonia and influenza (referred to below in section "Influenza")).
- Although there is little understanding of the various underlying causes for RDs, factors that have been identified include exposure to tobacco (active or second-hand), environmental and air pollutants (indoor and outdoor), and cold, dry air.

How are respiratory diseases affected by winter temperatures?

- Hospital admissions for respiratory conditions increase during winter months [The Royal College of Emergency Medicine, 2016; Mulroe et al, 2019].
- There is a large proportion of RD mortality associated with low, cold temperatures, especially for COPD in mild European climates [Donaldson and Wedzicha, 2014]. Findings from a European time-series study comparing the effects of cold weather on mortality in 15 cities, found clear evidence that a 1 degree Celsius decrease in temperature was associated with a 3.30% increase in respiratory mortality, with other studies reporting similar findings [Goodman et al., 2004].
- Exposure to cold air temperatures and atmospheric pollutants can cause airways in the lungs to constrict (bronchoconstriction), which results in coughing, wheezing and shortness of breath. Low temperatures (~7°C–8°C) are optimal for the survival and transmission of respiratory viral infections and are a primary cause of respiratory exacerbations during winter. In addition, the cold has adverse effects on the immune system's resistance to respiratory infections and is associated with cross-infection from indoor crowding [Donald & Wedzicha, 2014; Tang, 2009; Xu et al., 2012].

Cardiovascular diseases

- Cardiovascular diseases (CVDs) are a group of conditions and disorders affecting the heart and blood vessels. CVDs include all heart and circulatory diseases such as coronary heart disease, myocardial infarction, heart failure, hypertension, heart valve disease, and rheumatic, ischemic and congenital heart diseases.
- While the underlying causes of CVDs are not fully understood, the main common risk factors are high blood pressure, high cholesterol, tobacco smoking, low levels of physical activity, harmful alcohol consumption, and a poor nutritional diet. CVDs are a leading cause of death worldwide and a major global burden of disease, accounting for 31% of all global deaths in 2016. CVDs are expected to be the major cause of deaths in low- and middle-income countries by 2020 [Roth et al., 2017[1] ; World Health Organisation, 2017].

[1] For a recent overview of the global and national burden of CVDs, please see Roth and colleagues (2017): Global, Regional, and National Burden of Cardiovascular Diseases for 10 Causes, 1990 to 2015

How are cardiovascular diseases affected by winter temperatures?

- In a review of international research, nearly every subtype of CVDs was subject to peaks (10% - 20%) in related hospitalisations and mortality in the winter months, when compared to rates during other seasons [Stewart et al., 2017].
- Exposure to falling cold temperatures in the absence of adequate protection (e.g. wearing thermal clothing) can cause blood vessels to constrict (vasoconstriction), which leads to increases in the pressure and viscosity of blood (both systolic and diastolic), an increase in fibrinogen concentration levels (i.e. blood clotting), and cholesterol levels in a matter of hours - all biological markers for CVDs [Modesti et al., 2018; Ryti et al., 2016].
- Factors that may increase an individual's risk of an acute cardiovascular event include: sedentary behaviour, cigarette smoking, greater alcohol consumption, heavy meals (e.g. Christmas lunch), Vitamin D deficiency, and respiratory infections such as influenza [Mittleman & Mostofsky, 2011]; these are covered separately in Section 3.2.
- Several large population studies have shown that individuals are more sensitive when the season is transitioning from warm to cold conditions, than vice-versa [Freitas & Grigorieva, 2015]. Due to the variation in the timing and intensity of temperature and weather changes, there may be a lack of adaptation, particularly for individuals who are less able to regulate their body temperature in response to cold (e.g. the elderly), which can lead to increased pressure and cold-related stress on the cardiovascular system [Cheng & Su, 2010; Stewart et al., 2017].

Cerebrovascular diseases

- The Global Burden of Disease study in 2013 ranked cerebrovascular diseases as the second leading cause of death (11.8%) and the third leading cause of disability (4.5%) worldwide [GBD, 2013].
- Cerebrovascular disease is a group of conditions caused by the dysfunction of the blood supply to the brain [Yann, 2017]. The main subtypes include ischaemic stroke, haemorrhagic sroke, and transient ischaemic attack [Feigin, Norrving, & Mensah, 2016].

How are cerebrovascular diseases affected by winter temperatures?

- Numerous studies have reported higher incidences of hospital admissions and deaths due to stroke (both ischaemic and haemorrhagic) and transient ischaemic attacks in winter (December-February), and in some cases in autumn (October-November), when compared to the summer months.
- Some studies have attributed seasonal variations of cerebrovascular diseases to lower average temperatures and cold weather [Lichtman et al., 2016]. Exposure to cold weather can result in physiological responses including increased blood pressure, cholesterol, blood glucose and fibrinogen counts, and atrial fibrillation - all biological markers for stroke mortality [Fares, 2013; Pant et al., 2013; Lichtman et al., 2016; Shah et al., 2015].
- Greater variation between the lowest and highest temperature on the same day is strongly associated with an increased risk of stroke, particularly in colder conditions. For example, a study from Italy observed that reductions in temperature (5°C from the average) during early winter was associated with a 16.5% increase in hospital admissions for stroke among older adults (aged 65 years+) [Morabito et al., 2011].
- Research from Ireland has shown that exposure to cooler autumn weather significantly correlated with the rise of subsequent winter cerebrovascular deaths [McDonagh & Harbison, 2016].
- Seasonal patterns of factors such as air pollution and respiratory infections including influenza, have been highlighted as triggers for acute cerebrovascular events in the winter months, [Magalhaes et al., 2011]. In a meta-analysis of global research, short-term exposure to several gaseous (e.g. nitrogen dioxide, carbon monoxide) and particulate air pollutants (fine and coarse particles) were strongly associated with hospital admissions and mortality due to stroke [Shah et al., 2015].

Influenza

- Influenza is a contagious RD caused by a viral infection that affects the lungs and airways (Centers for Disease Control and Prevention, 2018). There are four main types of influenza (A, B, C, D), with influenza A (H3N2) and B most established and widely circulating, although dominant strains mutate and vary from season to season [World Health Organisation, 2018].
- Influenza can cause mild to severe illness and is characterised by a sudden onset of fever, cough, sore throat, headache, body aches, chills, and rhinorrhea. Influenza can also cause severe illness or death, with the elderly, pregnant women, children under 5, and individuals with underlying health conditions (e.g. COPD) most at risk.
- Seasonal influenza viruses infect 5% to 15% of the human population each year, resulting in an estimated 500,000 to 645,000 deaths worldwide [Luliano et al., 2018; Petrova & Russell, 2018].

How is influenza affected by winter temperatures?

- The severe outcomes of influenza are higher among older people (65+) [Pebody et al., 2010].
- In Wales during the 2018/19 influenza season, 69% of influenza outbreaks occurred in hospital wards, 16% in residential homes, 13% from school or nursery settings and 2% from prisons (Public Health Wales, 2019).
- The European Union recommends all member states vaccinate 75% of older people (65+ years) against influenza. In Wales in 2018/19, influenza vaccination uptake was 68.3% among those aged 65 years and older and 44.1% among those less than 65 years in one or more clinical risk groups (Public Health Wales, 2019).

Mental health and well-being

- Mental health is an integral part of health and not merely the absence of mental disorders, with mental illnesses comprising 7.4% of the global burden of disease [Whiteford et al., 2013]. Specifically, mental health is a collective state of emotional, psychological, and social well-being that contributes to a successful capacity to cope with normal life stresses (emotional resilience), realise one's own potential and make contributions to the community.

How is mental health and well-being affected by winter conditions?

- Studies have shown that more than 70% of the general population experience some seasonal influence on their mood, sleep, or behaviour [Basnet et al., 2016]. In a US and Australia time-series study, mental health problems and sleeping queries on Google were found to be up to 14% higher in winter than summer [Ayers et al., 2013], which is consistent with observed peaks in seasonal affective disorder (SAD) in early winter and in hospital admissions for depressive episodes in bipolar disorder [Geoffroy et al., 2014].
- SAD 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 [American Psychological Association, 2017; Basnet et al., 2016]. Although the etiology of SAD is not certain, it is thought to be related to natural sunlight levels and vitamin D deficiency, with natural sunlight regulating the human circadian clock that regulates many systems and organs [Manfredini et al., 2018], including the immune system and the sleep/wake cycle [Beersma & Gordijn, 2007; Mate et al., 2014].
- One study has found that longer and darker nights over winter have a greater impact on general mental well-being for those with dementia, leading to increased restlessness, anxiety and disruptive behaviours [Joseph et al., 2013].
- One study has found that at lower temperatures, there is a higher prevalence of a few subtypes of mental disorders and illnesses, such as general anxiety, obsessive compulsive disorder, panic disorder, and bulimia nervosa [Basnet et al., 2016], although this was not found explicitly during winter [Shiue et al., 2016].

Injuries and accidents: falls and road traffic incidents

- Injuries can be described as intentional (e.g. self-harm, interpersonal violence, suicide) and unintentional (e.g. falls, burns, natural disasters, road traffic crashes).
- Injuries due to slips, trips, and falls are a major public health burden and are the second leading cause of deaths due to unintentional injuries worldwide [Haagsma et al, 2016]. Falls in older people aged 60 and over are a particular public health challenge [Gribben et al., 2009].
- Hip fractures are the most common serious injury associated with falling in older people, with most hip fractures related to falls [Parker and Johansen, 2006]. Other consequences of falls include mild to severe injuries i.e. bruising, reduction of activity and loss of autonomy [Terroso et al., 2014].
- Road traffic crashes are one of the leading causes of death worldwide with 1.35 million fatalities from traffic crashes each year [WHO, 2018a], particularly among children and young adults (aged 5 to 29). Other consequences of road traffic crashes include economic loss in vehicle costs, disability, reduced quality of life, and minor trauma and injuries, especially to the head and neck region.

How are injuries and accidents affected by winter, including weather conditions of snow and ice?

- In Canadian and American studies, 18 to 64 year olds were twice as likely to receive hospital care for fall-related injuries on days preceding snow and icy rain, particularly whilst commuting to work between 7am to 10am [Gevitz et al., 2017; Morency et al., 2012].
- Most studies have found that less severe road traffic injuries increase during rain and snow [Andrey et al., 2013; Seeherman & Liu, 2015] due to more difficult driving conditions and greater tyre wear [Usman et al., 2010].
- A Canadian study using vehicle insurance and police records found both rainfall and snowfall were associated with over 64% more collisions and 74% more injuries [Mills et al., 2011].
- Drivers may deal with wintery conditions in numerous ways, with some choosing to equip their vehicles with spike tyres or chains to create more grip [Bardal & Jørgensen, 2017], or they may use other modes of transport.
- The majority of falls and hip fractures occur at home, particularly among older people [Chow et al, 2018]. Colder temperatures and weather can lead to more time spent indoors and less physical activity/performance [Hayashi et al., 2017], which is associated with slower reaction times and bone density loss in the elderly [Atherton et al., 2005]. Subsequently, this can contribute to the increased occurrence of falls [Chow et al., 2018], leading to higher healthcare costs [Gyllencreutz et al., 2015].
- Fall occurrences vary by the time of day, with significantly more falls during the daylight hours, particularly in the morning during commuting [Chow et al, 2018]. The increased risk of injuries is associated with reduced daylight hours and poorer visibility in winter. Fall occurrences are also higher on weekdays in the elderly [Chow et al, 2018], which may be the result of less physical activity and social support for the elderly during weekdays [Turner et al., 2011].

Hypothermia

- Hypothermia occurs when the mean body temperature falls below safe levels required for the typical function of vital organs (≤ 35°C) [Stares & Kosatsky, 2015; WHO, 2011]. In many cases, hypothermia is unintentional and the consequence of sudden immersion in cold water or excessive exposure to cold temperatures or secondary to impaired thermoregulation (e.g. age, alcohol or drug use) [Procter, Brugger & Burtscher, 2018; Stares & Kosatsky, 2015].
- People experiencing homelessness are particularly vulnerable to exposure to extremely low temperatures, with deaths caused by hypothermia accounting for 3.5% of total deaths among the homeless in Poland, 13 times higher than the general population [Romaszko et al., 2017].

Loneliness and social isolation

- Around half of all adults in Wales have experienced at least some feelings of loneliness, with 17% reporting that they were lonely [Statistics for Wales, 2018a].
- Living alone, not being married or in a civil partnership, using the internet (for young age groups), having worse general health or a limiting long-term illness, having few social connections, and having infrequent social contact are all associated with loneliness [Holt-Lunstad et al., 2015].
- According to the Community Life Survey and National Survey for Wales in 2017, younger people aged 16 to 24 years living in England and Wales are more likely to be lonely than older adults [Statistics for Wales, 2018a]. However, older people are particularly vulnerable to loneliness and social isolation due to worsening physical health, greater likelihood of living alone, the death of spouses and partners, and having fewer relationships [Victor & Bowling, 2012].
- Findings from a meta-analysis highlighted that people experiencing social isolation have a 29% higher risk of mortality compared with those who have 'adequate' relationships [Holt-Lunstad, 2015].
- Older people who report that they are experiencing social isolation are more likely to be admitted to hospital for heart failure [Cené et al., 2012] and RDs in winter [Jordan et al., 2008]. Other health outcomes associated with social isolation include: developing coronary heart disease and stroke [Valtorta et al., 2016]; depression and reduced quality of life [Courtin & Knapp, 2017]; high blood pressure [Hawkley et al., 2010] and declining cognitive function [Boss et al., 2015]. Those experiencing social isolation are also more likely to use health care services including visits to general practitioners [Gerst-Emerson, 2015].
- 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, exacerbating social isolation. It is estimated that more than 500,000 people aged 65 and older in the UK are expected to feel lonely during the Christmas holidays, with 52% feeling Christmas is a normal day [Age UK, 2018].

3.2. Risk factors for winter-related morbidity and mortality

Older age

- The elderly are particularly vulnerable to health effects of the cold due to natural reductions in thermoregulation [Castellani & Young, 2016; Szekely, & Garai, 2018], which is further exacerbated by the use of medication for chronic health conditions and alcohol consumption during periods of cold weather [Gronlund et al., 2018].
- Older people are less likely to follow home heating and warmth protection advice (e.g. wearing a blanket, due to associations with older age) [Day & Hitchings, 2011] or are less able to make suitable adaptions to protect themselves against cold exposure. For instance, older individuals may struggle to put on thermal clothing, prepare warm food, or use modern heating technology to heat the home or pay their fuel bill [Day & Hitchings, 2011].
- Factors that influence an older person's ability to keep warm and well were highlighted in the Keeping Warm in Later Life (KWILLT) project [Tod et al., 2013]. Findings indicate that the elderly are more likely to have pre-existing beliefs and experiences relating to being cautious around spending money, and embracing the cold rather than adhering to heating recommendations during winter. Some elderly residents viewed heating as a luxury [Tod et al., 2013]. Other barriers included a lack of awareness about the link between health and heating, and the challenges of using technology involved with keeping warm, such as boilers, thermostats, and fuel payments.
- Winter weather such as snow and ice can decrease older people's mobility and routine activities [Hjorthol, 2013]. Staying indoors for a long period can increase the risk of becoming physically frail characterised by inactivity, reduced dexterity and mobility, and greater loss of muscle mass, strength and bone density [Atherton et al., 2005].
- A number of field studies suggest that older adults living in cold homes and conditions are more likely to have low levels of physical activity and performance (e.g. grip strength, leg strength and balance) resulting in increased rates of fall-related injuries [Hayashi et al., 2017]. Consequently, older residents may be more vulnerable to severe injuries occurring at home throughout the winter period [Kojima et al., 2008; Morency et al., 2012; Yeung et al., 2011].
- Evidence from the English Longitudinal Study of Ageing [Gale, Westbury, & Cooper, 2017] has found that loneliness and social isolation among older people are associated with: an increased risk of becoming physically frail; declining functionality; and a variety of adverse physical health outcomes which are more common during the winter season [Courtin & Knapp, 2017].

Gender

- Evidence exploring gender differences in winter vulnerability is inconsistent. In England and Wales in 2017/18, females accounted for 56.1% of excess winter deaths and males for 43.7%. [ONS, 2018a]. This variation is partly explained by differences in age distribution, with a higher proportion of women aged 85 years and older. In Scotland, a population study found a greater seasonal variation of CVDs in women compared with men [Stewart et al., 2002], although this has not been consistently found outside of Glasgow.
- Younger females may be at a greater risk of morbidity and mortality during winter due to altered thermoregulatory responses to the cold as a result of hormonal changes relating to the menstrual cycle and use of oral contraceptive [Castellani & Young, 2016]. Such changes can increase blood flow and vasoconstriction and can also disrupt circadian rhythms and sleeping patterns [Castellani & Young, 2016]. In turn, this may increase women's vulnerability to CVDs during winter. In contrast, other studies indicate that females may be less vulnerable to cold exposure due women typically having greater body fat percentages that provides insulation during cold exposure [Castellani & Young, 2016].

Existing chronic conditions

- Individuals with pre-existing health conditions (e.g. rheumatoid arthritis) have frequently reported worsening of their pain and joint stiffness with falling temperatures and damp weather [Deall & Majeed, 2016]. Exposure to colder conditions in December and January has been linked to more negative perceptions of one's own arthritic symptoms [Hawley et al., 2001], with older adults reporting nearly twice as many arthritic problems whilst living in cold housing [Croxford, 2009].
- Improving the thermal comfort in the home often appears to improve arthritic symptoms and reduce levels of pain experienced by older adults, as observed in the Warm Front Scheme [Dear & McMichael, 2011].
- Studies have demonstrated that people with diabetes and pre-diabetes experience more cold-related cardiovascular and respiratory symptom exacerbations, especially cold-related chest pain and dyspnoea [Ikaheimo, et al., 2017], and increased peaks of mortality during cold temperatures and weather [Yang et al., 2015].
- Studies conducted in Germany and China found that cold temperatures were associated with vasoconstriction, elevated blood pressure, and several other blood markers in patients with diabetes, eliciting cardiac symptoms [Hampel et al., 2009; Li et al. 2014; Yang et al., 2015].

Homelessness

- Between 2013 to 2017 in England and Wales, there was no significant seasonal pattern of mortality among the homeless [ONS, 2018a].
- Causes of homelessness in the UK include a range of factors such as personal vulnerabilities, such as mental ill health; adverse experiences and addictions; and adverse social and economic conditions, such as changing housing market conditions, unemployment, and (childhood) poverty .
- In Canada, there are significantly higher rates of attendance at Emergency Department (ED) for cold-related injuries among homeless men compared to men on low-incomes, with the majority of injuries related to frostbite [Zhang et al., 2019]. People experiencing homelessness have less protection against the health complications of the cold weather, leading to an increased risk of elevated blood pressure and vasoconstriction [Kellogg & Horn, 2012], cold-related injuries [Zhang et al., 2019], and cold-related deaths.
- Homeless populations in high-income countries are at significantly increased risk of all-cause mortality, death due to injury and poisoning, and have a greater disease burden for infections, mental health, cardiovascular conditions, and respiratory conditions compared to the general population [Aldridge et al., 2018].
- Health inequalities are exacerbated by the impacts of not being able to access or obtain timely medical care, mental health care, prescription medications, and dental care, all of which can increase the risk for morbidity and mortality. For instance, 73% of homeless adults in the US report having at least one unmet healthcare need in the past year, whilst around half of homeless adults report two or more [Baggett et al., 2010].

