



Public Health
England

Protecting and improving the nation's health

Cold weather health risks and COVID-19: actions to prevent harm

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Cold weather health risks and COVID-19: actions to prevent harm

Date of issue: October 2020

Version: 01.00

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Amendment History:

Version	Date	Amendments made

Background

COVID-19 is likely to amplify the risks of cold weather.

For specific information on cold-related health risks, refer to the current [Cold Weather Plan for England](#) and associated resources. The plan recommends a series of steps to reduce the risks to health from cold weather for:

- the NHS, local authorities, social care, and other public agencies
- professionals working with people at risk
- individuals, local communities and voluntary groups

The ‘Cold Weather Plan for England’ is underpinned by the Met Office’s [Cold Weather Alert service](#) which runs annually from 1 November to 31 March.

Register for email updates from the [Cold Weather Alert Service](#) now.

The alerting system is moving to a new, upgraded platform. **Current and new users must register their email address with the new system by 1 November 2020.** Due to compliance with the General Data Protection Regulation (GDPR) it is not possible to subscribe current users to the new system automatically.

Outline

- Health impacts of cold weather
- Cold weather health risks and COVID-19
- Preventing cold-related harm
- Cold weather risks and COVID-19: recommendations
 - Key recommendations for all
 - Commissioners of health and social care (all settings) and local authority Directors of Public Health
 - Providers – health and social care staff in all settings (primary and community care, hospitals and care homes)
 - Community and voluntary sector and individuals
 - National Level: NHS England, PHE, DHSC, Met Office
- Resources
- References

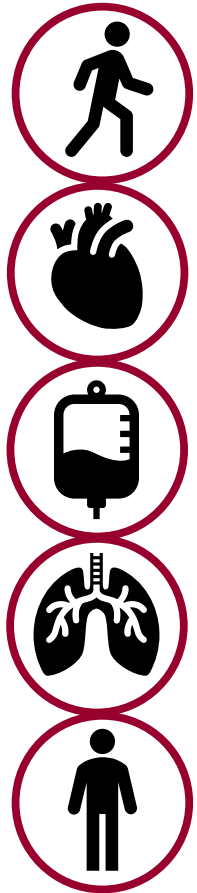
Health impacts of cold weather

How cold weather affects the body

The human body responds in several different ways when exposed to cold weather, even at temperatures which are not 'extreme' (see next slide).

Exposure to cold temperatures has a range of physiological effects including:

- increased blood pressure
- increased risk of clotting
- suppression of the immune system
- diminished capacity of the lungs to fight off infection
- increased airway constriction and mucus production in the lungs



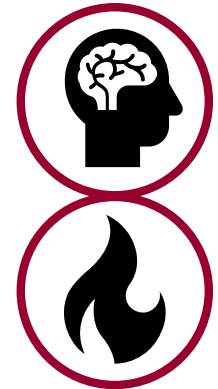
How cold weather causes harm

Although exposure to extreme cold can kill directly through hypothermia, this is not the main cause of cold-related illness and death.

Cold weather can have direct and indirect effects on our health:

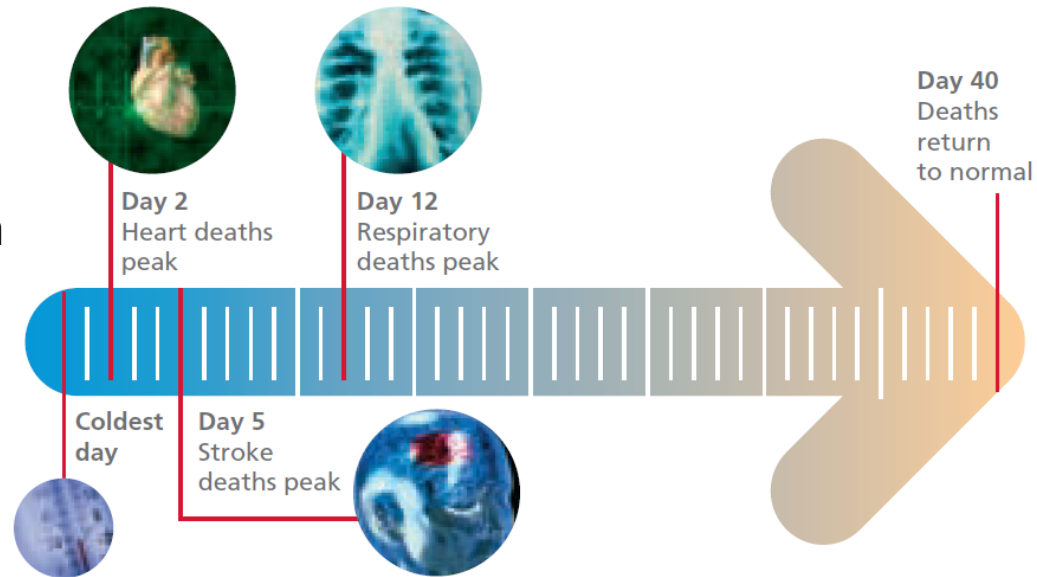


Direct health effects	Indirect health effects
heart attack	mental health effects from depression
stroke	
respiratory disease	reduced educational and employment attainment
influenza	
falls and injuries	risk of carbon monoxide poisoning
hypothermia	