Vitamin D levels

- Sunlight exposure on skin is the main source of daily vitamin D, which is essential for optimal health and healthy bones, and associated with reduced risk of various cancers, muscle weakness, autoimmune diseases, hypertension, and depression [Holick, 2016]. However, during the winter months (November to March), shorter daylight hours and people spending more time indoors lowers the amount of vitamin D individuals attain from sunlight, resulting in a higher prevalence of individuals with vitamin D deficiency at the end of winter across all ages [Cashman et al., 2016; Chatfield et al., 2007; van Schoor et al., 2018].
- Lower levels of vitamin D is 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; Wang et al., 2019], and increased risk of viral infections in winter including influenza infections [de Gruijl & Pavel, 2012].

Cold housing

- Older men with three or more existing medical conditions, lower grip strength, poor respiratory health (such as respiratory infection or chronic lung disease), and social isolation are more likely to live in cold homes. Having difficulties in meeting heating costs, staying in bed longer in order to stay warm, and being unable to keep the living room comfortably warm are associated with an increased risk of winter mortality [Sartini et al., 2018].
- Evidence from community trials in New Zealand has shown that children with respiratory illnesses (e.g. asthma) experience more exacerbations and frequent asthmatic symptoms and lung problems when living in cold and damp housing [Howden-Chapman et al., 2008].

Other housing characteristics

- Modifiable aspects of housing such as physical dwelling features (type, size, and age), household characteristics (tenure, income) and energy performance (heating system, insulation, and performance rating levels) determine indoor temperatures during cold conditions [Baker et al., 2016; Hales et al., 2012; Hamilton et al., 2015].
- In New Zealand, a study investigating seasonal mortality in relation to social factors has found evidence that excess winter mortality significantly varies by house tenure, with individuals living in private rented housing being at the greatest risk [Hales et al., 2012], with a particular concern for children [O'Sullivan et al., 2017]. However, New Zealand has a relatively poor quality housing stock, with private rented dwellings being less energy efficient and having higher fuel costs compared to other tenures (i.e. owner-occupied housing) [Howden-Chapman, 2015].
- One UK study found living in a non-owned home (e.g. social housing and privately rented accommodation) was significantly related to poorer respiratory function, especially for the elderly and individuals with existing lung problems [Webb et al., 2013].
- In a French study, elderly residents living in residential care and nursing homes were significantly more at risk of winter mortality than those living in non-nursing residences, even though this subpopulation is generally cared for and rarely exposed to outdoor cold weather, inferring a potentially vulnerable subgroup [Phu Pin et al., 2012].

Fuel poverty

- In colder conditions, when the need for energy/heating is the greatest, living in a comfortably heated home is regarded as a protective factor for human health [Liddell & Morris, 2010]. In contrast, living in cold and thermal inefficient housing for a long period can have a detrimental impact on physical health, especially for the elderly and young children, with people in fuel poverty significantly more likely to report poor or fair health status [Lacroix & Chaton, 2015].
- Cold homes can lead to other negative effects due to difficulties in staying warm, social isolation, financial burden causing stress and malnutrition, reduced educational attainment, and reduced emotional well-being [Hills, 2012; Roberts, 2008].
- In a UK study comparing fuel poverty between rural and urban areas [Roberts et al., 2015], the analyses found that rural households are, on average, more vulnerable to energy price increases than urban households. Specifically, in rural areas, there are fewer households with access to the main gas network or other cheaper fuels and therefore, they are often more reliant upon expensive fuel types such as oil, LGP gas or electricity, which can result in higher energy bills [Roberts, 2008; Roberts et al., 2015].
- Households on incomes below 60% of the average national income are classed as low income [Bridgeman et al., 2016]. There is a social gradient in fuel expenditure, with households on low income spending a higher proportion of their income on energy than those on higher incomes. Households on low income are less likely to invest in better energy-efficient technologies (e.g. cavity-wall insulation, double glazed windows, modern electronic appliances) in order to make the homes easier to heat and cheaper to run [Schleich, 2019].
- Households on low incomes are more likely to reside in low-priced dwellings and in privately rented accommodations, which often come with high fuel costs [Grosche, 2010].
- Households using a pre-payment meter are twice as likely to be unable to afford to heat their home adequately [Bridgeman et al., 2016] and more likely to be on a low-income [Vyas, 2014]. Specifically, a quarter of all households using prepayment meters are fuel poor, compared to less than one in ten paying by direct debit and one in six paying by credit [Hills, 2012].

3.3. Interventions to improve health and well-being during cold weather and reduce winter pressures

Advice on energy and keeping warm

- Interviews with older age groups have indicated that there is a lack of knowledge of the risks to health associated with cold temperatures and weather, with many not receiving related advice or support [Grey, et al. 2017; Tod et al., 2013; Chalabi et al., 2015].
- Advice is a simple low-cost intervention that can help households understand their energy use, the health consequences of cold and severe weather, and how to use heating technology and controls to keep warm in their home during the colder months.

Housing and energy efficiency improvements

- Studies, including a Cochrane review, evaluating the health impacts of energy efficiency interventions have shown that most single upgrades lead to relatively small increases in indoor temperature, and consequently, impacts on health [Maidment et al., 2014; Osman et al., 2010; Thomson et al., 2013]. For example, in a randomised controlled trial in New Zealand [Howden-Chapman et al., 2007], insulating homes in low-income communities improved bedroom temperatures during the winter (0.5°C) and decreased energy consumption by 19%. In relation to health, insulating existing houses led to a significantly warmer, drier indoor environment and resulted in improved self-rated health, self-reported wheezing, days off school and work, and visits to general practitioners as well as fewer hospital admissions for respiratory conditions [Howden-Chapman et al., 2007].
- Across England, the evaluation of the health impacts of the Warm Front scheme found no evidence of changes in physical health, yet there were improvements in mental health and psychosocial outcomes following energy efficiency improvements [Gilbertson et al., 2012; Liddell & Guiney, 2015]. Recipients of the scheme received new heating systems or significant heating repairs, dwelling insulation or both [Gilbertson et al., 2012]. As a result, recipients of energy efficiency improvements were 48% less likely to report high levels of psychological distress after the intervention (using measures of mental well-being GHQ-12) [Green & Gilbertson, 2008], and had better financial security, more disposable income, reduced stress and higher thermal satisfaction/comfort.

Financial help to increase warmth and health

- The Winter Fuel Payment (WFP) programme provides additional annual income (£200 to £300) between November and December to help with increasing fuel costs for households with older people (> 65 years as of 2019), who are particularly vulnerable to the effects of cold weather and tend to live in energy-inefficient homes. Although payments are unconditional, and therefore can be spent on any goods and services, labelling the cash payment as "winter fuel" encourages recipients towards spending more (47% of the payment [Beatty et al., 2014) on fuel and thus, raising indoor temperatures and reducing excess winter deaths.
- Notably, the only eligibility criteria for WFP is age, regardless of the number of people living in the home or the level of income the occupiers have. However, since 2010, the eligibility age condition was raised from >60 years to >65 years due to WFP not being a well-targeted expenditure intervention. As a result, studies have found that raising the cut-off age for WFP eligibility has had a negative effect on the health of households that were once, but are no longer eligible [Crossley & Zilio, 2018].
- A modelling study evaluating the health and economic costs of heating energy efficiency interventions and WFPs found that energy efficiency interventions with similar annual costs to current WFP payments (estimates between £2-3B [Angelini et al., 2019]) would achieve greatest improvements to indoor temperatures and health [Armstrong et al, 2018]. However, WFP may still have important benefits to healthy individuals under certain circumstances [Angelini et al., 2019]; at least until energy efficiency investments are implemented.
- Another policy initiative introduced to tackle fuel poverty within Great Britain (England, Wales, and Scotland) is the Warm Home Discount Scheme [Stockton & Campbell, 2011]. Under the 2010 Energy Act, energy companies are required to provide a fixed annual discount (£140) on electricity bills to help the 'core group' of low-income households with elderly residents and a 'broader group' of vulnerable populations, who are at most risk of falling into fuel poverty and living in cold temperatures.

- Another UK intervention to increase indoor temperatures is cold weather payments, which are cash transfers paid to households that are already entitled to certain benefits (i.e. Income Support, income-based Jobseeker's Allowance, income-related Employment and Support Allowance, Universal Credit, or Pension Credit) when there have been periods of cold temperatures [Foster & Kennedy, 2016]. Specifically, households automatically 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, to help with additional fuel and energy spending between November and March.

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 [World Health Organization, 2018b].
- Vaccine effectiveness largely depends on the extent to which the circulating virus strains match the strains covered by the vaccine, as well as the timing and type of vaccination, and the age and pre-existing immunity of the individual being vaccinated [Lukšić et al., 2013; Tricco et al., 2013; Costantino & Vitale, 2016].
- In the influenza season of 2014/15, there were considerable concerns over the influenza vaccine's effectiveness for the circulating influenza A(H3N2) strain, with 80% of the virus differing from the vaccine [Pebody et al., 2015]. While the vaccine effectiveness against influenza A(H3N2) was low (~30%) across the US, Canada and Europe, retrospective studies provided evidence that the influenza vaccine offered significant cross-protection that substantially reduced the number of influenza-associated hospitalisations. However, as the protection of the vaccine effectiveness was greatly reduced, there were also high levels of mortality and hospitalisation associated with influenza A(H3N2) among older adults [Pebody et al., 2015; Schaffner et al., 2018].
- Vaccine effectiveness was similar for the 2017/2018 influenza season, with generally high protection against influenza B viruses but lower protection than expected in preventing influenza A(H3N2) infections [WHO, 2018b]. Low vaccine effectiveness (10.1%) was associated with excess winter mortality among older adults in England and Wales [Office of National Statistics, 2018] and in the US [Schaffner et al., 2018].
- Although all age groups can be infected by influenza viruses, infections are more likely to result in severe disease for those aged under 65 with chronic illnesses, children under six months of age, older adults aged 65 and over, and pregnant women [Public Health England, 2019a].
- Incidence of influenza infection is the highest amongst children aged between 2 to 17 years, with children aged 2 to 4 years reporting higher rates of influenza-like illnesses than all other age groups [Fowlkes et al., 2012; Fraaij & Heikkinen, 2011]. As a result, numerous countries have introduced a routine childhood influenza vaccination programme for healthy children aged between 6 months to 18 years [Usonis et al., 2010].
- In Mexico, there have been significantly lower rates of hospitalisation and influenza-associated mortality (by 53%) in children under the age of five after receiving influenza vaccinations as part of the National Immunization Programme [Sanchez-Ramoz et al., 2017].
- In Germany, modelling studies have estimated that routine influenza vaccinations for children (assuming 50% coverage) would prevent up to 16 million cases of influenza across all age groups, resulting in fewer prescriptions of antibiotics (1.7m), and hospitalisations (167,000) – with about 60% of influenza-related hospitalisations being prevented in adults and the elderly over a 10 year period [Damm et al., 2015].
- A number of studies piloting universal influenza vaccinations within English primary schools have reported direct and indirect protection to both the individual child and vulnerable contacts, by reducing the risk of transmission, as well leading to reduced health service use (e.g. GP consultations) for influenza-like illnesses across the wider population [Pebody et al., 2015]. This was also the case with other national programmes rolled out for primary school-aged children in Europe, including Finland and Wales, although results in the USA for the 2015/16 season did not show this [Pebody et al., 2018].
- There are increasing reports of low levels of influenza vaccination uptake among young children, with one UK study reporting less than 40% of preschool children aged 2 to 4 from England and Wales were vaccinated against influenza in 2016 [Hardelid et al., 2016]. This is consistent with official statistics of seasonal influenza vaccination uptake in the 2018/19 season, with 42% of 2 and 3-year-olds vaccinated in England, and nearly 70% of children aged 4 to 10 vaccinated through primary schools' programmes [Public Health England, 2019b]. Preschool children are being offered vaccines through their general practitioner, although there are several barriers reported by family members including fear, misinformation and mistrust, or the inconvenience of attending for an appointment [Bhat-Schelbert et al., 2012].

- Findings from several observational and intervention studies have shown that influenza vaccinations for those with at least one chronic condition can reduce the risk of contracting influenza and reduce hospitalisations and mortality during winter, especially for those with chronic heart or lung diseases [de Diego et al., 2008; Huang et al., 2013; Lall et al., 2016].
- A Cochrane review (2010) indicated that influenza vaccinations in healthcare workers did not result in reduced laboratory-confirmed cases of influenza, hospitalisation or influenza-associated mortality among patients [Thomas, Jefferson and Lasserson., 2010]. Conversely, other systematic reviews have indicated that vaccinating healthcare professionals can enhance patient safety and provide a protective effect for patients [Burls et al., 2006; Dolan et al., 2013]. One review reported a pooled estimate (from four observational studies) of influenza vaccinations leading to a 29% reduction in influenza-related deaths and 42% reduction in influenza-like illnesses among patients [Ahmed et al., 2013].

Hygiene advice on preventing the transmission of influenza

- A Cochrane systematic review found that improving routine handwashing behaviours among younger children, who are the least capable of hygiene behaviour themselves and have greater social contact, resulted in the greatest reduction in influenza virus transmission [Jefferson et al., 2011].
- A number of staff educational programmes on handwashing in day-care centres (among senior adults and children) was effective in significantly reducing infection rates [Falsey, 1999; Krilov, 1996]. Although it is commonly believed that adding antiseptic soaps or virucidals to normal handwashing can help reduce infection transmission, its effectiveness in reducing influenza infection rates remains unclear [Jefferson et al., 2011].
- Internet-based interventions to modify handwashing behaviours have been highlighted to increase handwashing among children and reduce influenza virus transmission [Yardley et al., 2011]. One study in England found that encouraging adults to take part in four weekly web-based sessions that provided information on the role of handwashing on influenza infections, significantly reduced the number and severity of influenza-like-illnesses for both themselves and other household members in the following 4 months [Little et al., 2015].
- Multi-faceted interventions comprising education programmes to promote handwashing, timely reminders, and feedback, result in sustained improved hand hygiene practice within clinical and healthcare settings [Kingston et al., 2016]. Notably, electronic devices which automatically count and monitor hand hygiene compliance have been particularly useful within hospital wards [Koff et al., 2011].
- It is also recommended for employees to stay home from work when experiencing influenza-like illnesses to reduce the spread of influenza transmission. One review estimates that up to one in six influenza transmissions events occur in the workplace, with transmissions in schools being 2 to 3 times higher than in workplaces [Edwards et al., 2016]. Therefore, social interventions encouraging sick employees to stay home and seek health advice could be important, with one modelling study from the United States indicating that influenza infections rates in the workplace could reduce up to 40% [Edwards et al., 2016].

Vitamin D supplementation

- Several systematic reviews and meta-analyses show that higher levels of vitamin D are associated with better protection against influenza infections and are beneficial to respiratory health [Bergman et al., 2013; Martineau et al., 2017]. For example, whilst infants are particularly vulnerable to the severe complications of influenza, infants given daily high-doses of vitamin D for 4 months are significantly less likely to contract influenza and experience shorter durations of seasonal influenza illnesses and infections (A viruses) than infants receiving low doses [Zhou et al., 2018].
- The beneficial role of vitamin D is also seen in randomised controlled trial findings among healthy children [Urashima et al., 2010] and adults [Berry et al., 2011], although individuals with Vitamin D deficiency might benefit more from supplementation [Martineau et al., 2017].

Falls prevention / Walking and exercise interventions for older adults

- A Cochrane review showed that exercise interventions can reduce the rate of falls and risk of hip fractures among older people [Gillespie et al., 2012], with interventions containing multiple exercise types, whether at group classes (e.g. Tai Chi) [Taylor et al., 2012] or individually conducted at home [Hwang et al., 2016], showing the greatest benefits.
- In another review and meta-analysis of global research, falls prevention exercise programmes including moderate to high challenge balance exercise (more than 3 hours/week) had the greatest protective effects for community-dwelling older adults [Sherrington et al., 2017].

Protective clothing

- The combined use of gloves, hats, and scarves was identified as the most important clothing items for protection against cold-related mortality, since they protect body areas most involved in determining blood pressure response to the cold. Although the number of layers worn increased with cold weather, clothing layers were not correlated with winter mortality, indicating wearing key clothing items rather than layers offers the greatest thermal protection [Donaldson et al., 2001].
- In a Canadian study [Li et al., 2009], young and middle-aged people were asked to wear different clothing outfits of hats and/or trousers and were exposed to intermittent cold periods of -5°C for 15 minutes, with 25 minutes of rewarming after each period. Findings suggest that periods of cold exposure can result in significant increases in blood pressure but wearing a hat can reduce this effect and provide faster recovery time when in warm conditions (e.g. indoors) [Li et al., 2009]. Wearing an extra pair of trousers also provided similar protective effects, but less prominent than wearing a hat.

Anti-slipping devices

- The use of anti-slipping devices can be useful in the prevention of falls in icy or snowy weather conditions. For example, pedestrians (aged between 27 to 67 years) using anti-slipping devices on daily walking activities during snowy and icy conditions in Sweden walked longer distances, increased walking mobility and balance, and experienced fewer falls compared to people not using anti-slipping devices [Berggård & Johansson., 2010].
- The performance of winter footwear can vary depending on a range of winter surface conditions, with a pilot study indicating that soft (but compressed) snow was the most challenging to walk on across six styles of winter footwear [Hsu et al., 2016]. Similar findings from a Swedish study showed that ice covered with snow lead to balance challenges while walking [Gao et al., 2008].

Healthy behaviour interventions

- According to a German study, approximately 80% of chronic diseases could be prevented by being physically active (>3.5hours per week), not smoking, maintaining a BMI below 30, and adhering to a healthy diet consisting of high intake of fruits, vegetables, and low meat consumption [Ford et al., 2009].
- In the UK, adults exhibiting these four healthy behaviours and not drinking alcohol excessively are four times less likely to die from all-causes and three times less likely to die from CVDs [Kvaavik et al., 2010].

Community-based healthy behaviour interventions

- Community-based interventions have been observed to be particularly effective in improving healthy behaviours at population-level. For example, findings from the Heart of New Ulm Project (HONU), a community-based project in Minnesota, have shown significant improvements in cardiovascular risk factors (i.e. blood pressure, LDL cholesterol, and glucose levels) and mortality risk [Benson et al., 2019]. In this local project, there were healthcare, community and workplace interventions at multiple levels designed to reduce CVDs. The community was served by one health system and was encouraged to partake in heart health screening and community health challenges (e.g. nutrition, physical activity, and weight management), supported by social marketing campaigns, cooking demonstrations, educational programmes, and worksite wellness programs and policy (e.g. healthy vending). Subsequently, the multi-levelled intervention significantly increased physical activity (+7.7%) and recommended daily fruit and vegetable consumption (+11.2%) across the New Ulm town over 6 years [Benson et al., 2019].
- There are similar findings in other community-based healthy behaviour interventions in the Netherlands, with physical activity increasing by 2 hours a week (e.g. walking and cycling) among women by promoting local walking routes and guides, and media exposure of the benefits of exercise [Wendel-Vos et al., 2009].