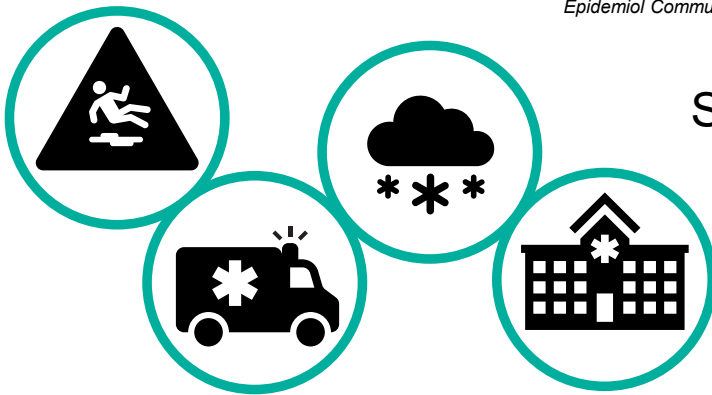


What happens during cold weather?

During cold weather deaths caused by **cardiovascular conditions** peak first (on day 2) followed by **stroke** (day 5) and then **respiratory conditions** (day 12).



Reference: 2009 Annual Report of the Chief Medical Officer. Original source: Donaldson GC, Keatinge WR. Early increases in ischaemic heart disease mortality dissociated from and later changes associated with respiratory mortality after cold weather in south east England. *J Epidemiol Community Health*. 1997 Dec;51(6):643-8.

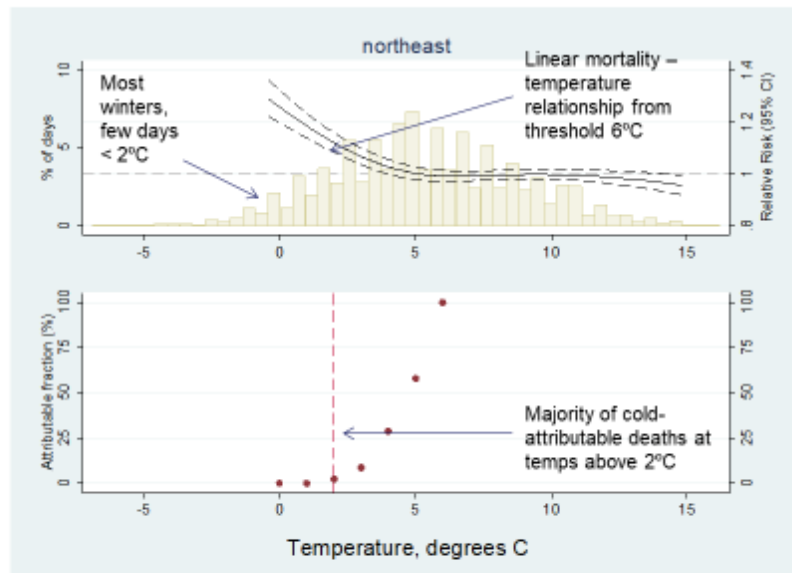
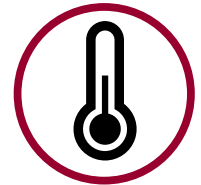


Snow and ice also cause:

- disruption to service provision
- reduction in access to essential services
- increase in the risk of falls and injuries

Which temperatures have an impact?

Risk curve for all cause mortality for the North East
(October-March) and the attributable fractions at
different temperature thresholds



Hajat et al, Public Health 2016

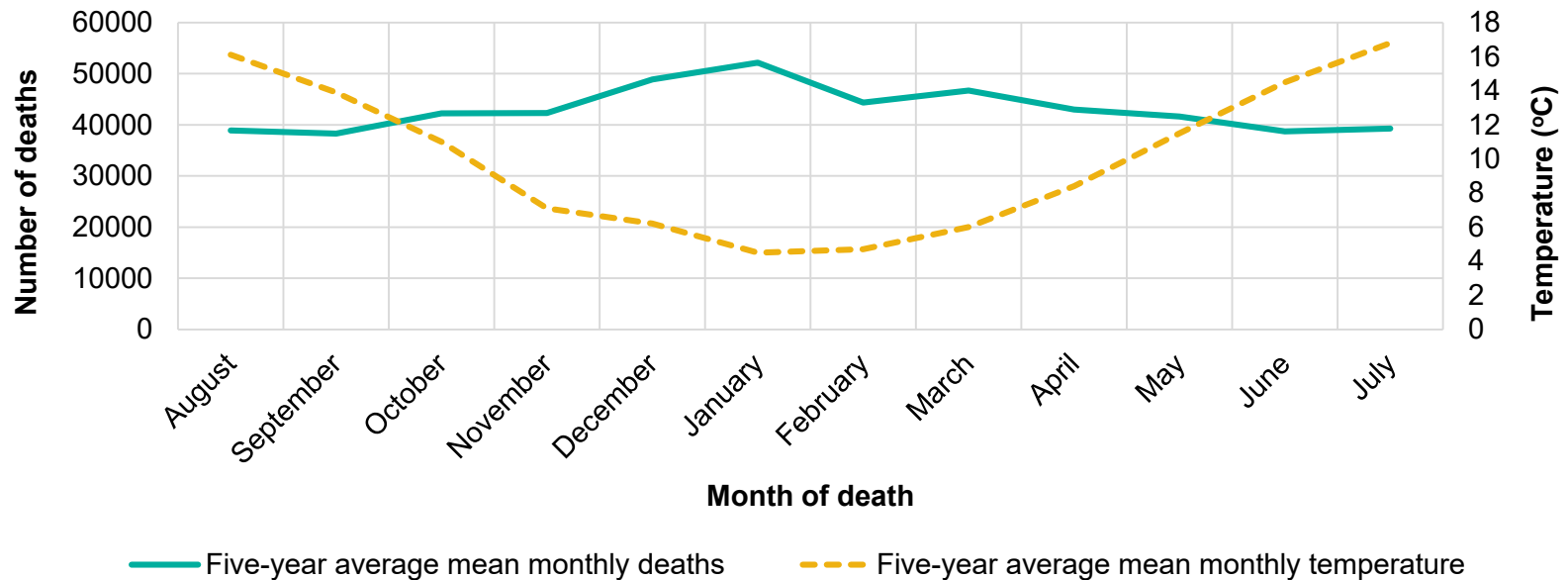
- Health impacts of cold weather occur at outdoor temperatures which might be considered relatively mild (4°C to 8°C).
- The risk of death increases as temperatures fall, so periods of very low temperatures will cause significant harm.