Technology-based lifestyle interventions

- Technology-based approaches (e.g. internet, mobile devices and applications, telehealth, and wearable devices) offer the potential to improve accessibility and low-cost provision of prevention interventions in real-time to improve lifestyle. In a 6-month text-messaging program (Text4Health) in New Zealand [Dale et al., 2015], adults with coronary heart disease who received daily text messages related to healthy behaviours (e.g. physical activity, healthy diet, smoking cessation, and alcohol use) on heart health had a significant positive effect on adherence to healthy behaviours (≥3) and medication after three months, resulting in lower LDL cholesterol levels after six months.
- The feasibility and acceptability of tailored packages of text messages for other chronic conditions have been supported by findings in New Zealand [Dobson et al., 2018]. In this study, adults with poorly controlled diabetes received text messages to motivate and engage in behaviours to successfully self-manage diabetes (e.g. control of glucose levels by eating the right foods). Findings show that after receiving the intervention for nine months, adults significantly improved glycaemic control, health status, and perceptions of illness [Dobson et al., 2018].
- Research from the US has shown that obese individuals receiving automatic and tailored text messages (related to diet, nutrition, or eating) significantly increase their fruit and vegetable consumption (i.e. up to 4 portions a day) [Afshin et al., 2016] and achieved significant weight loss (2.3kg) [Norman et al., 2013].
- A pilot study in the Netherlands using internet treatment and therapy programmes was found to help people with harmful alcohol consumption to significantly reduce weekly alcohol consumption, subsequently leading to numerous positive health outcomes including fewer problems with memory and depression [Postel et al., 2010].

Sedentary behaviour

- One study in the US has reported that regular exercise during the winter period was not protective against weight gain. Findings show that individuals gained weight (0.78kg) and had increased levels of body fat and blood pressure levels after the holiday season, regardless of their exercise behaviours (average of 4.8 hours per week) [Stevenson et al., 2013]. Notably, the study utilised questionnaires to gather information on physical activity before and after the Christmas holidays.

Transport-related interventions

Gritting roads

- Numerous modelling studies have shown that winter road maintenance can lead to reductions in road traffic crashes. For example, a Canadian study found that providing anti-icing and pre-wetting operations (salting with ploughing) on highway routes can significantly improve road safety by reducing the number of crashes but found conventional operations of ploughing or road salting were not as effective if initiated individually [Fu & Perchanok, 2006].
- A study in the USA found crash rates on divided highways were reduced by 87% hours after receiving salting measures [Hanbali and Kuemmel, 1992].
- Many factors are involved in road safety during winter weather, such as poor visibility, low air temperature, high wind speed, long weather exposure, poor road surface conditions, and a lack of driver safety behaviours. These factors contribute to the effectiveness of winter road maintenance, as identified by a Canadian modelling study [Usman et al., 2012].
- Road conditions can vary hour by hour within a snow storm or severe winter weather, and the combined maintenance operations of ploughing and salting can significantly improve road surface conditions and reduce the risk of traffic crashes, although the risk can fluctuate with changing road conditions [Usman et al., 2012].

Encouraging the use of winter tyres

- Winter tyres with additional metal spikes in the tread (studded tires) are intended to offer extra grip when driving on roads covered with ice and snow [Tuononen & Sainio, 2013], though studies have reported that studded tyres only provide a slight safety benefit related to road traffic injuries [Strandroth et al., 2012].
- In a study in Finland, there was no significant difference between tyre types (studded verses unstudded winter tyres) in preventing road fatalities during the winter months, though the number of fatal crashes were slightly lower for studded tyres on ice than on other surfaces and with other tyre types [Malmivuo et al., 2017].
- In Norway, reduced use of studded tyres in five cities between 2002 and 2009 increased the number of police reported injury incidents during the winter months by 2% [Elvik & Kaminsha, 2011].

Social isolation and loneliness

- Older adults are the most likely to be living alone and therefore at the greatest risk of social isolation [Tomstad et al., 2017].
- Elderly residents living in residential care who interacted with family and friends on a weekly basis through videoconference technology experienced lower levels of loneliness [Tsai et al., 2010]. These findings were also reflected in an evaluation of a UK telephone befriending service providing one-to-one social support, where older people reported feeling better able to cope and more confident in reconnecting with the community and people around them [Cattan et al., 2011].
- Interventions that offer skills development and productive activities individually or as part of group activities have also been found to be effective. Notably, interventions offering older people (aged 70 years and older) computer training reduced feelings of loneliness in Finland and Slovenia [Blazun et al., 2012].
- Animal interventions have shown that owning a pet could provide social support and companionship for older women [Krause-Parello, 2012], with human-animal interaction and attachment found to alleviate loneliness among older people [Banks & Banks, 2005]. This was also the case for older people living and interacting with robotic dogs in nursing homes in the US and New Zealand [Banks et al., 2008; Robinson et al., 2013].
- The *Spread the Warmth* Campaign is a national winter health and well-being campaign in Wales established by Age Cymru, raising awareness of the health impact of cold weather and winter and encouraging the elderly and the public to take shared responsibility 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. According to Age Cymru, 37 grants were funded across Wales in 2017, estimated to benefit nearly 2,100 older people by providing social inclusion through organised social events.

Homelessness

- Offering homeless people secure housing as a precondition for any treatment is a key step to achieving stable health and reducing homelessness. For instance, several studies have observed that tenants of Housing First schemes have experienced reduced emergency care utilisation, reduced criminal activity and substance use, and improved ratings of quality of life (DeSilva= et al., 2011; Larimer et al., 2009).

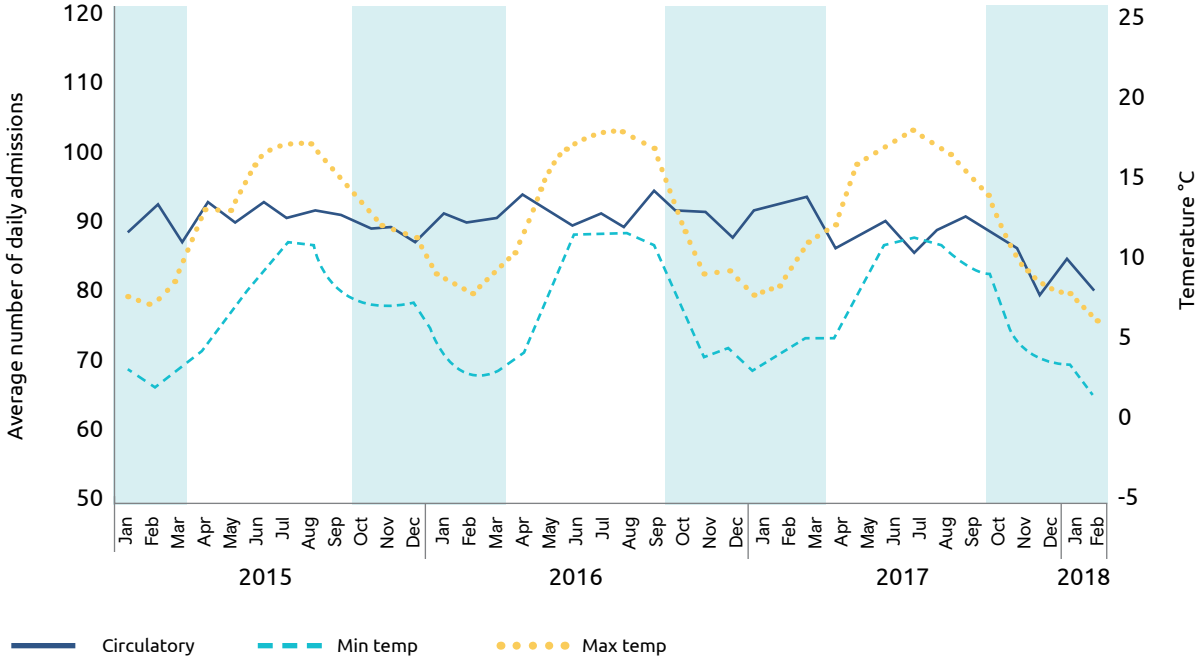
04 Epidemiology findings

A range of Welsh data sources were used to gain a general picture of how winter impacts upon the health of the Welsh population and services more generally. The charts included in this section are additional analyses that are referred to, but not included, within the main report.

4.1. Hospital emergency admissions

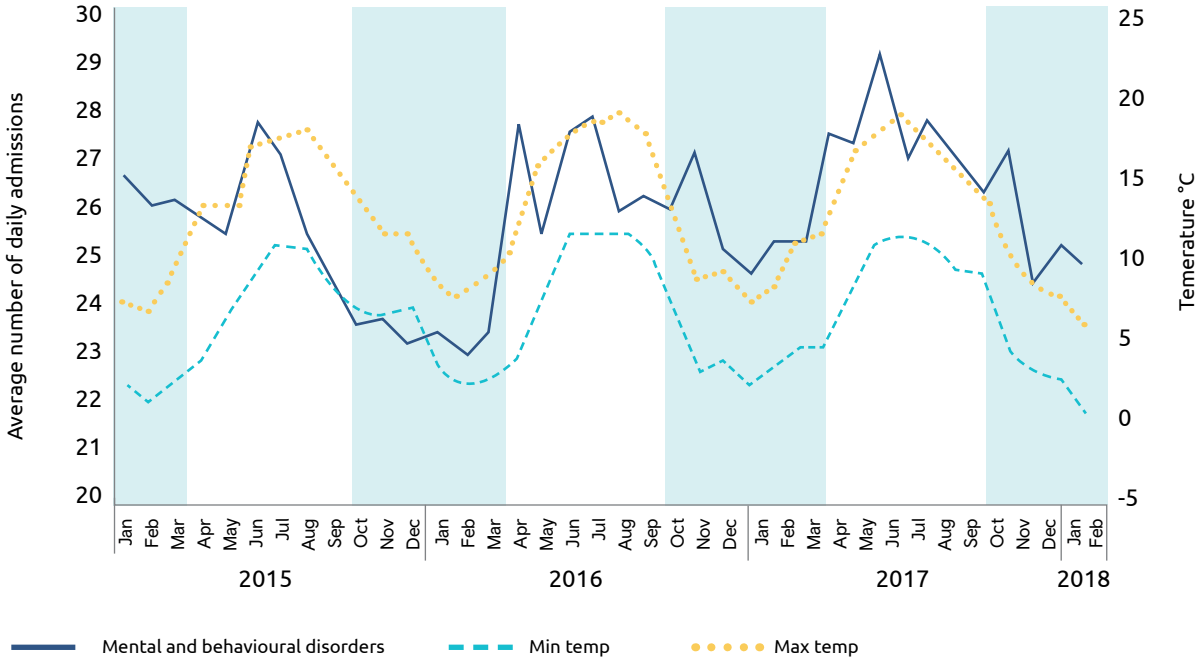
Figures 1 to 4 show trends in emergency hospital admissions for circulatory disease, mental and behavioural disorders and falls from injuries (all ages and 65+).

Figure 1. Average daily hospital emergency admissions for circulatory disease, by month, 2015-2017.



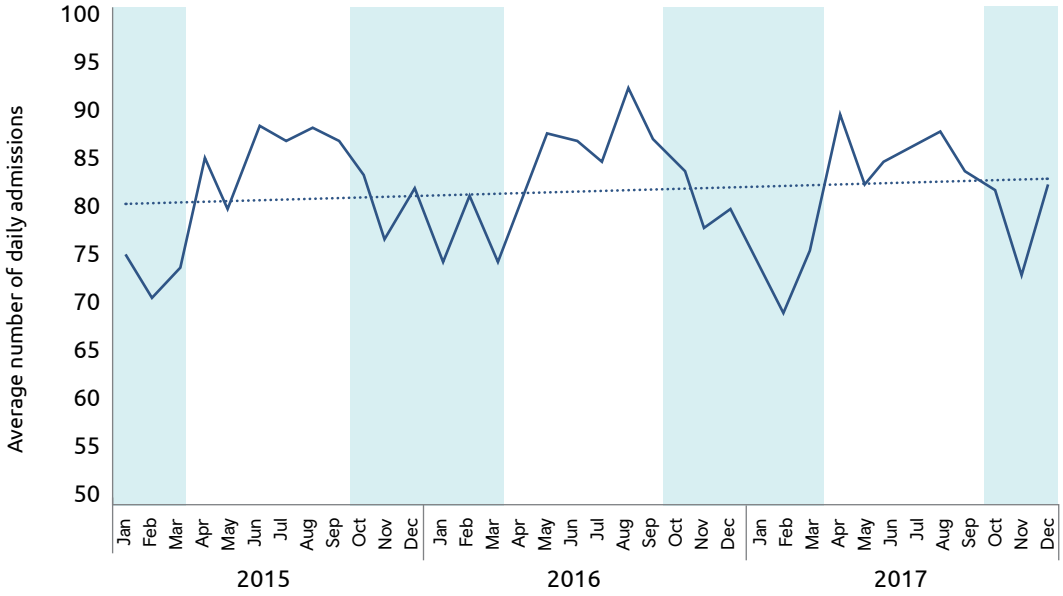
Source: Patient Episode Database for Wales, Public Health Observatory

Figure 2. Average daily hospital emergency admissions for mental and behavioural disorders, by month, 2015-2017.



Source: Patient Episode Database for Wales, Public Health Observatory

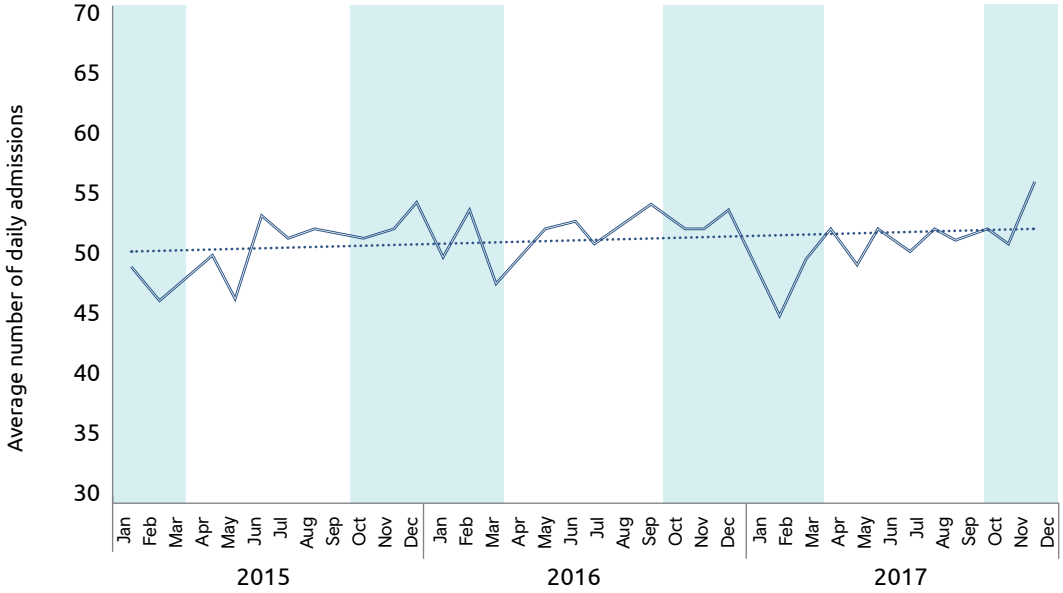
Figure 3. Average daily hospital emergency admissions for injuries from falls, by month, 2015-2017, all ages.



Source: Analyses conducted by the All Wales Injury Surveillance System (AWISS, www.awiss.org.uk) at Swansea University[2]

[2] AWISS is funded by Public Health Wales and supported by Health Data Research UK, which receives its funding from HDR UK Ltd (NIWA1). The data used to produce these results are anonymised and held in the Secure Anonymised Information Linkage (SAIL) Databank, which acknowledges all the data providers who make anonymised data available for research.

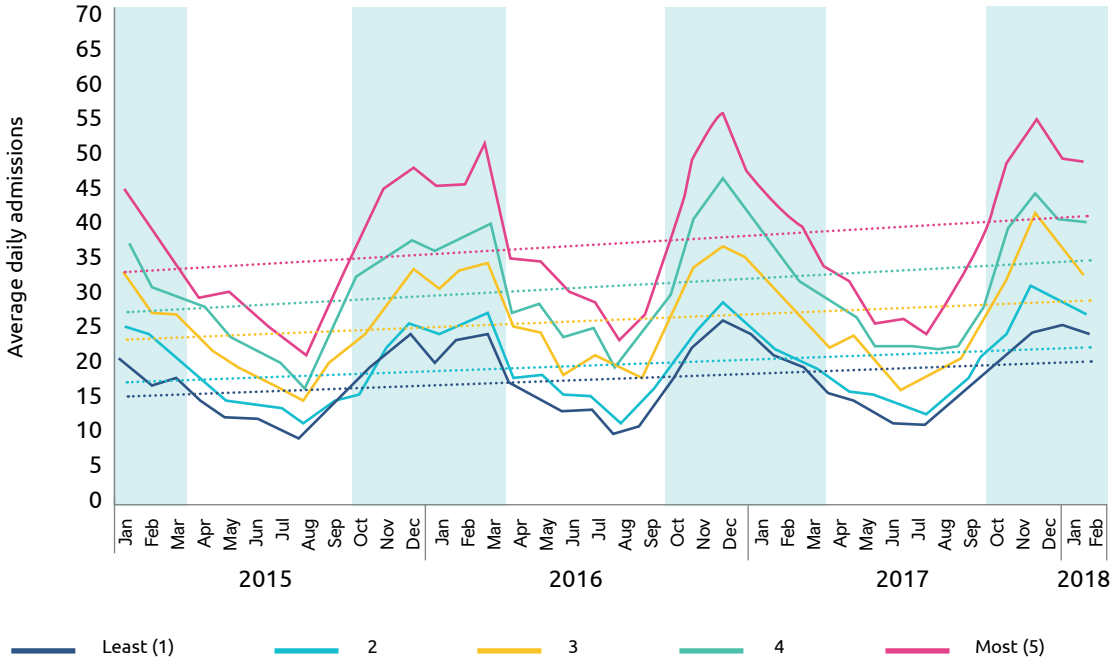
Figure 4. Average daily hospital emergency admissions for injuries from falls, by month, 2015-2017, age 65+.