The effect of temperatures on health

Temperature	Effect
18°C (65°F)	Heating homes to at least 18C in winter poses minimal risk to the health of a sedentary person, wearing suitable clothing
Under 18°C	May increase blood pressure and risk of cardiovascular disease
Under 16°C	May diminish resistance to respiratory diseases
4°C to 8°C	Mean outdoor temperature threshold at which increased risk of death is observed at a population level
5°C	Poses a high risk of hypothermia

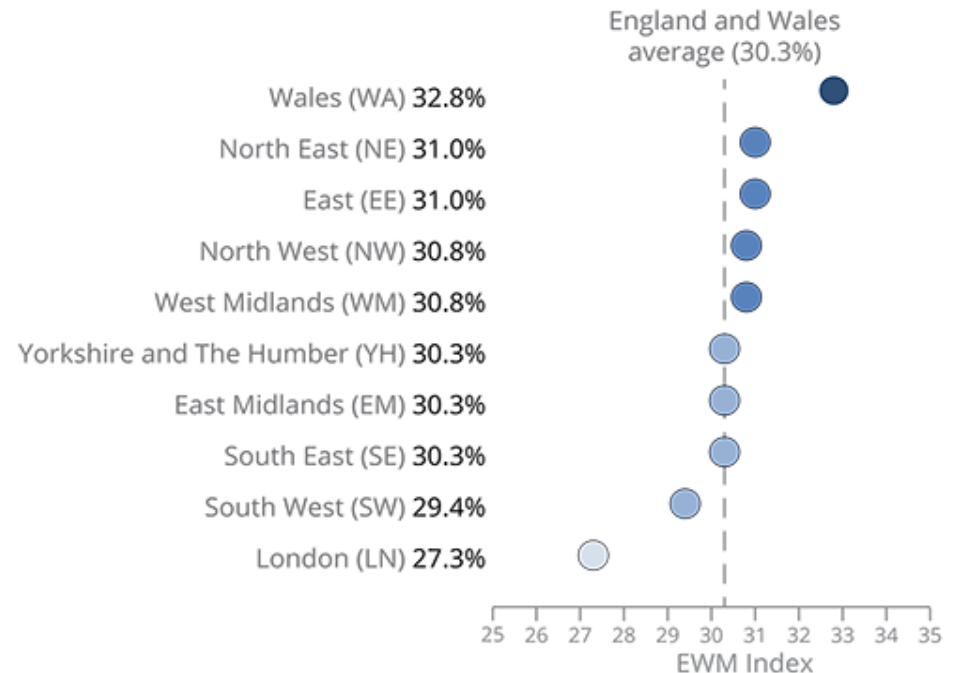
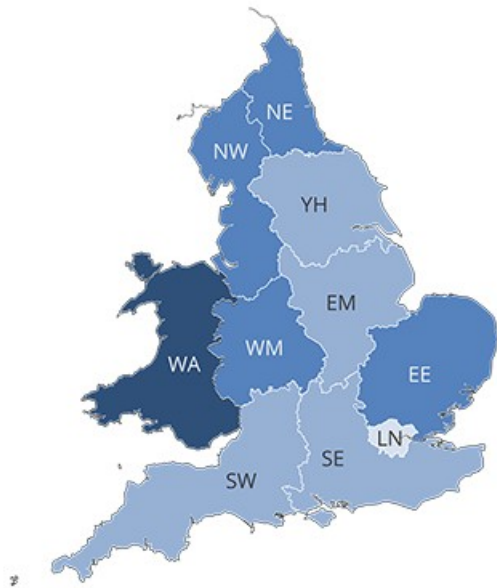
Deaths over the year

Mean daily deaths and temperature by month, five-year average , England and Wales



- More people die in the winter than in the summer
- Excess Winter Deaths (EWDs) = winter deaths - average non-winter deaths
- 80% aged 75+ (but not only the very old are affected by cold)
- Large variation in EWD numbers year on year

Where do these impacts occur? (1)



Source: Office for National Statistics licensed under the Open Government Licence v.3.0.
Contains OS data © Crown copyright 2018
Graphic created by the GIS and Mapping Unit, ONS Geography