Source: Source: Analyses conducted by the All Wales Injury Surveillance System (AWISS, www.awiss.org.uk) at Swansea University[2]

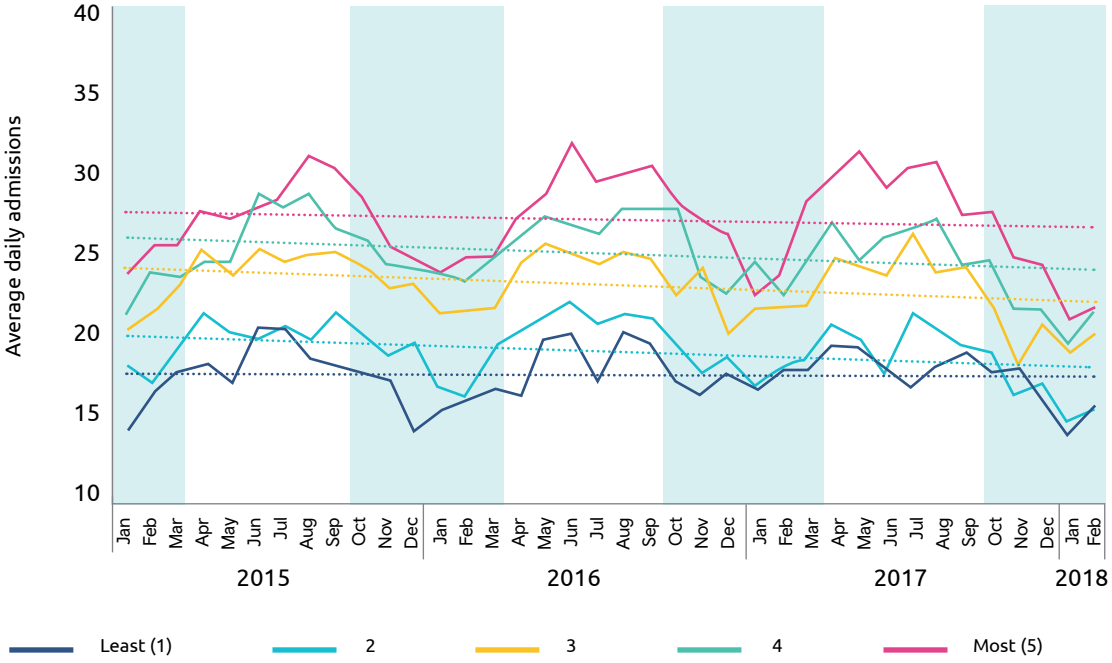
Figures 5 to 7 show trends for RD, injuries/poisonings and circulatory disease by quintiles of deprivation (quintile 1 is the least deprived and quintile 5 the most deprived). Patterns and sizes of peaks were fairly consistent across deprivation quintiles for respiratory conditions and injuries/poisonings. However, for CVDs, whilst those living in the more deprived quintiles had higher admissions over time than those in the least deprived, peaks in admission tended to vary across deprivation quintiles (Figure 7).

Figure 5. Average daily emergency admissions for respiratory disease, by month and quintile of deprivation, 2015-2017.



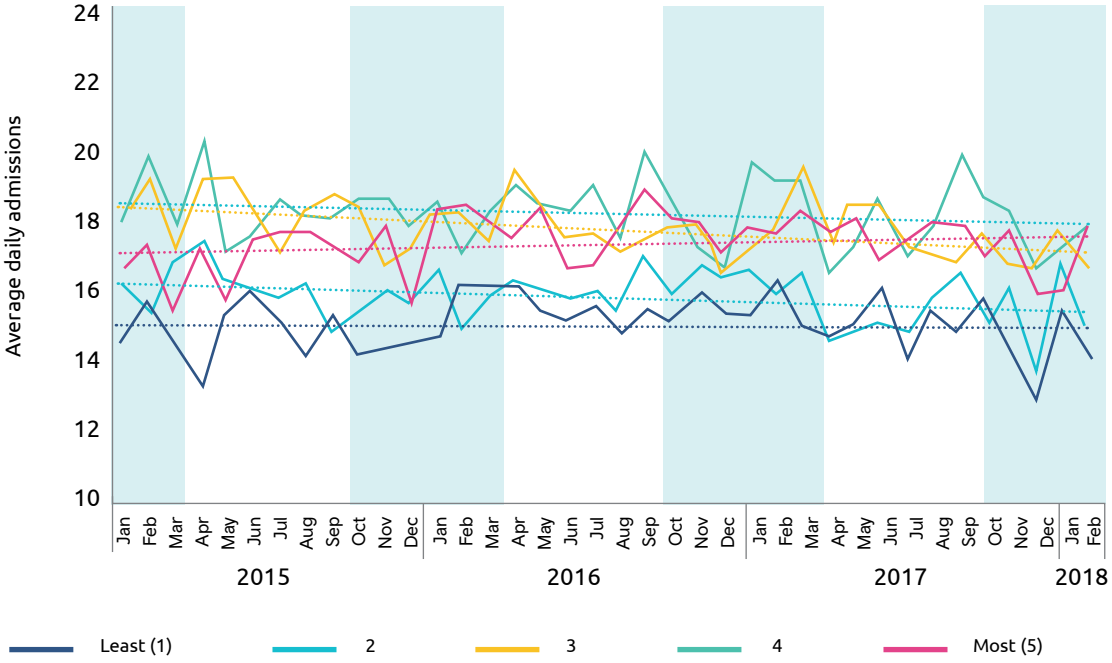
Source: Patient Episode Database for Wales, Public Health Wales Observatory

Figure 6. Average daily emergency admissions for injuries and poisonings, by month and quintile of deprivation, 2015-2017.



Source: Patient Episode Database for Wales, Public Health Wales Observatory

Figure 7. Average daily emergency admissions for cardiovascular disease, by month and quintile of deprivation, 2015-2017.

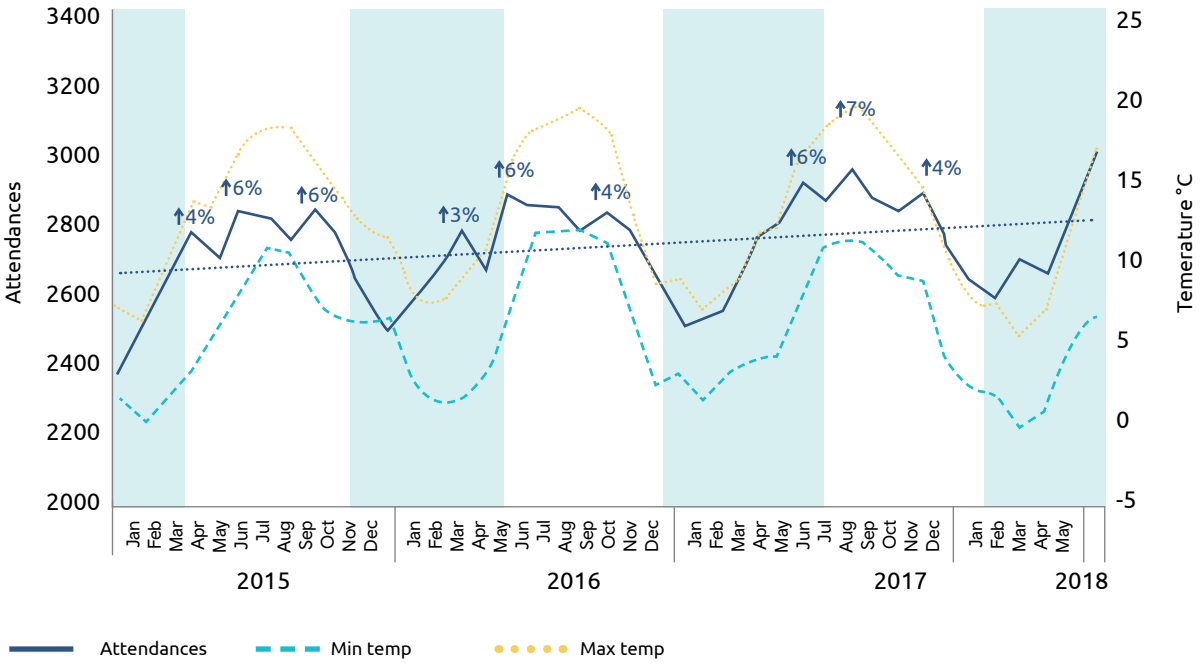


Source: Patient Episode Database for Wales, Public Health Wales Observatory

4.2. Emergency department attendances

Figure 8 shows the trend in the average daily attendances to emergency departments in Wales from 2015 to 2018 and shows increases in attendances over the summer months.

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

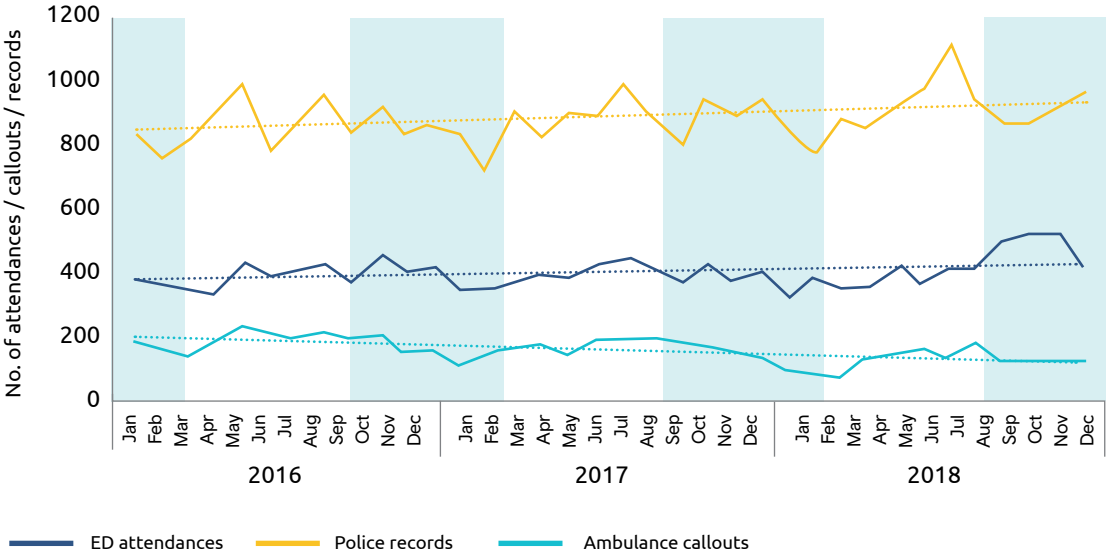


Source: Emergency Department Data Set, Public Health Wales Observatory

4.3 South Wales violence surveillance system

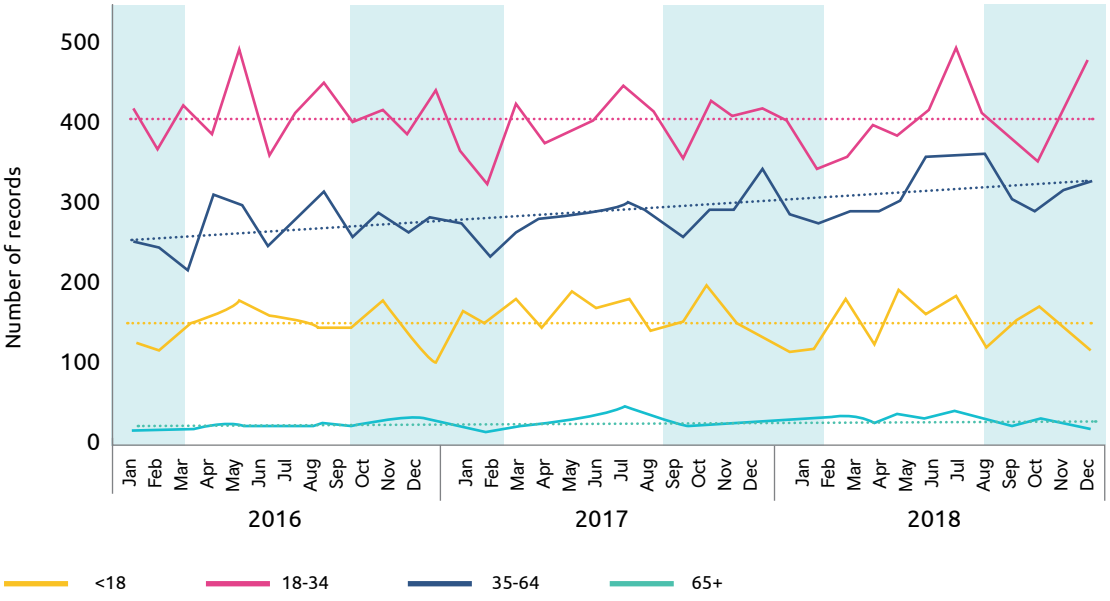
Using the South Wales violence surveillance system, it was possible to observe the number of police recorded assaults, emergency department attendances and ambulance call outs for assaults with injury across South Wales between 2016 and 2018 (Figure 9). These trends are presented by age group in Figures 10 and 11 (ambulance data was not analysed by age group because age group was unknown for around a third of cases) and by deprivation quintile in Figures 12 and 13 (deprivation data was not available for police recorded assaults).

Figure 9. Number of emergency department attendances, police records and ambulance callouts for assault with injury, South Wales, 2016-2018.



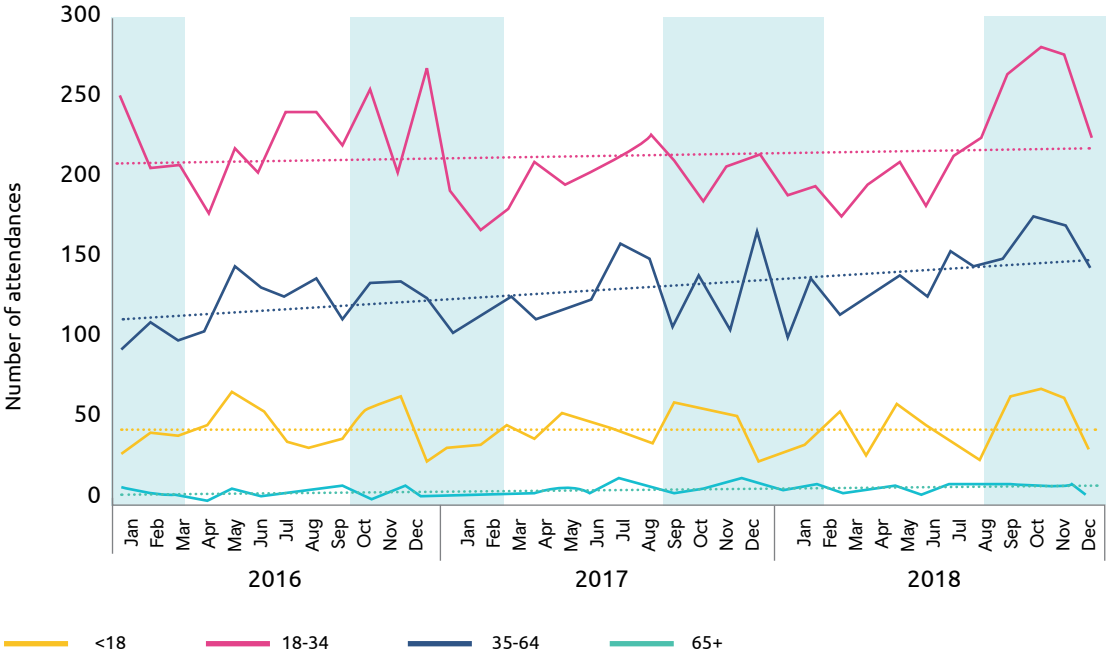
Source: South Wales violence surveillance, Public Health Wales

Figure 10. Number of police recorded assaults with injury, by age-group, South Wales, 2016-2018.



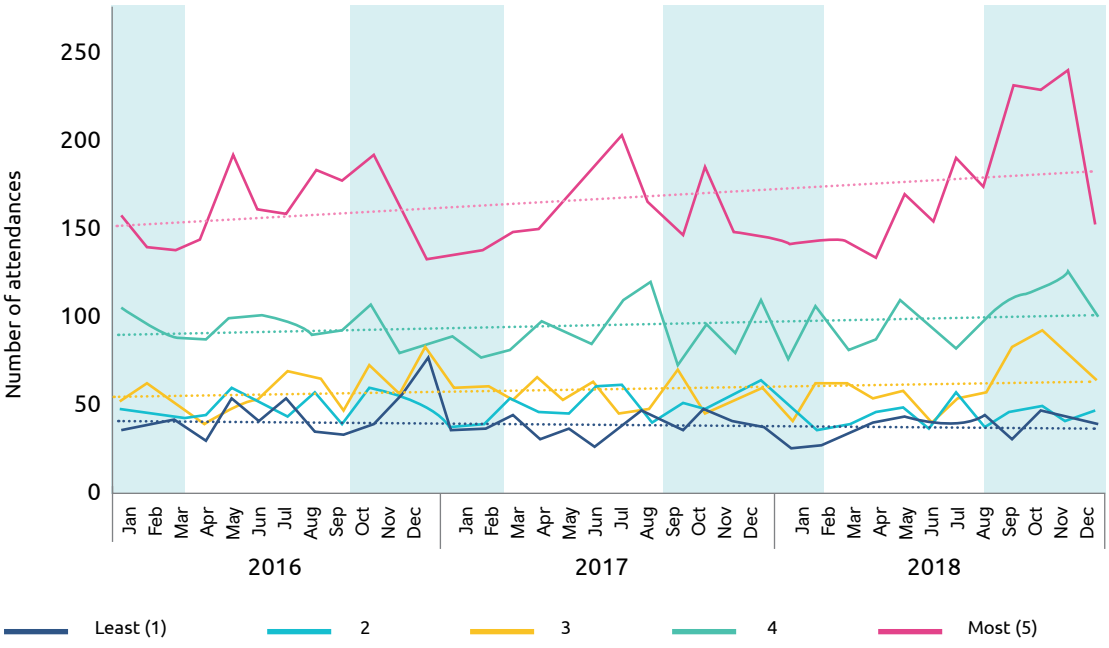
Source: South Wales violence surveillance, Public Health Wales Observatory

Figure 11. Number of emergency department attendances for assault with injury, by age-group, South Wales, 2016-2018.



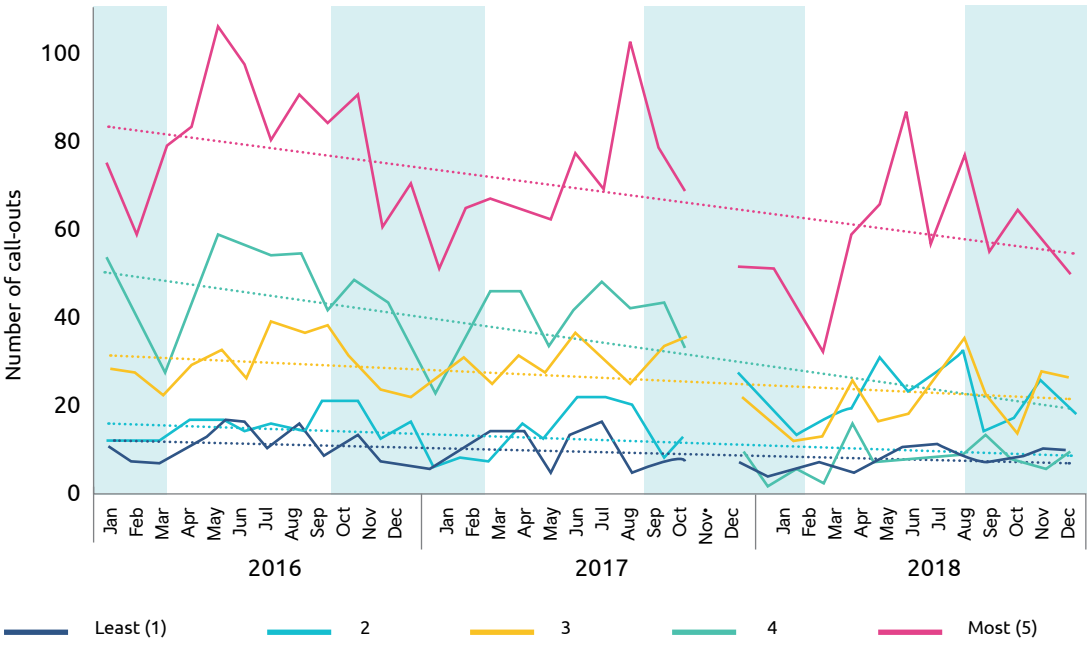
Source: South Wales violence surveillance, Public Health Wales Observatory

Figure 12. Number of emergency department attendances for assault with injury, by deprivation quintile, 2016-2018.



Source: South Wales violence surveillance, Public Health Wales Observatory

Figure 13. Number of ambulance call-outs for assaults with injury by deprivation quintile, 2016-2018.



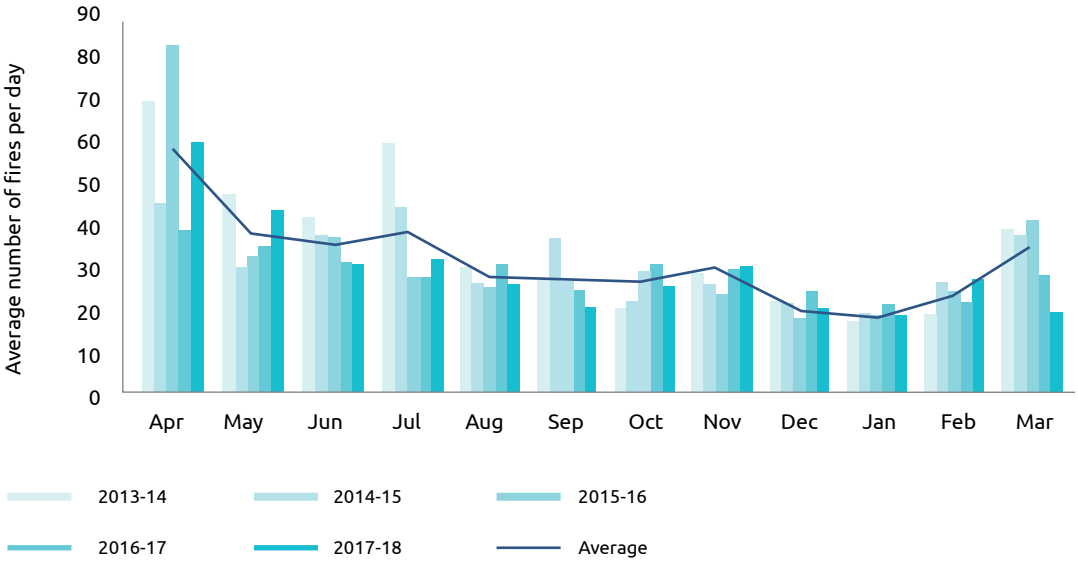
Source: South Wales violence surveillance, Public Health Wales Observatory

** Data for November 2017 was excluded since the majority of records were unable to be assigned to a deprivation quintile.*

4.4. Fire service call-outs

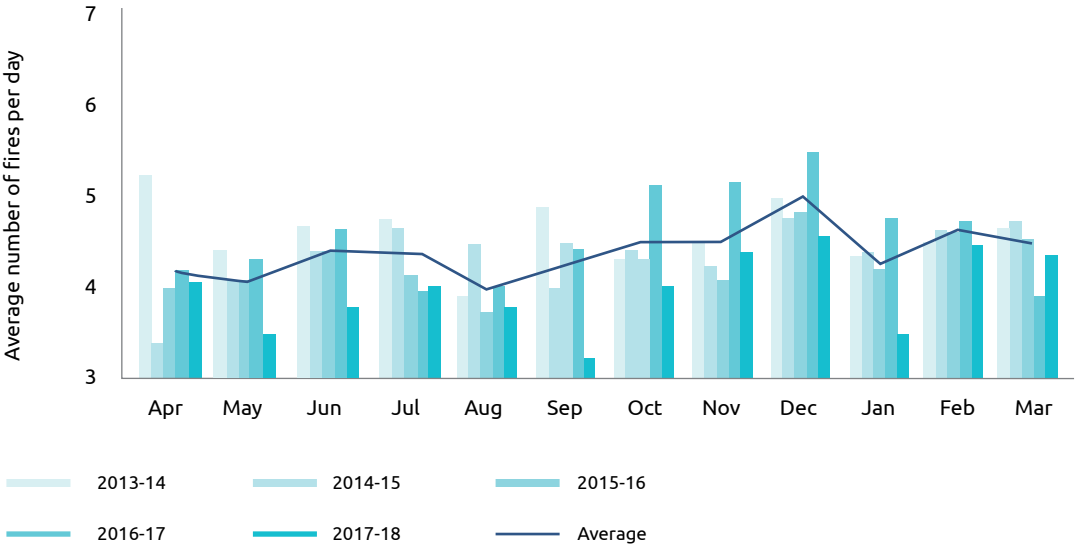
Figures 14 and 15 present the average number of fires and accidental fires per day by month from 2013/14 to 2017/18. Whilst numbers of any type of fire decrease over the winter months, accidental fires peak in December.

Figure 14. Average number of fires (any type) per day, by month, 2013/14 to 2017/18.



Source: StatsWales

Figure 15: Average number of accidental dwelling fires per day, by month, 2013/14 to 2017/18.



Source: StatsWales

05 Interview findings

The findings from nineteen interviews of multi-disciplinary professionals from organisations across a range of sectors focused on four key themes: factors contributing to winter pressures experienced in Wales; the current plans and systems to manage and reduce winter pressures; the challenges and issues of the current systems and approach; and potential changes and improvements for the future to help reduce and/or manage winter pressures. All themes were analysed to identify differences and similarities of experiences between the sectors, and anonymised quotes have been included. Within each of these themes, various subthemes were identified and are outlined below. Emphasis is given to those themes in which respondents across sectors reported a consensus, those which prompted more detailed discussion and were emphasised as being of importance or for which there was a clear disparity of perspective between sectors. This section provides information additional to that in the main report.

5.1. What is happening in Wales: winter pressures experienced

Health and care professionals from the health, housing and third sector, and Welsh Government officials described their experience and perspectives of the current factors increasing pressure on health and care services during the winter months in Wales, focusing on both the perceived health factors involved and the impact this may have on their services and sector.

Factors influencing health and well-being

The adverse impact of winter on health was well recognised across all sectors. Participants recognised that there was a complex but predictable interaction of factors related to personal situations and the environment which contributed to poorer health in the winter months. There was a consensus that the **population are not adequately prepared and less resilient** to cope with the effects of colder temperature and inclement weather, which can exacerbate the risk of RDs (mainly influenza and viral infections), unintentional falls and cold-related injuries. Most respondents described the significant impact of ongoing issues such as poor housing, destitution and loneliness, which worsen during winter, and which impact on both mental and physical health by limiting social opportunities and reducing warmth in homes.

Whilst some respondents focused more on the seasonal and temperature changes in winter, others reflected on the *"grassroots problems"* contributing to poorer physical and mental health in winter, for example, the prevalence and challenges of **poverty in Wales**. There was a sense among all respondents in the housing sector that experiencing **fuel poverty** and having limited access to affordable heating for homes (particularly for rural areas) greatly contributes to the winter health burden. Respondents working in the Welsh Government highlighted that those living in areas with higher levels of deprivation or in a cold home environment are more likely to be at greater risk of ill-health. They suggested that some of the health burdens in winter are preventable by focusing more attention on these groups as they are more likely to benefit from support. Further, one respondent from a third sector organisation reflected similar concerns that the winter season aggravates challenges of poverty and further impacts on health and well-being. However, such factors were seldom mentioned by respondents in either health or social care sectors.

> "Obviously, we've got the 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. The impact that has on their health and well-being, families, children, attainment, schools… "
>
> ***Representative from Healthy Homes, Healthy People***

Vulnerable groups

Three main vulnerable groups (older people; those with long term health conditions; and those who are homeless or rough sleepers) were identified by participants from across all sectors, which are discussed in turn.

Older People

Many respondents acknowledged that there were demographic challenges faced by health and social care services in Wales, with an increasingly ageing population with complex long-term care needs. In particular, there was a clear concern for older people during the winter months, largely orientated around their underlying health status, physical frailty, and ability to independently live and cope at home. Some respondents felt that older people may be more prone to severe health complications from being directly exposed to cold weather, from seasonal viral infections or from the adverse effect of staying inside for long periods of time (e.g. increased risk of falls).

Further, respondents in the housing and social care sector referred to social issues of isolation, especially a lack of contact or support from family and the community for everyday tasks, for example difficulties accessing and using public transport or buying weekly shopping. A care home manager observed admitting a higher number of older people to the care home with lower levels of well-being and mental health conditions (e.g. depression, anxiety) across the winter months.

"We seem to get a lot of people in the winter months into these beds with depression and anxiety (…) Out of our seven beds that we've got at the moment, I've got six in with anxiety and depression and hallucinations, which is a high, high number for us. So, I don't know if that's got something to do with the winter this year."

Care Home Manager

Long-term health conditions

Several respondents were aware that there was a high burden of long-term health conditions such as RDs over the winter months, which were triggered and exacerbated by colder temperatures, inclement weather or influenza infections. Further, one respondent in healthcare mentioned that if (asthmatic) people are not routinely engaged with regarding their medication (e.g. inhaler), they are more likely to suffer worse health and subsequently be admitted to emergency services.

Homeless and rough sleepers

Two respondents (from health and third sector organisations) identified a range of health and psychosocial concerns encountered by people experiencing homelessness and sleeping rough on the streets in cold weather, including an increased risk of cold-related death and injuries (e.g. hypothermia) and limited access to healthcare and emergency shelter services.

Understanding the impact of winter pressures on services

Across all sectors, there was consensus that there are pressures experienced by services throughout the year, and that there is also a predictable increase in demand for services between December and March, especially on Christmas Day and the months following (January/February). All respondents from third sector organisations suggested that they experience greater demand and referrals for services by vulnerable people (e.g. rough sleepers, those living in cold homes) over the winter months, though this could potentially reduce with better public preparation and all-season engagement.

"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

All respondents, and particularly those in healthcare organisations, experienced a substantial increase in demand on services during winter with more people acutely unwell. Several healthcare professionals described how services struggle to cope with the volume of patients presenting to emergency departments, often leading to overcrowding and lengthy waiting times, and therefore potential knock-on effects on performance such as delays in patient flow and escalation. Whilst increased admissions could be managed if inpatients were discharged earlier, there was recognition that the growing numbers of frail older patients with multiple comorbidities required greater care, and therefore placed additional demands on services. Further, one respondent described how bank holidays and festive periods can result in significant pressure for 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 was a shared concern amongst health and care professionals that inappropriate attendance at emergency departments, for example by those with non-urgent health problems that could be managed by primary or community services, resulted in avoidable additional pressure on services. Whilst some respondents felt that inappropriate service use was primarily due to a lack of public understanding of the alternatives available or what constitutes an emergency, others suggested that there was little in place to prevent unnecessary access to emergency services.

"A couple of Christmas eves ago, someone came in and asked me to syringe his ears. I'm not being funny, it's Christmas Eve. This is not an emergency or an accident. "Yeah, I know, but if my ears are blocked, then I might lose my balance and I might fall off my truck." But again, this is not an emergency. But to him, he's visualised this whole thing that if he continues to have wax in his ears, he will become sort of dizzy and might fall off his truck."

Ex-Senior ED Nurse

Further, there was a clear sense that there was a lack of capacity, either in medical and nursing staff or resources (e.g. hospital beds), to successfully meet the growing demands during winter. Both health and care professionals often reported being understaffed due to rising levels of staff sickness, which placed increased pressure on remaining staff and services resulting in issues such as difficulties in securing packages of care, and 'decimated' any prior planning for staff recruitment.

"It's a real challenge to staff the wards, and to open extra beds is also very challenging. So we deliberated about opening a winter ward in [location removed] for much longer than we normally do because we were unsure whether we could get nursing staff to staff it (…) the challenge this year was whether we could actually staff it, even if we've opened it."

Consultant, Health Board

5.2. Current approaches and winter preparations in Wales

Professionals described the current approaches and planned actions to address the anticipated surges in demand across the whole system and respond to the needs of the population and local communities during the winter months.

Winter preparations and planning

Integrated winter planning

Respondents reported that 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, following annual multi-organisational conferences, with each health board leading on the development and delivery of their own integrated plans every winter.

Understanding the usefulness and effectiveness of winter planning

Respondents in healthcare felt that integrated winter planning helped improve understanding of the key pressures experienced across the system and provided guidance for future planning by supporting learning from previous winters in a routine and timely way. Many respondents involved in the planning process reported incorporating new schemes and models of care, and making improvements on service delivery and performance (predominantly on patient escalation and flow) early on, prior to the winter months. This was done to build resilience in the system and alleviate anticipated demand. Further, respondents in health and social care were generally in agreement that an integrated approach of working with multiple sectors and agencies (e.g. Welsh Ambulance Service Team, Community Services) enables more detailed operational planning and the development of alternative care pathways. There was a sense across the sectors involved in winter planning that undertaking a formal collaboration process instigated more opportunities for new partnerships and integration among services that they may not have considered previously.

"One of our biggest challenges last year was the length of time and the number of patients we were holding in ambulances outside our hospital emergency department. This year, actually, we've completely turned that around (…) We've seen a 70% drop in the number of patients that we're holding in ambulances for 60 minutes or more (…) and in winter, to date, we've had the least number of ambulances for the whole of Wales, particularly over the last two weeks (December/January) when the pressure has been high. So, we're very proud of that work that we've done."

Unscheduled Care Lead

However, health and social care professionals remained concerned about the effectiveness of winter planning, with some describing a negligible impact of planning on tackling the wider determinants of adverse health and mortality in Wales in winter and all-year round. Other professionals across healthcare and Welsh Government suggested that more long-term continuity was needed. For instance, one member of Welsh Government reflected that winter planning needs to be part of a long-term strategy where mechanisms can be established and automatically arranged year on year, rather than planning on an annual basis and responding to recurring issues in the autumn/winter periods. This suggestion was also reflected in healthcare, where it was highlighted that there needs to be continuous planning all-year round with plans incorporating slightly different actions at certain times of the year, rather than solely focusing on the winter season.

"I think it needs to be a little bit more long term than that. I think it needs to be embedded in the longer-term strategy of this is what's going to happen in the future, but it's not going to happen on just an annual basis. It's going to happen year on year."

Member of Welsh Government

Approach to prevention

Across all sectors, prevention was thought to have an integral role in alleviating winter pressures, for both the general population and specific vulnerable groups (e.g. the frail and elderly, those living in cold homes).

General population

Education and advice on staying well in winter

Emphasis was given by healthcare professionals on engaging with the population to be more accountable for their own health and care, particularly throughout the winter months. This includes giving people the information and support they need to manage their own medical conditions (e.g. information packs for asthmatic patients), engaging and educating people on keeping healthy through healthy behaviour campaigns, and offering general advice to households on how to best prepare for the winter, for example advice on boiler care during cold and severe weather. Respondents felt that these interventions were not only beneficial in keeping people well, they also provided the right referral routes and pathways (other than emergency services) for specific health-related problems in winter. Only a few respondents were critical of the messaging of the interventions, expressing some concern with the quality of communication and language used, particularly for the seasonal *"Stay Well This Winter"* and *"Choose Pharmacy"* campaigns, due to either the lack of effective care navigation or signposting patients to commercial settings, respectively.

Community resilience and social networks

Healthcare and housing respondents discussed an emerging preventative approach to winter pressures of building community resilience. This incorporates individual preparedness as well as establishing a supportive and sustained social context in communities. There was an emphasis on the positive impacts of engaging individuals and communities towards building connectedness and social support networks. Interviewees had a clear understanding of the future need for community resilience to alleviate winter pressures associated with public dependency on healthcare services.

"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

Vulnerable groups

Influenza vaccination and immunisation

Although influenza was well recognised as a significant destabilising factor in winter, most respondents did not have concerns about winter preparations against influenza and influenza-like illnesses. Influenza vaccination coverage was felt to be comprehensive for most eligible groups, with particular emphasis on the integral role and advantages community pharmacies have on delivering vaccinations.

However, some respondents wanted to see additional encouragement and education for health care workers and care home staff in Wales to be vaccinated.

"Patients are quite aware that they do need one [influenza vaccine]. And they're becoming more and more aware that we do it in the pharmacy, which is a lot more convenient for some people ... they don't have to book an appointment for one ... they can come in on the weekend for it, which is another advantage, and we're open until seven o clock at night ... which is another advantage if you're trying to get it done around work.."

Community Pharmacy

"I think the staff don't take it [influenza vaccine] up enough. In our setting, even though now it's free to all, I still have a very low uptake and I've got 35 to 40 staff here. I have a very, very low uptake. I very rarely get a new member of staff that will have the flu jab cos there's rumours out there that you get ill after it, you get the flu after it. So maybe we need to educate them a little bit better."

Care Home Manager

Identifying and engaging with vulnerable people

For all respondents, keeping those who are the most vulnerable safe and well in winter was a priority and most, therefore, had taken preventative steps to reduce winter risks. One approach adopted by both healthcare and housing sectors was to identify and engage with people who may be vulnerable and whose health may be at risk from the cold. For example, primary care teams asked patients about their living and housing conditions during consultation sessions or prompted older patients (and other eligible groups) about influenza vaccinations when appropriate. In one instance, a community pharmacist reported engaging with vulnerable people, particularly those with chronic conditions and older people, as part of a new campaign *'My Winter Healthcare Plan'* providing individual winter healthcare advice and referral pathways. Overall, respondents considered that engaging with people who may become vulnerable in the winter was an important and sensible approach and that there should be more contact with vulnerable individuals following discharge from hospital, with attention to their living environment and medication adherence.

"……we developed a healthy homes on prescription service, where we worked with the GP practices to identify patients who'd be vulnerable to cold or damp housing (…) in addition to the GP being prompted to ask them whether they'd had the flu vaccination, they'd also be prompted to ask the patients about their housing conditions"

Expert in housing and health

Falls prevention and improving home safety

There was a major focus on home safety and falls prevention across health, social care, housing and the third sector. However, reducing the risk of falls and fall-related injuries requires a broad approach as falls have multiple causes. Some health and social care professionals focused attention on winter plans to build system infrastructure (e.g. staff training, anticipatory care plans, identifying frequent attendees) in order to reduce fall-related admissions from care homes, whilst others highlighted the importance of improving home safety by making adequate home adaptations (e.g. handrail installation). It was noted that the effectiveness of fall-related interventions relies on collaborative efforts and partnerships between sectors. Although falls commonly occur among the frail and elderly each year, it is often an early indicator that the individual may not be managing and is often followed by further ill health. Some respondents suggested that the housing and third sector are both underused as part of a wider system approach and could contribute more to falls prevention. This would not only be beneficial in terms of improving service efficiency but would also lead to fewer admissions for fall-related injuries in winter and throughout the year.