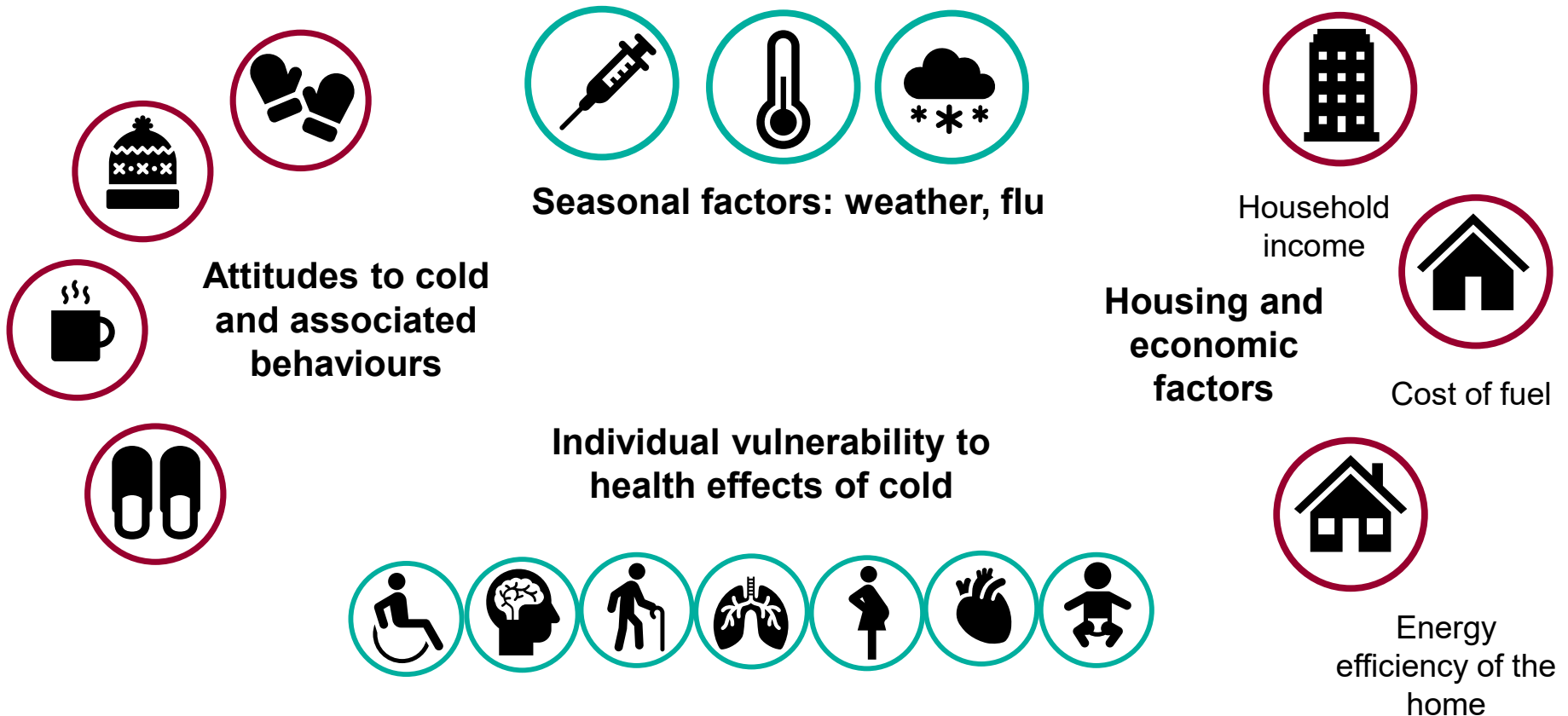
The EWM index is calculated as excess winter deaths (EWD) divided by the average non-winter deaths, expressed as a percentage.

The North East, North West, West Midlands, and East of England experienced a higher EWM index than the rest of England.

Who is affected by cold?

Excess Winter Deaths (EWDs) represent an important health inequality – people who experience greater socio-economic deprivation are more likely to be affected.

Multi-agency action is required to address wider determinants of health that impact on risk from cold such as socio-economic inequalities, fuel poverty and housing energy efficiency.



Cold weather health risks and COVID-19

Cold and COVID-19: key messages

COVID-19 is likely to amplify the risks of cold weather.

Fear of COVID-19 should not prevent action to tackle the risks from cold temperatures and winter weather.

It is critical that actions to prevent health harms from cold temperatures and winter weather continue – including identifying and supporting those at risk – with necessary adaptations in line with coronavirus guidance to keep everyone safe.

Cold and COVID-19: potential interactions

Shared risk factors among population sub-groups affected by both cold temperatures and COVID-19

Clinical impacts arising from the concurrence of cold weather and COVID-19

Increased exposure to cold temperatures due to change in patterns of energy use at home, fuel poverty and reduced access to warm public spaces

Social and community networks, access to resources

System level risks related to concurrency of impacts, change in patterns of health and social care use, access and delivery and health seeking behaviour

Cold and COVID-19: shared risk factors (1)

Risk factors linked with worse outcomes from COVID-19, that are also risks for cold-related harms, are:

- age (65+ for cold, 70+ for COVID-19)
- underlying health conditions – chronic respiratory and heart disease
- diabetes
- pregnancy

Factors that impact on ability to adapt to cold, such as severe mental illness, cognitive impairment, drug and alcohol dependencies and disability, may also impact on ability to reduce exposure to COVID-19 – for example, through reduced ability to maintain good respiratory and hand hygiene.

Cold and COVID-19: shared risk factors (2)

Other groups with increased risk across the 2 hazards include:

- people who are housebound or otherwise have low mobility – they have reduced ability to self-care, greater dependence on care, suffer from social isolation
- people living in deprived circumstances
- people living in houses with mould - mould arises in poorly ventilated settings and poor ventilation is likely to be a risk factor for transmission of COVID-19 within the home
- people living in households experiencing fuel poverty – fuel poverty is linked to income and socio-economic deprivation, which is recognised as a risk factor for both cold and COVID-19
- people who are homeless or sleeping rough
- other marginalised or socially isolated individuals or groups – these may face barriers to accessing care because of, for example, language barriers or concerns about eligibility.

Cold and COVID-19: clinical impacts (1)

We still have much to learn about how COVID-19 infection affects the body, however possible mechanisms of interaction are described below:

Clinical outcomes may be more severe where exposure to cold and COVID-19 co-occurs for a given individual – for example, through increased stress on the cardiovascular system and respiratory systems.

Immunosuppression and increased rates of respiratory infections – winter is linked to increases in respiratory infections, likely related to factors such as increase in transmission, susceptibility to infection in cold weather.

Complications or long-term impacts of COVID-19 over the months prior to a significant cold weather event may increase the numbers with vulnerability to low temperatures.

Cold and COVID-19: clinical impacts (2)

Interaction with other seasonal infections

The impact of protective or harmful interactions between COVID-19 and other infections (for example, common cold coronaviruses, rhinovirus, respiratory syncytial virus (RSV), influenza and bacterial pathogens) is not yet known.

There is emerging evidence of poorer outcomes in those who are co-infected with COVID-19 and flu.

There may be overlap in symptoms and potential for mis-diagnosis or late diagnosis in community settings.

Cold and COVID-19: increased exposure (1)

Potential increase in exposure to cold may arise as a result of:

Fuel poverty and cold homes

- Increased numbers of people spending **more time at home than usual**, with increased demand for energy and costs of heating.
- Economic drivers this winter may see an increase in the number of households and a difference in the types of households that experience **fuel poverty and cold homes**, not all of whom will be aware of funds or resources available to help with keeping warm.

Reduced access to public warm spaces

Necessary controls to limit spread of COVID-19 may limit access to warm public spaces, such as libraries.

Discharge of vulnerable patients from hospital to a cold home

This is a specific risk that has been recognised by NICE.

Cold and COVID-19: increased exposure (2)

Transmission of viruses is dominated by indoor pathways. People spend significantly more time indoors during the winter.

Risk of transmission indoors is likely to be increased by housing factors:

- Poor ventilation in winter months increases the density of virus particles accumulating in a room. Barriers to ventilation include fuel poverty and other contextual factors such as noise, pollution and security concerns.
- Overcrowding

Socio-economic factors: poor housing and deprivation are often shared risk factors for poor health that may also interact to increase the risk of transmission.

Cold and COVID-19: Increased exposure (3)

Homelessness and rough sleeping

There may be reduced access to shelters and other public warm spaces due to COVID-19 measures, which increases risk of exposure to cold.

Homeless people, including the hidden homeless, may be at increased risk of exposure to COVID-19 due to overcrowding, and barriers to practising regular hand and respiratory hygiene, as well as facing a high burden of pre-existing health problems.

The extent of interacting risks from cold and COVID-19 faced by this vulnerable group will be influenced by decisions such as the safe provision of shelters, alternative accommodation and the activation of Severe Weather Emergency Plans.

Cold and COVID-19: social and community networks, access to resources

Social isolation is a risk factor for cold and is likely to be increased by COVID-19.

New groups of people and households may be drawn into fuel poverty and unaware of funds and resources available to help with keeping warm.

Digital exclusion may also be more relevant as a driver of inequitable access during COVID-19, as people are less able to access resources in person.

Reduced opportunities to identify cold, damp and mould due to remote interactions (consultations with health and social care staff, key workers, friends and family) unless specifically asked about.

Cold and COVID-19: system level risks (1)

Surveillance – established baselines may be unreliable and difficult to interpret this winter season due to changes in behaviour, impact on interpretation of signals, and overlap of symptoms (syndromic surveillance) caused by the COVID-19 pandemic.

High demand and unmet need – additional demand from COVID-19 and cold weather and other seasonal impacts (winter pressures).

Other factors: Discharge of patients to care settings slower, staff absence.

Change in patterns of health service use and reorganisation of health and social care systems to address COVID-19 has impacted the ability of the NHS to deal with non-COVID-19 work.

Cold and COVID-19: system level risks (2)

Health seeking behaviours

- Perceptions of risk from COVID-19 negatively impacted on attitudes to accessing care during lockdown, including anxiety about being at risk from COVID-19.
- Confidence was found to be lower among people from BAME backgrounds and people living with a disability.
- There was a significant reduction in presentations to emergency care for both minor and urgent conditions from March to May. This may impact on cold-related health harms such as heart attacks and strokes.