"The strength of [organisation] is that it's got expertise of actually being in somebody's home. It works so well because it's face to face. You're invited into the home. You can get a sense of how well people are managing. And as you go around the home, the journey around the home then you can begin to see what the pressure points are. Alongside them with the caseworkers, you've got surveyors, you've got the technical officers who can actually look at the housing fabric and maybe what could be done to keep people home. (…) Doing a health home assessment routinely for older people would not be a bad thing because that would stop them also returning to hospital."

Third Sector representative

Housing and thermal comfort

Interventions addressing inadequate thermal comfort and energy efficiency were frequently mentioned by most sectors. There was a clear sense that the problem is more closely linked to the age of the Welsh housing stock, where older properties are less energy efficient. It was acknowledged that challenges of poverty limit a household's means to heat their home adequately and sustainably during colder months. Respondents across both the housing sector and Welsh Government agreed that as well as improving the energy efficiency of homes, interventions taking a target-based approach and addressing individual needs (i.e. the Nest Warm Home Programme), as opposed to blanket-based approaches for vulnerable areas or regions can have an impact on physical health and well-being.

"In terms of the biggest benefit, it is about targeting need, but at the same time if properties are going to be there for the next 100 years then who's to say who is going to be living in that [property] over the next 100 years (…) even if you haven't got a particularly vulnerable person living there at the moment, surely there'll be benefits to future households."

Expert in housing and health

Some respondents, while recognising the value of income supplements and financial aid for older people (e.g. winter fuel payments), noted that it was not targeted at people in or near fuel poverty. One respondent in the housing sector suggested that it is more financially and environmentally sustainable to invest in home energy efficiency interventions as part of a longer-term strategy to solve the problem of fuel poverty. However, others in Welsh Government suggested that it would be more appropriate to consider taking smaller yet pragmatic steps by focusing on reducing the number of houses experiencing fuel poverty, with the intention of making energy efficiency upgrades when affordable. It was also mentioned that for the best return on investment, any investment in energy efficiency needs realistic consideration for the lifespan of the property and to understand the overall benefits (e.g. health and well-being, thermal comfort) for both current and future occupants.

Managing demand

Reducing avoidable admissions

There was a consensus that reducing avoidable admissions to urgent and unscheduled care helped alleviate some of the high demand for services experienced during the winter months and interventions addressing this concern were viewed as a key priority. Examples of interventions included extending access to primary care and community services (e.g. pharmacies), changing service models to navigate and signpost patients to more appropriate sources of care, and improving clinical support to nursing and residential homes. However, the scale and reach of these initiatives and their effectiveness was unclear. One respondent identified that there were too many interventions addressing the same issue across Wales, and that resources could be better allocated by reflecting on and evaluating current practice.

Improving capacity and capability

Healthcare professionals highlighted general and local winter initiatives that helped smooth the transition of patients through the healthcare system, and that small changes to ordinary practice appeared to result in positive change. Examples included educating staff in care homes on early recognition of potential crisis situations and identifying the need for appropriate ambulance call-outs; providing additional consultant sessions in community hospitals at the weekend; and adding mental health practitioners to out-of-hours services.

Achieving timely and efficient patient discharge was one of the main goals stated across most sectors, as this improves flow through the entire system and reduces pressure at the "front door" of the hospital where lack of capacity can result in long waiting times, queuing ambulances, and overstretched staff. Multidisciplinary teamwork (e.g. discharge reviews by pharmacies) was welcomed by healthcare professionals for ensuring high quality of patient care.

Healthcare respondents highlighted that problems, such as difficulties scheduling timely reviews, and securing packages of care resulted in discharge delays and longer lengths of stay in acute care settings. Further, one healthcare respondent described how concerns about getting people through the system as quickly as possible needed to be balanced against safeguarding the quality and safety of care and discharge planning to prevent repeated admissions.

"When you're talking about systems running so close to their maximum capacity, they're running right at the edges of what they can deal with. It's taking tiny bits to push them over the edge into crisis – only a tiny bit because they're already at capacity. So, often the small things actually don't look very strategic but end up being those things that keep the system alive."

Advisor; NHS Trust

"There's a hospital to home 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 say 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."

Third Sector staff

One respondent described an innovative model of patient discharge where housing services (Hospital to Home service) works as an integral part of the discharge team in hospital to achieve timely placements. The model was thought to not only support a safe and rapid hospital discharge for vulnerable patients but also provided other benefits including face to face agreement between healthcare staff and housing services. This particularly benefitted vulnerable patients by allowing timely assessments and adaptations to the home for longer term well-being, which may reduce admissions in the future.

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

Respondents from all sectors described a number of challenges that have influenced individual practice and service delivery and had an effect at system and national level. These include challenges with winter preparations; challenges of communication within and between sectors; and a need for funding and capacity.

"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. However, they may not look strategic in a report because they are ordinary, but when you see how well they function, they are miraculous that they keep going and they keep doing the great things."

Advisor; NHS Trust

Challenges with winter preparations

Flawed focus on winter preparations and planning

There was a clear sense that while there is a responsibility for all health boards to have an integrated winter plan, the absence of one does not cause winter pressures. The reasons for winter pressures are far more complex and present throughout the year, regardless of season. Accordingly, some respondents felt that winter planning was flawed, as current focus was on key performance targets, sorting out short-term budgets, and integrating systems, for example through multi-disciplinary teams working together more efficiently. Whilst this may all help to remove a small amount of demand, there was general agreement that winter planning is *"narrowly focused"* and *"short-sighted"*, failing to consider the wider determinants of health, such as living in cold homes, or in fact other inclement weather (i.e. summer heatwaves). Above all, planning for winter is predominantly reactive. Respondents frequently mentioned that planning took place earlier and earlier each year. There was a consensus that winter planning needs to be part of a long-term and continuous approach, one that involves proactive planning, integrating workforces, engaging with local populations on coping with unexpected events, appreciating and utilising more ordinary yet effective practice, and building resilience in the community by having sufficient capacity and resources and a workforce with many different skills.

"I think my main issue is that frustration as to understand why we have the winter preparations but those people [homeless] don't just appear for winter. It's not like everyone's got a home, then when it gets most dangerous to sleep rough, they leave their house and wait for someone to give them support. Those people are there at all times of the year. We need to be thinking about- it's not okay for someone just to be treated as a priority during winter months. People have to have access to services and support all months of the year."

Third Sector Organisation

Lack of evidence and available information

Effective planning requires an understanding of population health and well-being needs. Respondents involved in the planning process were concerned that there was not enough available population-level data to best inform health boards on local needs or enough local knowledge to understand which interventions would be most effective for local populations.

Participants from different sectors mentioned many positive initiatives and interventions in Wales at local and regional level, although projects are often funded on a short-term basis and are small scale. Whilst pilot schemes are viewed as a sensible approach, there needs to be more evaluation and longer-term continuity to fully understand the impact of the interventions.

Issues of timing

Prior to each winter, additional funding is invested in health and care services to enable suitable changes to alleviate surges of demand across the system. However, several respondents reported that there is insufficient time after receiving additional winter funding to effectively implement and create longstanding change, with most financial support focused on 'quick fixes' and extra capacity. While this may help with peak winter periods, participants mentioned it would be more appropriate to have smaller amounts of funding earlier to assist, and have more certainty, with winter planning.

"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 of communication and perspectives

Barriers of communication within healthcare services

From the viewpoints of health professionals, winter months are particularly stressful for staff at all levels. With staff being overworked and overwhelmed, relationships and communication between health care team members are fragmented, leading to poorer performance. Shortages of nurses and other staff, alongside mistrust between community, primary, and secondary care services were also seen as barriers to communication within healthcare.

"Everybody is under pressure, everybody is stressed. Everybody is trying to defend their own service to stop it falling over and so it can get more and more difficult for generalists to have to refer into specialist services. It always feels like a battle (…) The more stressed the system is, the more stressed the organisms in it are, i.e. us, people, and then if that translates through into being rude, then you can then have an escalating situation whereby everybody's effectiveness (worsens)."

Medical Consultant and General Practitioner

According to frontline staff and other health professionals, there was a sense that staff in emergency departments do not feel that they have a voice within the organisation. One nurse in emergency care (Health Board) described being 'frustrated' at how there was a lack of recognition and consideration for staff in terms of winter planning, even though they were impacted greatly during peak periods in winter. However, this was not the case for all Health Boards across Wales. In one Health Board, health professionals reported how improving communication across the whole organisation was one of the main priorities for the executive team, with accounts of the chairman spending time having one-to-one conversations with the frontline staff. Having clinical conversations was not only seen to be beneficial in terms of bringing focus to winter preparations, it was also felt that conversations with staff allowed messages to be clearly understood throughout the system, and therefore potentially improved staff performance.

Challenges of communication/perspectives between healthcare and other sectors

There was an agreement across health and social care professionals that there was a lack of communication and understanding between the sectors, particularly for joint processes of patient escalation and discharge. Several health care professionals described concerns that social care may not have the same view on the importance of a speedy discharge, with many experiencing difficulties securing packages of care and delays in transferring patients out of care. One health professional stated that: *"people actually come to harm in community hospitals if they stay there for long periods of time. 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're safe"*. One care home manager felt that there was no *"easy"* flow of communication from healthcare services or documentation regarding patient discharge. The care home reported that despite being proactive on all cases they received, they still struggled to contact hospital wards and find enough information about the patient and the discharge. It was noted that this was a part of a bigger issue, where there was a lack of follow-up from health services after patients were discharged and also a lack of social care staff to efficiently cope with surges in demand.

"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

While housing and healthcare professionals felt that integration between agencies and healthcare services was beneficial, there were concerns about difficulties with collaboration. For instance, one professional in the housing sector reported that when vulnerable people were referred by primary care services to housing services, some people may *"fall through the cracks"* due to breakdowns in communication between different agencies. This was a recognised issue across Wales and the UK. In response, one health professional described a novel local delivery model (the Community Care Collaborative Hub in Wrexham) addressing homelessness and drug addiction, whereby people can conveniently access the different services and agencies they need at the same time by having them co-located on a weekly basis.

Issues of service awareness

There was concern across all sectors that there was, in some cases, low levels of public knowledge and awareness surrounding winter wellness. Several respondents within the housing and third sector described that some households are not aware of the available services within their local area that could potentially support and advise them, and therefore are still in distress during winter.

Further, there was an agreement that people would not ordinarily be aware of or contact services until they were in need during winter. For example, one expert on homelessness reported feeling frustrated that those sleeping rough received more attention and support from the public and services approaching the festive holidays *"when it gets most dangerous"* but were not supported enough during the rest of the year. Several respondents suggested that publicity and awareness campaigns were needed throughout the year, whether providing public information on available services in local areas or how best to support the homeless. From the perspective of housing professionals, it was felt that although poorer households and individuals may be aware of support services available, they may not have adequate knowledge or the capability to access them, for example, not having *"a level of IT proficiency"* to use price comparison websites to change energy providers, and therefore *"end up poorer for it"*.

"I suppose my thing is, a couple of visits that I've been doing recently, is knowing or seeing the number of people that still don't have proper, full heating systems ... that are relying on a form of heating in one room. We're still coming across individuals that are living like that. It still surprises me ... we can assist. But again, it all goes back to people being aware of what is out there ... what help and assistance are available"

Third Sector representative

For healthcare professionals, some respondents believed that having a better knowledge of available local services can help them to navigate patients to appropriate services when needed, particularly for social and mental health-related issues.

"When we're talking about primary care or even A&E really – the frontline staff, if you have a team of sign posters, care navigators front of house, if they then are aware of these resources that they can then direct people to.
"Do you know there's a mental health hub on Thursday? Do you know there's this…?" Actually, it just gives you somewhere to direct people to which, at the moment, we haven't got."

General Practitioner

Recognised need for capacity and funding

Issues related to staffing

Participants expressed concern about the growing problem of staff recruitment and retention. Many professionals identified that shortages of staff are now widespread across nearly all disciplines of health and social care, particularly with too few GPs, nurses, and social care workers to meet the current demand, regardless of the season. A few health professionals expressed the view that the current model is "*jam-packed and isn't sustainable*", with primary care dealing with most of the increase in patient contact for winter-related illnesses. Further, the age profile of the nursing workforce in primary and community care was raised as a *"ticking time bomb"*, with one respondent reflecting that many of their colleagues were due *"to retire in about two years' time*". Above all, there was a clear sense that addressing capacity in social and domiciliary care was a priority. Health and social care professionals frequently mentioned experiencing challenges with delivering care and patient escalation as there were not enough social care staff to carry out patient discharge assessments or give support at-home.

"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.

"I think the problem, which is always lost in all of this, or seems to be, is that many of the problems are not with the health services. There was a lack of capacity in social care. But because we can't move people out of hospital, the problem becomes a health problem."

Occupational Therapist

In terms of staff recruitment, there were a number of barriers raised relating to health services including: a lack of job security for staff; tighter and stricter financial budgets; problems of commuting due to the rurality of Wales; a lack of unique selling points for professional posts in Wales compared with other locations in the UK; and negative perceptions about the culture in some Health Boards. From the viewpoint of social care workers and community carers, challenges included experiences of loneliness among staff and transport-related difficulties (e.g. travelling between clients in rural areas).

With increased demand and constant stressful conditions, the winter months were invariably perceived as a damaging time to staff health and emotional well-being. It was widely acknowledged from all levels of health and social care that there had been no real let-up in underlying workforce challenges and that staff were feeling *"exhausted and demoralised"*, partly due to tight resources and longer shifts, and partly because people could not work under constant pressure. As a result, staff burnout was felt to be endemic, impacting on productivity and resulting in staff taking sickness or holiday leave.

Further, planning for extra capacity in winter is difficult. In order to meet the surges of demand in winter, there is an 'over-reliance' on employing a temporary workforce, where employers are having to resort to *"expensive"* agency and locum staff to fill workplace gaps. However, due to rising levels of sick leave in winter, some respondents suggested that this does not address the issue.

"You don't have the break any more, winter pressures has almost become 10 months' pressures. Its extraordinary pressures, and the teams are literally on their knees. It can only be done through supporting each other. And at the end of the day, you are only human beings, so it does greatly impact."

Senior ED Nurse, Health Board

Issues of funding

From the viewpoints of health and social care professionals, there was consensus that their concerns about growing financial pressures and increased need for investment in the community were not being addressed. While respondents acknowledged the benefits of integrated winter planning for multi-agency collaboration, many felt that community services were not sufficiently funded to support and deliver care to meet the needs of the system, with one third sector organisation reporting that at least *"half the agencies run out of money in the last [winter] quarter of the year"*. In particular, a few stated that services within the community that have improved practice and potentially made a long-lasting change are often only funded on a short-term (e.g. one winter season to two years) and non-recurrent basis. For the community options that do exist, several respondents reflected that these are often small in scale and reach and tend to have stricter acceptance criteria, leading to fewer complex patients accessing community services and thus defaulting back to original healthcare pathways. A few respondents suggested that it would be more appropriate to first understand and evaluate existing practice and then invest and expand effective services.

"In Wales in particular, there is an obsession in putting in short term transformation funding and expecting it to pay regard really quickly. What that's doing is that is driving the development of services that are like show gardens – the Hampton Court Flower Show – rather than a substantial robust forest that can weather the storm. 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

Housing professionals described how vulnerable people struggle to access funding and winter-time benefits for warm housing and adaptations. For example, one respondent was concerned that many older residents were not able to receive the benefits they were entitled to in order to keep homes adequately heated (e.g. winter fuel payments). Participants from Welsh Government also acknowledged this issue, with one respondent stating that although winter fuel payments are intended to support and target the fuel poor, many older people in Wales who are not fuel poor still benefit from those payments. As a result, there is an ongoing debate on how best to support older residents to keep warm in their homes during the colder months.

"And I think the other problem is that there can be pockets of good practice, but they tend to be short funded. You might have the funding one year to do a particularly good piece of work. But you might only get funding for one year for one winter. Even if something is successful and you can prove that it's successful, quite often the funding doesn't follow through to following years."

Occupational Therapist

5.4. What could be improved in Wales: changes for the future

Areas for improvement

Better collaboration and integration between sectors

From interviews, it is clear that the demographic, financial, and service demand pressures that are exacerbated in the wintertime are a whole-system issue and need a collective solution. While healthcare is an important and integral part of the solution, many respondents inferred that the healthcare system in Wales cannot rise to the challenges without the support of other sectors, including social care, community services, third sector, and the housing sector. Closer integration and increased collaboration both within and outside the health service is the key to ensuring improvements in productivity, efficiency, and quality of care and making best use of existing resources – given the financial and workforce limitations. Overall, it was generally viewed that Health Boards have a positive track record of joint working with other sectors to alleviate winter pressures. However, a few respondents suggested that there needs to be even more involvement and closer integration to drive the widespread use of preventive approaches and ensure resilience across the whole system, regardless of season.

"The performance of a complex system, like a society or a community, is not the sum of how well its parts work. The quality actually depends on the interaction between the parts, not the parts themselves."

Advisor; NHS Trust

Encouraging further use of available and alternative services

In recognition of greater demands experienced by public services during the colder months, a few respondents in health and social care discussed the benefits of 'nurturing' and making further use of available services to their full capabilities. One example was an unscheduled care approach in Ysbyty Gwynedd, Betsi Cadwaladr University Health Board where close working with the Welsh Ambulance Services and other third sector organisations saw ambulances increasingly treating patients and reducing admission to emergency departments by 30%.

Emphasis was placed on the integral nature of community services, ambulatory care, and third sector organisations in supporting everyday practice. For example, the key role of pharmacists was frequently mentioned in successfully engaging with their local populations through interventions such as administering influenza vaccinations, providing consultations on minor ailments, conducting reviews on patient medication following discharge from secondary care or being a point-of-contact in the local area for advice on healthy behaviours (e.g. smoking cessation) or winter wellness. As a result, strengthening services across the community and making further use of available healthcare services has been generally viewed to have 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. Further, it was viewed that utilising available alternative options to offer patient support following on from acute care (e.g. Hospital to Home service in Bridgend) could lead to more staff confidence for earlier patient discharge.

"How do we get GPs to manage that demand? But then, to do that, we need to take some of the demands off them. So, it's actually that knock on effect. 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. So, I do think that's the way forward."

Locality Manager; Health Board

Improving preparations for all-seasons and weather

Although winter weather and colder temperatures were well recognised as a causal factor contributing to poorer health and well-being, a few respondents remained concerned about there being little preparations in place for climate change and other inclement weather, for example, *"prolonged periods of intense summer heat"*. There was a sense among respondents that current preparations and policies may not be *"fit for purpose"* as weather changes are becoming more extreme than previously experienced, and therefore impacting the health of the most vulnerable such as rough sleepers and the elderly. As a result, there was a clear understanding that future preparations would need to consider embedding other seasonal weather and temperature changes in routine practice.

"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 as a sector 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. It's definitely something that I think needs to be looked at for the future about how actually to keep people well over the summer as well, particularly as climates get warmer and that kind of weather is going to be more and more common."