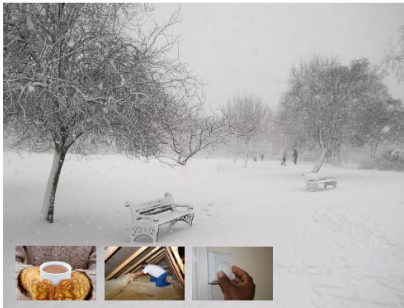
Preventing cold-related harm

Preventing cold-related harm

The NICE guidelines (NG6) for reducing the risk of death and ill health associated with living in a cold home aims to improve the health and wellbeing of people vulnerable to the cold. Further detail is provided on the next slide.



The Cold Weather Plan for England Protecting health and reducing harm from cold weather



Local
Government
Association

Met Office

The Cold Weather Plan for England recommends a series of steps to reduce the risks to health from cold weather for:

- the NHS, local authorities, social care, and other public agencies
- professionals working with people at risk
- individuals, local communities and voluntary groups

Near real-time data is also produced throughout the year to support planning and prevention of EWDs.

What does this mean for the NHS?

The NICE guidelines provide specific recommendations for the NHS, summarised below. These should not happen in isolation and require action by, and collaboration with, local authority and other stakeholders.



Health and Wellbeing Boards, Clinical Commissioning Groups, and wider NHS

- Develop a strategy to address the health consequences of cold homes
- Provide a single-point-of contact health and housing referral service for people living in cold homes to provide tailored solutions
- Raise awareness among practitioners and the public about how to keep warm at home
- Train health and social care practitioners to help people whose homes may be too cold

Primary healthcare practitioners

- Identify people at risk of ill health from living in a cold home*
- Make every contact count by assessing the heating needs of people who use primary health and home care services



Secondary healthcare practitioners

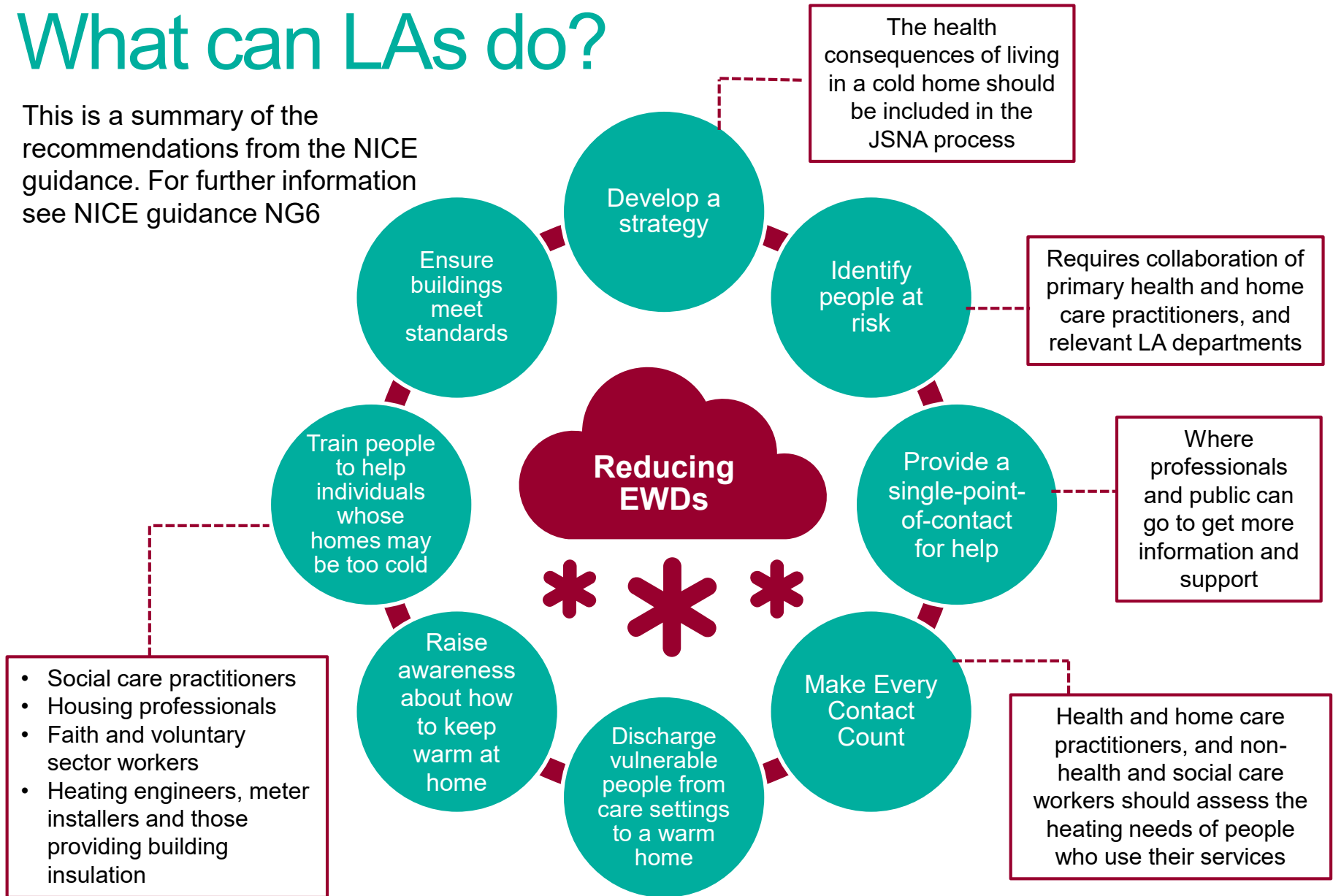
- Identify people at risk of ill health from living in a cold home*
- Discharge vulnerable people from health or social care settings to a warm home



*advice on how to identify people at risk is provided in the NICE guidelines

What can LAs do?

This is a summary of the recommendations from the NICE guidance. For further information see NICE guidance NG6



Cold weather risks and COVID-19: recommendations

COVID-19: cold weather preparedness and response

The guidance and good practice recommendations in the [Cold Weather Plan for England](#) set out in Figures 3.1 to 3.4 should **continue to be followed** with some additional considerations to mitigate and manage the concurrent COVID-19 risks.

The following slides detail specific considerations for:

- Commissioners of health and social care (all settings) and local authority Directors of Public Health
- Providers – health and social care staff in all settings (community, hospitals and care homes)
- Community and voluntary sector and individuals
- National level: NHS England, PHE, DHSC, Met Office

All actions should also consider [current COVID-19-specific guidance](#) and be carried out in line with local regulations.

Key recommendations for all

1. All local authorities, NHS commissioners and their partner organisations, including health and social care providers, should consider the 'Cold Weather Plan for England' and satisfy themselves that the suggested actions and the cold weather alert service are understood across their locality, and potential additional need has been considered in surge capacity plans. [Register for the Cold Weather Alert Service](#)
2. People at risk from cold weather may also be vulnerable to COVID-19 infection and vice versa. This can be due to concurrence of both clinical and environmental or socio-economic factors. **Identify those at greatest risk this winter, taking into account intersecting risks. Ask about living in a cold home, and support vulnerable individuals to access existing resources to keep warm.**
3. Cold weather actions and decisions should continue, while following national guidance on COVID-19 and related policies (for example, social distancing and self-isolation advice).

Commissioners of health and social care (all settings) and local authority Directors of Public Health (1)

In addition to actions set out on page 36 of the CWP for England:

- ensure there is a single point of contact to provide tailored advice for people living in cold homes.
- train social care, housing and other professionals who may make home visits to identify those most at risk, taking into account the intersection of cold and COVID-19, and integrate these risk assessments to target information and support to vulnerable households.
- engage the community and voluntary sector to identify and support those most at risk, especially those who are socially isolated
- work across STPs/ ICSs to utilise existing structures such as primary care networks; social prescribing networks; community pharmacists; local authority social care and crisis support teams to identify and support vulnerable individuals to access resources to keep warm
- consider potential measures which could be implemented to reduce the cold-related risks faced by individuals who are clinically vulnerable, clinically extremely vulnerable or self-isolating

Commissioners of health and social care (all settings) and local authority Directors of Public Health (2)

Increase the resilience of partners to the concurrent risks of cold and COVID-19:

- work with partner agencies, providers and businesses to raise awareness about the concurrent risk of cold weather and COVID-19
- support local health and social care organisations in protecting vulnerable residents and ensuring staff welfare (e.g. mutual aid, PPE supply, mental health)
- Local Health Resilience Partnerships may wish to satisfy themselves that there is adequate review across local health and social care systems of usual plans for surge capacity in cold weather in light of possible COVID-19 related staff absence and to ensure staff welfare
- Local Resilience Fora should consider the impact of cold weather on the existing operational response to COVID-19 and vice versa
- ensure care homes and hospitals are aware of the cold weather plan and are preparing for cold weather as a concurrent risk with COVID-19
- ensure other institutional establishments (for example, prisons, schools) are aware of cold weather guidance
- ensure adequate provision of COVID-safe accommodation for homeless people and other vulnerable groups and ensure capacity to scale up provision

Providers – health and social care staff in all settings (primary and community care, hospitals and care homes) (1)

In addition to actions set out on page 37-39 of the CWP for England:

- Review who may be at high risk – identify those at greatest risk this winter, taking into account intersecting risks. Ask about living in a cold home.
- Provision of care and support during winter will be particularly important in the context of additional risks and vulnerabilities related to COVID-19 (such as protecting BAME staff) and cold weather. There may be additional need over above ‘usual’ winter pressures on this sector. Review your usual plans for surge capacity in cold weather in light of possible additional need and COVID-19 related staff absence.
- Encourage staff to sign up to cold weather alerts, communicate alerts to staff, ensure staff know what to do when the weather gets cold, and get their flu vaccinations.

Providers – health and social care staff in all settings (primary and community care, hospitals and care homes) (2)

- More people receiving personal care, particularly in domiciliary settings, may be at higher risk than usual from cold due to potential for concurrent COVID-19 related ill-health and COVID-19 restrictions.
- Ensure a minimum temperature of 18C is kept and patients are comfortably warm whilst following COVID-19 guidance on ventilation.
- Ensure safe discharge (for example, patients are not discharged to cold homes) including regular post-discharge support (which may need to be increased) and use of multi-disciplinary approaches such as hospital-at-home and reablement services.