Third Sector Organisation

Potential approaches and interventions

Respondents were asked for their ideas on other approaches or interventions that could be implemented to ease winter pressures, and there were a number of considerations raised. However, many of the suggestions either related to tackling sector-specific issues or required further investigation and analysis to understand how these ideas could lead to addressing winter pressures. Nevertheless, these ideas offer useful insight, and are available in Appendix 3.

A Change in Focus

Pressures experienced are broader than wintertime

There was a consensus that winter pressures are not only attributable to winter weather or seasonal illnesses. It is also a reflection of the same financial, demand, and demographic pressures that exist all-year-long and which are exacerbated in wintertime. While there was an emphasis on the health and care system using winter plans and a range of strategies to manage surges in demand, given the limitations of bed occupancy and pressures on the workforce, participants suggested that it would be more appropriate to adjust the focus away from planning and funding short-term changes for the colder months, and instead consider having a broader set of measures and actions across the whole year that could be adapted, dependent on seasonal needs. Longer-term strategies also need to focus on how best to address the current challenges facing services in Wales, such as meeting the needs of the ageing population, growing financial pressures, and a stressed workforce.

Further, there was a sense of frustration among respondents that winter preparations currently fail to consider that vulnerable people require services and support at all times of the year.

Prevention as a means of easing pressures

There was a widespread agreement that having a greater emphasis on prevention can help more people stay well and live healthier lives and at the same time reduce the demand on the health and care system, particularly during wintertime. Professionals across most sectors were instinctively aware of the benefits and need for prevention, and in many cases, it was part of their winter preparations. However, there was a sense among respondents that a focus on prevention meant different things to different sectors, with each having competing priorities.

From the perspectives of health and social care, strengthening individual resilience through community-centred approaches was a high priority. It was felt that working closely with local authorities, the third sector and public health on building well-being networks can foster a sense of social connectedness in the community, help with developing support services (e.g. Hospital to Home service) and help address wider issues (e.g. loneliness) through services such as Community Care Collaborative Hubs. Respondents from the third sector and the housing sector reflected a similar view, but also discussed the importance of engaging with vulnerable people on wider determinants of health and well-being. For example, it was suggested that having routine living environment assessments for older people would better ensure home safety and that their basic needs were met (e.g. adequate warmth), leading to fewer hospital admissions.

There was a clear sense among participants that there was a willingness to move further towards a prevention agenda but making such a shift required "bravery" in terms of time and funding.

"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. That's, third sector and also communities themselves. So it's about helping them to keep themselves healthy. 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."

Locality Manager; Health Board

06 Evidence analysis: full findings

Table 1. Prevention and early intervention of winter morbidity and mortality and winter pressures

	Causes and epidemiology of winter morbidity and mortality and winter pressures (Technical Report - Sections 3 and 4; Main Report - Sections 3, 4 and 6)	Evidence-based interventions (Technical Report - Section 3; Main Report - Section 5)	Expert stakeholder views (Technical Report - Section 5; Main Report – Section 7)	Examples of interventions in place in Wales
Chronic conditions	People with **chronic conditions** tend to have worsening health during winter, more hospital admissions and longer length of stays compared to summer months. **Respiratory diseases (RDs) and circulatory diseases** are the main causes of Excess Winter Deaths (EWD). RDs account for over a third and circulatory diseases nearly a quarter of all EWDs. Prolonged periods of cold result in worse health, increasing risk of mortality from RDs by 20% and by CVD two-fold. RD and CVD exacerbations are more likely to occur 15+ days post-exposure to cold. RD emergency hospital admissions substantially increase over winter. **Dementia** accounts for over a fifth (22%) of EWD, possibly due to a range of factors such as increased vulnerability to RDs, difficulties with self-care, greater exposure to cold temperatures in the home. **Chronic Obstructive Pulmonary Disease** symptoms increase nearly twofold in winter compared to summer. **Rheumatoid arthritis** symptoms worsen with falling temperatures and damp weather. Older people experience nearly twice as many arthritic problems whilst living in cold housing. **Diabetes** is associated with a reduced ability to maintain body temperature during cold temperatures.	Prevention of chronic diseases including through interventions to promote healthy behaviours. Prevention of winter exacerbations of chronic conditions over winter months e.g. tackling sedentary behaviour / overeating / heavy alcohol consumption, particularly during winter festive periods. Further research and evaluation are needed on the reach, scale and impact of winter specific campaigns promoting healthy behaviours.	Engage with and support individuals to **self-manage** their condition, particularly for those who are frail and elderly. Telehealth/ telecare services to monitor people with chronic diseases.	Prevention and independent self-care and management of chronic diseases e.g. through healthy behaviour interventions is a part of care pathways for chronic diseases. Those with existing chronic conditions are a target group for interventions such as: • *My Winter Health Plan* scheme • *Warm and Healthy Homes* • Telehealth monitoring via GP Comprehensive influenza vaccination programme delivered by primary care (GPs and pharmacists), health care employers, and school programmes.

Behaviours increasing risk of winter morbidity and mortality	**Sedentary behaviour** all year round, but particularly in winter results in weight gain, raised blood pressure levels, and increased CVD risk. Cold temperatures can result in more time indoors and reduced physical activity. In older adults this is linked to slower reaction times and reduced bone density, leading to increased frequency and severity of falls. **Alcohol consumption** (chronic and increased over festive periods) results in morbidity, including from unintentional injuries. **Smoking** is a known risk factor for CVDs and RDs (commonest causes of EWDs). Smoking is associated with increased RD hospital admissions. **Health behaviour changes over the winter festive period** (increased food and alcohol consumption, sedentary behaviour) can increase the risk of CVD mortality, particularly if these changes last beyond the winter months.	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 promoting healthy behaviours.	**Public campaigns,** leaflets and 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.	A number of public health programmes are in place to promote healthy behaviours e.g. smoking cessation services, use of the Making Every Contact Count approach Examples of activity across Wales include: • Screening programmes for early identification and intervention e.g. cancer • Public health campaigns, including smoking cessation and healthy eating campaigns • Community health champions • Promoting and ensuring access to leisure and physical activity • Immunization programmes
Respiratory viral illnesses	Viral illness is a major driver for RD exacerbations (e.g. accounting for 48% of COPD exacerbations). GP consultation rates for **influenza** increase between December and April. **Pregnant women** are more susceptible to viral infections e.g. influenza and have a higher associated morbidity and mortality rate.	**Influenza vaccinations** are effective in preventing circulation, transmission and infection and reduce its severe health outcomes, particularly among vulnerable groups. Frequent **handwashing, education** for care staff, electronic devices to promote **hand hygiene** compliance in hospital wards and routine handwashing in younger children can reduce transmission. Encouraging **sick employees to stay home** can reduce influenza infections in the workplace by >40%.	**Further education is needed** on the benefits and annual use of influenza vaccination among health professionals in contact with the frail and elderly.	Comprehensive influenza vaccination programme delivered by primary care (GPs and pharmacists), health boards and health and care employers.
Hypothermia	Hypothermia related mortality peaks during the winter months and is associated with cold exposure at **extreme ambient temperatures** (below 2°C). Across Europe, there are estimated to be 1-5 cases per 100,000 per year. In 2017, Scotland reported 34 cases of hypothermia. Hypothermia is known to be linked to **alcohol and psychoactive drug** use.	**Advice to the public,** for example as part of winter campaigns with messages including: • Maintaining **household warmth** whilst reducing energy use; obtaining better deals from energy suppliers; utilising heating technology • Wearing **gloves, hats, and scarves**, which can provide protection during winter, particularly for older people and those with health conditions (e.g. dementia). There is unclear evidence of direct health benefits, including healthcare use. Use of items has associated stigma.		Interventions to **improve warmth of homes for vulnerable households** e.g. through *Warm and Healthy Homes Fund*, advice on financial support. Advice on ideal home temperatures and how to keep warm in winter provided in *Spread the Warmth* campaign (e.g. using gloves and hats outside, keeping the face covered, wearing layers). Other schemes in place in Wales include: • *Arbed Scheme* • *Nest Scheme* • *Warm and Healthy Home Fund* • *Winter Fuel Payment / Warm Home Discount Scheme*

Vitamin D deficiency	Lower vitamin D levels are associated with increased **CVD** risk and mortality, **RD exacerbations**, **falls** complications, and **viral infections**.	Vitamin D **supplementation** can protect against influenza, is beneficial to respiratory health and can reduce falls in older people (particularly in those with vitamin D deficiency or when combined with exercise falls prevention).		Advice on taking vitamin D supplement given in *Spread the Warmth* campaign. NICE guideline on vitamin D supplementation throughout the year, including the winter months.
Falls prevention	Emergency hospital admissions and deaths from falls increase by between 15 and 55% in the winter (globally). Falls and hip fracture incidents are higher on days with or preceded by snow, strong wind, and rain. Increased wrist and forearm fractures in those aged over 75 during winter months. **Incomplete data** regarding emergency department activity limits analysis and understanding of reasons for falls and seasonal trends**.**	**Exercise programmes** in older adults can reduce the risk of falls, particularly if incorporating multiple exercise types and if held over a longer duration. **Home safety assessments and modifications** can reduce the risk of falling in older adults. **Anti-slip / winter footwear** can reduce risk of slip and falls – although the evidence of impact is limited.	**Falls prevention,** with partnerships between sectors, to utilise assets of housing and third sector.	*Steady On, Stay Safe* is a national falls prevention campaign focusing on primary falls prevention and management with the ambition to reduce the number of falls experienced by older people. Within health boards, health and social care professionals undertake falls brief intervention training. Other initiatives are: • Fall prevention programmes including home modifications e.g. Care and Repair home visits • Advice on gritting outside areas at home given in *Spread the Warmth* • Community classes to improve fitness and dexterity • Targeted discharge services such as fragility discharge services
Mental health and well-being	No significant relationship identified between winter and mental health and well-being. **Reduced sunlight hours** may lead to increased mental health distress e.g. seasonal affective disorder, particularly among those with existing mental health conditions (e.g. dementia). Emergency department data does not currently allow analysis of seasonal trends / scale of mental health problems in Wales.		Adding mental health practitioners to out-of-hours services.	*Spread the Warmth* includes a one-off grant of up to £150 for winter social events for older people (communal days out, Christmas dinner etc.) and advice on staying connected. Social prescribing, such as schemes targeting psychosocial needs, community arts programmes, referrals to welfare rights advice, exercise referral and commercial weight loss programmes.

Cold homes and fuel poverty	**Fuel poverty** contributes to 10% of EWDs in the UK. Those living in **rural areas, low income** households, or in **poor energy performance homes** are more vulnerable. Fuel poverty is linked to winter respiratory hospital admissions in those aged 65+. In the UK, around 30% of EWDs is attributable to living in a **cold home**. Cold homes are associated with increased morbidity in older adults (e.g. higher blood pressure, RDs) and children (e.g. RDs, poor mental health and well-being). Rural areas, on average, are more at risk of fuel poverty due to higher energy prices and fewer homes connected to gas networks. **Payment method** is associated with fuel poverty. Households using a pre-payment meter are twice as likely to be unable to afford to heat their home adequately. Quarter of all households using prepayment meters are fuel poor.	**Advice on energy efficiency and keeping warm** can affect behaviour and change risk perception of cold, but the impacts on health are unclear. **Housing and energy efficiency improvements** (e.g. insulation, central heating, improved heating efficiency) can increase indoor temperatures, thermal comfort, and reduce energy demand. Impact on health and well-being is less clear, although there is evidence of improved health and mental well-being, reduced GP visits and emergency admissions, particularly when targeted at households in greatest need (e.g. low income households). Schemes that provide **financial help to keep warm** and healthy are not consistently proven to improve indoor temperature or well-being. There is some evidence that winter fuel payments could reduce the health impacts of severe cold. Further research and evaluation are needed to understand their impact. **Improved ventilation** (air quality) alongside energy efficiency measures in homes improves respiratory health of children.	**Fuel poverty** and limited access to affordable heating for homes (particularly for rural areas) substantially contribute to the winter health burden. **Improve home warmth and energy efficiency**, with targeted interventions. In the short term, tackle fuel poverty, with a longer term focus on improving the energy efficiency of homes. Working with OFGEM, households with pre-payment meters should have reduced monthly rates in summer due to less energy use.	Interventions to i**mprove warmth of homes for vulnerable households** *e.g. through Warm and Healthy Homes Fund*, advice on financial support. Schemes in place in Wales include: • *Spread the Warmth* • *Arbed Scheme* • *Nest Scheme* • *Warm and Healthy Home Fund* • *Winter Fuel Payment / Warm Home Discount Scheme* Appendix 4 provides a **Health and Housing Collaboration Checklist** to support integration and collaboration between sectors.
Travel and transport	Snow events can increase the road traffic crash rate by 84% and the injury rate by 75%.	Use of **winter tyres** (Canada) can reduce road traffic crashes (although relevance to Wales is unclear). Reducing speed limits (Finland) may also reduce road traffic crashes although further research is needed. There have been no formal evaluations of the practice of keeping **pavements clear** of snow and ice, although this is the main location for outdoor falls. Examples of interventions include community snow wardens (City of York) and citizens clearing pavements outside homes (Germany, Austria, Switzerland).		Local Authorities grit and plough major roads during icy/snowy weather. *Spread the Warmth* includes advice on gritting paths at the homes of older people

Social isolation	**Older people** experiencing social isolation are more likely to be admitted to hospital for heart failure and RDs in winter as well as being at increased risk of physical frailty and functional decline.	Interventions to **tackle social isolation and loneliness** among older people in winter include using technology, skills development, interacting with animals. Whilst some interventions are successful in reducing isolation and loneliness, their direct impact on well-being and health in wintertime is unknown. There is a need to monitor the evidence and undertake evaluation of interventions and initiatives.		Activity includes: community hubs and centres (including specialist dementia cafes), community activities (lunch clubs, exercise classes), social prescribing, peer-support groups, befriending schemes (in care homes), and other support services with third party organisations e.g. Ageing Well in Wales. *Spread the Warmth* offers a one-off grant of up to £150 for social events for groups of older people at wintertime.
Engaged & resilient communities			More engagement with local populations, building community resilience, with supportive and social networks and community programmes, working with the Third sector.	Pobl Seiriol (Anglesey) is a community approach to building resilience. The case study displays the value of open discussions between local communities and service providers seeking to shape preventative services to address local needs and create more independent and resilient communities, e.g. independence planning and community resilience models.
Health forecasting		No clear evidence that health forecasting reduces winter health care utilisation, illnesses or mortality. Cold weather alerts prompt service providers about actions that should be taken, although evidence suggests that long-term interventions (e.g. improved housing and winter preparations) are more relevant and useful than interventions triggered by the alerts.		A COPD Health Forecasting Pilot Service was implemented in Rhondda Cynon Taff Health Board in 2007/08 but is no longer running.

Supporting vulnerable groups				
Older people	Those aged 65+ have higher winter related morbidity and mortality rates for a number of reasons: • Having medical comorbidities • Being less able to keep warm through reductions in thermoregulation • 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 • Being less likely to heat the home, e.g. due to **attitudes** around frugality or stoicism • **Lack of awareness** about the link between health and heating • During winter months, spending more time indoors with less physical activity resulting in **reduced physical performance** (e.g. grip strength, leg strength, and balance) There are winter peaks in older people in EWDs, emergency hospital admissions and emergency department attendances.	Evidence on interventions in other sections of this table can be related to older people.	Interventions by organisations from across sectors to target vulnerable groups e.g. tackle social isolation, address living conditions, provide support with everyday tasks, help with accessing support and advice services, promote flu vaccination. Improve home safety e.g. through home assessments and adaptations to meet the needs of vulnerable individuals.	Primary care services ask older people about living and housing conditions during routine consultations or prompt them to receive their influenza vaccination. Anticipatory models of care and planning, including adaptations and multidisciplinary team services and approaches to help maintain independence in the home (e.g. *Hospital to Home* service). Services targeted at older people: • *Warm and Healthy Homes* • *Spread the Warmth* campaign (including advice on winter clothing) • *Winter Fuel Payment/ Warm Home Discount Scheme* • *Care and Repair* home visits • *Steady On, Stay Safe* falls prevention campaign and other falls prevention • *My Winter Health Plan* • *Keep Well this Winter* campaign involves multi sector action to look after the health and safety of older people.
Gender	Inconsistent evidence, with differences in vulnerability more dependent on healthy behaviours, and general body characteristics than gender.			
Pregnant women	Pregnant women are more susceptible to **viral infections**, and can suffer adverse health outcomes such as miscarriage and low birth weight. They are eight times more likely to die from influenza than non-pregnant women. Pregnant women are more **vulnerable to extreme temperatures**, and cold in particular, with adverse associated outcomes such as premature birth.	Maternal influenza vaccination is effective in pregnant women, reducing influenza-associated adverse outcomes in infants born to pregnant women with influenza, e.g. lower birthweights.		Vaccinations for influenza offered to all pregnant women. Pregnant women are a target group for *Warm and Healthy Homes.*
Deprivation/poverty	Average **daily emergency admissions** are highest for individuals living in the most deprived areas of Wales (quintile 5). Populations living in areas of greater deprivation are more likely to have **pre-existing illnesses** and live in **poorer quality housing**; there is limited evidence for further impacts of deprivation on winter mortality.		Poverty is recognised as a *"grassroot"* problem that contributes to winter pressures in Wales.	People living in deprived areas/on low incomes are a target group for: • *Warm and Healthy Homes* • *Arbed and Nest* energy efficiency schemes • *Warm Home Discount Scheme, Cold weather payments*

People who are homeless	Homelessness is associated with increased morbidity and mortality due to direct cold effects and reduced ability to **access healthcare**.	Services for homeless individuals can protect against winter related morbidity and mortality (Finland). Support with housing can reduce health care use generally (not just in winter months).	Target integrated interventions at those who are homeless e.g. *Community Care Collaborative Hub* in Wrexham addresses homelessness and drug addiction, with services co-located on a weekly basis.	Interventions including *Housing First* and the *Community Collaborative Care Hub* (Wrexham) and a range of services provided by third sector organisations offer support to those experiencing homelessness throughout the year.
populations	The effect of rurality on winter-related health is inconclusive. Differences in winter mortality and morbidity between rural/urban areas may be linked to differences in **access to health and care services, housing quality, fuel poverty.**		Rural populations are more vulnerable to fuel poverty due to living in older and energy inefficient properties and having less access to healthcare services / gas networks. Working with OFGEM, households with pre-payment meters should have reduced monthly rates in summer due to less energy use.	

Table 2. Expert stakeholder views on improving systems to reduce demand and increase winter preparedness of services

Area	Intervention (Main Report - Section 7)	Examples of interventions in place in Wales
Planning	**Undertake ongoing integrated long term planning**, responsive to seasonal needs, including other unexpected events. Remove focus on reactive, short term winter planning / projects. Incorporate **evaluation of impact** of interventions on population health. Improve preparations for **all weathers and seasons**, including climate change and extreme weather events. Develop longer term strategies, with **broader measures**, across the year, focusing on **addressing current and future challenges** e.g. ageing population, increasing financial pressures, stressed workforce.	Integrated winter planning across multiple sectors that incorporates new schemes, models of care, improvements to service delivery and performance, and further use/assistance of alternative and community services.
All-year-round prevention	**Develop a collective understanding of effective preventative measures** to reduce demand on services. Through inter-sectoral working, develop **community centred approaches** to build community networks, foster social connectedness and strengthen individual resilience. **Support vulnerable people** e.g. through routine living-environments assessments for older people to promote better home safety and well-being.	**Falls prevention** in care homes through staff education and early recognition of those at-risk. Address falls risk in tenant's home adaptations by utilising assets of housing and third sector (e.g. Hospital to Home service). **Interventions to address fuel poverty** include improving thermal efficiency of housing stock through Welsh Government investment in the *Warm Homes* programme.
Appropriate and timely funding	Funding to support winter pressures should be **earlier in the year**, with adequate time to implement plans and create long-standing change. Move away from short-term transformation funding and "quick fixes".	
Appropriate utilisation of health and care services	Improve appropriate public utilisation of health, care and support services e.g. through **public awareness, signposting** to appropriate services, **removing barriers** to services (e.g. IT literacy, internet access) – particularly for those with social and mental health issues. Enable **effective care navigation** for alternative and community services for non-urgent health issues for the public.	The *Choose Well* campaign encourages and informs people to think about and chose the right health service for their illness or injury, including self-care where appropriate. As part of *Choose Well*, a national community pharmacy campaign aims to particularly 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.
Community services	Provide **sufficient ongoing recurrent funding** of community services that are delivered at sufficient scale and reach. Strengthen services across the community.	Investment has recently been granted for the *Community Collaborative Care Hub* (Wrexham), which 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 room, on a weekly basis.
Schemes to reduce avoidable admissions	Reduce avoidable admissions through: • extended access to **primary and community care** • improved clinical **support to care homes**, educating care home staff regarding early recognition of crises and system infrastructure to prevent admissions from care homes e.g. anticipatory care plans • additional clinical sessions at **community hospitals** • more **mental health practitioners** at out of hours services.	Improved clinical support to nursing and residential homes e.g. education for care home staff on early recognition of crisis situations and need for appropriate ambulance call-outs. Additional consultation sessions in community hospitals on weekends. Increased mental health practitioners to out-of-hours services to address social and well-being issues.

Staff capacity and well-being	Maintain health and care professional **staffing levels**, ensuring there is adequate staffing. Adequate staff capacity should enable better communication between hospitals and care homes on hospital discharge. Improve staff **recruitment and retention**, across all areas of care. Move away from over-reliance on a temporary winter workforce. Address barriers to recruitment e.g. more flexible budgets. Support staff **health and emotional well-being**, all year round and particularly over winter months. Improve **contracts with annualised hours**, allowing more flexibility for staff on having time-off for either summer holidays or during winter.	Improved clinical support to nursing and residential homes e.g. education for care home staff on early recognition of crisis situations and need for appropriate ambulance call-outs. Additional consultation sessions in community hospitals on weekends. Increased mental health practitioners to out-of-hours services to address social and well-being issues.
Improved data and evidence	Improve availability and utilisation of population data to understand **local health needs** and support planning. Improve the **evidence base of the effectiveness** of local interventions to share good practice.	

Table 3. Expert stakeholder views on responding to increased demand on health and care services

Area	Intervention	Examples of interventions in place in Wales
Improved ways of working	Increase **integration and collaboration** both within and outside the health system to improve productivity, quality of care, making best use of existing resources (including financial and workforce).	• Community pharmacists engaging with vulnerable people, particularly those with chronic conditions and older people, as part of a new campaign *My Winter Healthcare Plan* providing individual winter healthcare advice and referral service pathways. • Improved collaboration and performance for reducing average length of time ambulances hold patients outside EDs. • Third sector organisations and healthcare service providers collaborating for quicker and safer patient discharge as part of a pilot *Hospital to Home* service.
Graduated care models and discharge	Ensure **timely and efficient patient discharge** to improve patient flow e.g. through input from multi-disciplinary teams (with safeguards to prevent repeat admissions).	• Other healthcare services provide support (e.g. discharge reviews by pharmacies). • Housing services form part of the discharge team in one model of care.
Improved communication within and between health and care services	Improve communication **between services** over winter months to support positive relationships. Listen to the **views and concerns of frontline staff** and recognise the impact of additional pressures on frontline staff. Improve communication and understanding of different perspectives and concerns **between sectors**, particularly health and social care. Improve communications **between hospitals and care homes** on patient hospital discharge – all year round, not just during winter.	• One-to-one discussions between frontline staff, community services and executives.

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Appendices

Appendix 1: Search strategies for literature review

Impact on health	Interventions
• exp *seasons/ • exp *Cold Temperature/ • (winter adj4 (death$ or fatalit$ or mortalit$ or morbidit$ or illness$ or disease$)).ti,ab. • (temperature$ adj3 (death$ or fatalit$ or mortalit$ or morbidit$ or illness$ or disease$)).ti,ab. • 1 or 2 or 3 or 4 • (health or death$ or mortality or admission$ or hos pitali$ation$ or illness*).ti,ab. • exp Death$/ • exp Mortality/ • exp Morbidity/ • 6 or 7 or 8 or 9 • 5 and 10 • limit 11 to english language • limit 12 to (humans and yr="2008 -Current") • limit 13 to "review articles" And variations of the above also using exp *cardiovascular disease/; exp *cerebrovascular disease/; exp *stroke$/; (respiratory disease* or lung$ or breath$ or air*).ti,ab /; (influenza or flu or infection$).ti,ab.; (mental health or well-being or disorder$ or illness$).ti,ab.; (fall$ or slip$ or accident$ or injur$ or incident$ or fracture$).ti,ab;	• exp Cold Temperature/ • cold adj3 (temperature$ or weather or condition$)).ti,ab. • Snow/ or Ice/ • (winter adj4 (death$ or fatalit$ or mortalit$ or morbidit$ or illness$ or disease$)).ti,ab. • (health impact$ or health effect$).ti,ab. • or/1-5 • (winter adj3 fuel).ti,ab. • (winter adj3 (payment$ or allowance$ or benefit$ or grant$)).ti,ab. • ((cold or frozen) adj3 (home$ or house$ or household$ or housing)).ti,ab. • ((energy adj3 efficien$) and (home$ or house$ or household$ or housing)).ti,ab. • (insulat$ adj4 (home$ or house$ or household$ or housing)).ti,ab. • (Warm Home or Warm Front or Warm Zone).ti,ab. • or/7-13 • ((fall or falls or slip or accident or injury or injuries) adj3 (winter or snow or ice or weather)).ti,ab. • 14 or 15 • ((cold or weather) adj3 (plan$ or harm or health$ or protect$)).ti,ab. • (winter adj3 (evaluate or evaluation or intervention$ or program or prevent$)).ti,ab. • ((seasonal or cold) adj3 (infection or virus or vaccination$ or vaccine$ or flu)).ti,ab. • 17 or 18 or 19 • 16 or 20 • 6 and 21 • limit 22 to (english language and humans and yr="2008 -Current")

Risk and protective factors

- exp *seasons/
- (season* adj4 (varia$ or tempertaure$)).ti,ab.
- ((cold or colder) adj3 (vulnerab$ or risk$1 or suceptib$)).ti,ab.
- (winter adj4 (vulnerab$ or risk$1 or suceptib$)).ti,ab.
- (temperature$ adj3 (vulnerab$ or risk$1 or suceptib$)).ti,ab.
- (weather adj3 (vulnerab$ or risk$1 or suceptib$)).ti,ab.
- 3 or 4 or 5 or 6
- 1 or 2
- 7 and 8
- (risk$1 or risk factor$1 or protective$ or protective factor$1 or reduc$ or prevent$).ti,ab.
- 9 and 10
- limit 11 to (english language and humans and yr="2008 -Current")

- Risk Factors/
- exp Death/
- exp Mortality /
- exp Morbidity/
- 1 or 2 or 3 or 4
- (risk$1 or risk factor$1 or protective$ or protective factor$1 or reduc$ or prevent$).ti,ab.
- (elderly adj3 (vulnerabl$ or risk$1 or suceptib$)).ti,ab.
- (age adj3 (vulnerabl$ or risk$1 or suceptib$)).ti,ab.
- exp Chronic Disease/ep, mo, pc, td [Epidemiology, Mortality, Prevention & Control, Trends]
- ((pre-existing illness$ or chronic) adj2 (season$ or susceptib$ or vulnerab$)).ti,ab.
- (pregnant adj2 (vulnerab$ or season$ or susceptib$)).ti,ab.
- 6 or 7 or 8 or 9 or 10 or 11
- ((cold or colder) adj3 (vulnerab$ or risk$1 or suceptib$)).ti,ab.
- (winter adj4 (death$ or fatalit$ or mortalit$ or morbidit$ or illness$ or disease$)).ti,ab.
- 13 or 14
- 5 and 15
- 12 and 16
- limit 17 to (english language and humans and yr="2008 -Current")

- ((cold or colder) adj3 (vulnerab$ or risk$1 or suceptib$)).ti,ab.
- (winter adj4 (vulnerab$ or risk$1 or suceptib$)).ti,ab.
- (temperature$ adj3 (vulnerab$ or risk$1 or suceptib$)).ti,ab.
- (weather adj3 (vulnerab$ or risk$1 or suceptib$)).ti,ab.
- 1 or 2 or 3 or 4
- Risk Factors/
- (risk$1 or risk factor$1 or protective$ or protective factor$1 or reduc$ or prevent$).ti,ab.
- Seasons/ and (Death/ or Mortality/ or Morbidity/ or Risk Factors/)
- 5 or 6 or 7 or 8
- exp Housing/
- Heating/
- ((cold or freez$) adj3 (home or homes or house or houses or household$ or housing)).ti,ab.
- ((cold or freez$) adj3 (accommodation$ or rent or rents or rented or tenancy or tenancies or dwelling$)).ti,ab.
- ((energy adj3 efficien$) and (home or homes or house or houses or household$ or housing)).ti,ab.
- thermal comfort.ti,ab.
- (insulat$ adj4 (home or homes or house or houses or household$ or housing)).ti,ab.
- ((warm$ or temperature$) adj3 (home or homes or house or houses or household$ or housing)).ti,ab.
- (winter adj3 (fuel or payment$ or allowance$ or benefit$ or grant$ or voucher$)).ti,ab.
- 10 or 11 or 12 or 13 or 14 or 15 or 16 or 17 or 18
- exp *socioeconomic factor$/
- (socioeconomic adj3 (vulnerab$ or risk$1 or suceptib$)).ti,ab.
- 20 or 21
- 19 and 22
- (winter adj4 (death$ or fatalit$ or mortalit$ or morbidit$ or illness$ or disease$)).ti,ab.
- 5 and 9
- 5 or 9 or 24
- 23 and 26
- limit 27 to (english language and humans and yr="2008 -Current")

Appendix 2: Pre-intervention information sheet and interview questions

Thank you for agreeing to complete a telephone interview regarding prevention as a means of reducing Winter Pressures. We hope this short summary of the project will help you to formulate a few ideas before the interview and help to structure the interview. The conversation should take no longer than 30 minutes and, if you wish, you will receive a summary of the project once it is completed.

This project is being completed by the Policy, Research and International Development Directorate of Public Health Wales; therefore, the focus is on how to keep people well over winter. We have identified that there is a lot of focus on flow in healthcare systems when completing winter pressure preparedness plans, but a lack of guidance on how to prevent vulnerable populations becoming ill in the first place. This project aims to bring together the latest literature, epidemiology, along with expert opinion across all sectors in Wales about how prevention methods could be improved in preparation for winter 2019/20.

There are around 34,000 excess winter deaths in England and Wales each year. The conditions contributing to this the most are respiratory, cardiovascular/cerebrovascular, and falls, particularly in the elderly. We are really interested in your views from personal experience about who you feel are most vulnerable to becoming unwell, why this might be, and any ways you think this could be prevented.

The questions we will be asking are as follows:

- What do you think are the pressures faced by health and care services (across sectors) during the winter period?
- What does your sector do to prepare for winter pressures?
- Do you think current winter preparations are effectively contributing towards reducing morbidity and mortality? Why?
- Are there any other interventions or approaches that could be implemented?
- Do you think winter preparations should have a broader public health approach? What do you think these should be and why?

Thank you for taking the time to read this. We look forward to talking soon.

Appendix 3: Table of additional interventions and approaches in Wales to ease winter pressures suggested by interviewees

Health care	
Influenza vaccinations	• A single provider (e.g. community pharmacies or a group of GP Practices) providing flu and pneumococcal vaccine in care homes for both residents and care staff. Currently, GP practices provide flu and pneumococcal vaccine to their registered patients. Therefore, a GP practice can have patients in different care homes and offering influenza vaccines to all their patients can be resource intensive.
Health and social care workforce	• Feedback to all staff providing the number of days lost due to staff on sick leave, particularly with influenza and influenza-like illnesses. • National approach and campaign targeting the younger generation, in schools and colleges, for careers in nursing and domiciliary care. • Collaborative team meetings among healthcare professionals at a cluster level, such as community pharmacists, GPs, opticians, district nurses etc, to best understand healthcare roles and how best to utilise available services. • Create community teams at the cluster level to manage acute demand more effectively, working closely with primary care services. • Referral pathways into third sector support agencies and organisations for frontline staff (e.g. paramedics, police).
Wintertime campaigns	• Local media campaign using various mediums to promote flu vaccine, staying healthy in winter, and ***Choose Well*** campaigns. • Eat well and hydration campaign targeting elderly people both in communities and care homes. • Social inclusion campaigns working in collaboration with community connectors, social prescribers and frontline care workers. • Digital inclusion campaigns. • Offering training to people so they can use the internet and smartphones, potentially for social contact. • Use of mobile applications to support and engage local populations to keep active and exercise.
Winter planning	• Shorter 90-day cycles for integrated winter planning regarding demand management. • Having continuous planning in-place was perceived to allow health boards to ensure service efficiency and support is in place.
Care homes	• Implementing postural stability programmes in care homes as part of falls prevention. • Working in collaboration with Fire and Rescue Services to extend their fire safety visits into safety and well-being visits – offering brief interventions and signposting to relevant services. • Electronic system of shared advanced care plans across the system to make them available for any professional visiting. This would reduce the number of patients unnecessarily admitted to end-of-life care.
Building social networks/ community resilience	• Building supportive social networks around vulnerable people, especially for those who are living alone or more vulnerable to the effects of winter, in the community. One example described was an intervention ***'Compassionate Communities Wales'***, which was trying to change the conversation in primary care to recognise potentially vulnerable patients. • Developing Well-being Hubs for communities to access social activities and engage in community projects, as well as be a one-stop place for other key services in healthcare, housing, and employment on a weekly basis.

Social care	
Influenza vaccinations	• Encouraging more information and early education on how to self-care for minor ailments and injuries. • Educating health and social care staff on the benefits of seasonal influenza vaccinations for protecting themselves and others.
Telehealth and telecare services	• Encouraging more use of telecare and telehealth services for better surveillance and monitoring of people's chronic health conditions as a preventive approach before individuals become ill, particularly during the wintertime.
Escalation beds	• Additional escalation beds over winter for vulnerable people, reducing the likelihood of subsequent hospital admissions.
Third sector organisations	
Education	• Encouraging early education programmes in schools on how to adequately manage finances such as budgeting and debt management. These essential skills could be influential in reducing the number of people living in poverty/fuel poverty.
Support for those sleeping rough	• National public guidance on how to best prepare in all types of weather (e.g. summer heat or winter cold), with a section dedicated to those sleeping rough on the streets. • Guidelines on what would be most helpful in terms of donations and public activity to support individuals sleeping rough.
Housing sector	
Energy efficiency interventions	• Introduce length-of-stay criteria for energy efficiency interventions, which consider both the length of time current tenants are predicted to continue living in the property and the general lifespan of the property. This will provide more information about the return on investment for interventions.
Local authority run energy companies	• Consideration of Welsh local authorities to create their own energy companies to offer competitive prices of gas/energy to local residents, particularly for those most vulnerable.
Social networks & community resilience	• Encourage more social activities at local authority level, for example, communal Tai Chi classes. • Expand the Community Collaborative Hub to other regions and for other vulnerable groups (e.g. those living with loneliness).
Welsh Government	
Support for those in fuel poverty	• Additional referral routes to energy-efficiency interventions (e.g. Nest programme) for vulnerable households, for example, people accessing emergency assistance payment schemes regarding heating systems. • UK Government should remove standard charges or reduce charges in low-gas usage months such as summer, on prepayment meter tariffs for vulnerable households with little financial means of heating. • Introduce widespread use of smart energy technology such as smart thermostats and digital meters to better manage energy consumption.
Energy efficiency interventions	• Cooling measures as part of energy-efficiency interventions to keep properties cool in the warmer months as well as measures to keep warmer in the colder months; a better-rounded retrofit addressing changes to the climate.

Appendix 4: Health and Housing Collaboration Checklist

How well are we working together?

Checklist for local health board planners	✓
1. Strategic Overview Identify how the Health Board recognises the significant contribution and assets that the housing sector brings to the Health Board agenda which impacts on the following: • Protecting health and preventing ill-health • Improving patient outcomes • Reducing health service usage • Supporting earlier hospital discharge • Enabling significant cost savings to be made in the NHS • Enabling patients to stay in their home and community for as long as possible How is joint work between the health board and housing sector reflected in the Integrated Medium Term Plan and Service Change Plans?	
Comments:	
2. Partnerships Is there sufficient housing representation on the Regional Planning Board in the area? How does the Health Board ensure that a focus on health and housing (both social and private sectors) is developed as part of regional and local statutory partnership working arrangements? Is there demonstration of joint initiatives, and of health and housing (both social and private) being included in health and well-being plans at regional and local level?	
Comments:	
3. Excess Winter Deaths To what extent has 'NICE Guidance and pathways on Excess Winter Deaths' and/or toolkits such as 'Cold Homes Toolkits' been implemented? Provide examples to highlight good practice	
Comments:	

4. Health and Housing Pathways How has the Health Board worked with partners to implement and improve referral pathways between health and housing professionals, using local partnerships and tools listed in 3 above (or similar local tools)? How do these target the most vulnerable, across both social and private sector housing (e.g. older people, children, homeless)? Does the Health Board encourage take-up of national housing schemes which would be of benefit to local residents e.g. NEST, Arbed?	
Comments:	
5. Falls Prevention Does the Health Board review and improve multi-agency falls prevention programmes ensuring there is join up between falls prevention initiatives in health, local authority and third sector settings? Does the Health Board have a Falls Strategy for a) inpatient care, and, b) the community?	
Comments:	
6. Primary Care How does the Health Board ensure housing is a priority in GP Cluster Plans, demonstrating and including links with local housing organisations, and establishing referral pathways between primary care and the housing sector?	
Comments:	
7. Enhanced Discharge How does the Health Board work with housing organisations to find suitable solutions, including working with those patients with complex health and social needs, to enhance early discharge from hospital at the appropriate time?	
Comments:	

8. Networking and Information Are opportunities maximised for integrating housing within Single Point of Access and information portals, and increasing and improving data linkage between health, care and housing?	
Comments:	
9. Research and Development How does the Health Board encourage evidenced based health and housing research and initiatives? What examples demonstrate this?	
Comments:	

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