Community and voluntary sector and individuals

In addition to actions set out on page 40 of the CWP for England:

- have plans in place to be able to check on others safely in advance of the cold weather (for example, over the phone)
- develop clear messaging to the public to encourage them to begin winter preparedness, for example, checking eligibility for assistance with heating costs, checking heating appliances, and checking on vulnerable neighbours and relatives
- encourage those who may find it more difficult to cope in cold weather to request help through volunteer networks, for example, the [Royal Voluntary Service website](#)
- advise those at risk that they should continue to seek medical help if they are feeling unwell and that plans are in place to deliver services safely despite COVID-19

National Level: NHS England, PHE, DHSC, Met Office (1)

In addition to the actions set out in Page 41 of the Cold Weather Plan for England:

- ahead of cold weather, NHS England should consider the impact of cold weather on workforce capacity and wellbeing
- NHS England should satisfy themselves that alerts are cascaded widely and promptly, including to patient-facing and clinical staff
- PHE Regions should be aware of the Cold Weather Plan and note the new Keep Warm, Keep Well resource, and provide support to Directors of Public Health and other local stakeholders as appropriate

National Level: NHS England, PHE, DHSC, Met Office (2)

PHE surveillance systems to provide early warning of the potential health impacts of cold weather will continue throughout winter 2020 to 2021. However, the wider impact of the COVID-19 pandemic on the surveillance systems routinely used to monitor the health impact of cold weather adds complexity to the surveillance outputs making their interpretation difficult

PHE and the Met Office will be hypervigilant within the cold weather alerting system to ensure the earliest possible issuing of cold weather alerts and the maximum possible warning time.

Resources

[Cold Weather Plan for England](#)

[Keep Warm, Keep Well leaflet](#)

[E-learning on helping people living in cold homes](#)

[Simply energy advice website](#)

[Specific advice and guidance on coronavirus \(COVID-19\)](#)

References (1)

Slide 3

- Cold Weather Plan for England: protecting health and reducing harm from cold weather, available at: <https://www.gov.uk/government/collections/cold-weather-plan-for-england>

Slide 8

- 2009 Annual Report of the Chief Medical Officer. Original source: Donaldson GC, Keatinge WR. Early increases in ischaemic heart disease mortality dissociated from and later changes associated with respiratory mortality after cold weather in south east England. J Epidemiol Community Health. 1997 Dec;51(6):643-8.

Slide 9

- Hajat S, et al. (2016). Public health vulnerability to wintertime weather: time-series regression and episode analyses of national mortality and morbidity databases to inform the Cold Weather Plan for England. Public Health 137, 26-34

Slide 10

- Cold Weather Plan for England (see slide 3)

Slide 11

- Public Health England Training slide sets Excess Winter Deaths in the winter 2017-18. 2019. available at: <https://www.gov.uk/government/collections/cold-weather-plan-for-england>

References (2)

Slide 17

- NHS 'Who's at higher risk from Coronavirus' 2020 available at: <https://www.nhs.uk/conditions/coronavirus-covid-19/people-at-higher-risk/whos-at-higher-risk-from-coronavirus/>
- Cold Weather Plan for England (see slide 3 reference)

Slide 18

- Office for National Statistics 'Deaths involving COVID-19 by local area and socioeconomic deprivation: deaths occurring between 1 March and 31 July 2020 Available at: <https://www.ons.gov.uk/peoplepopulationandcommunity/birthsdeathsandmarriages/deaths/bulletins/deathsinvolvingcovid19bylocalareasanddeprivation/deathsoccurringbetween1marchand31july2020#:~:text=There%20were%2051%2C831%20deaths%20occurring,period%2C%20which%20was%20259%2C199%20deaths.>
- SPI-B/EMG: COVID-19 housing impacts, 10 September 2020. Available at <https://www.gov.uk/government/publications/spi-bemg-covid-19-housing-impacts-10-september-2020>
- Tsai J, Wilson M. COVID-19: a potential public health problem for homeless populations. The Lancet Public Health. 2020 Apr 1;5(4):e186-7
- Cold Weather Plan for England (see slide 3 reference)
- Patients not Passports 'Migrants Access to Healthcare During the Coronavirus Crisis'. 2020. Available at: <https://neweconomics.org/uploads/files/Patients-Not-Passports-Migrants-Access-to-Healthcare-During-the-Coronavirus-Crisis-FINAL.pdf>

Slide 19

- The UK Sepsis Trust. Recovery After Critical Illness: What you should know after leaving a critical care unit. 2020 <https://sepsistrust.org/wp-content/uploads/2020/05/Critical-Care-Booklet-220420.pdf>

References (3)

Slide 20

- The Academy of Medical Sciences. Preparing for a challenging winter 2020/21. The Academy of Medical Sciences; 14 July 2020. Available at: <https://acmedsci.ac.uk/file-download/51353957>
- Stowe J, Tessier E, Zhao H, et al. Interactions between SARS-CoV-2 and influenza and the impact of coinfection on disease severity: a test negative design. medRxiv (preprint) 18 Sep 2020. <https://www.medrxiv.org/content/10.1101/2020.09.18.20189647v1.full.pdf>
- Office for National Statistics. Excess winter mortality in England and Wales. 2019. Available from: <https://www.ons.gov.uk/peoplepopulationandcommunity/birthsdeathsandmarriages/deaths/bulletins/excesswintermortalityinenglandandwales/2018to2019provisionaland2017to2018final>
- Docherty AB, Harrison EM, Green CA, Hardwick HE, Pius R, Norman L, et al. Features of 20,133 UK patients in hospital with covid-19 using the ISARIC WHO Clinical Characterisation Protocol: prospective observational cohort study. BMJ. 2020 May 22;m1985

Slide 21

- NICE Guidance (NG6) Excess winter deaths and illness and the health risks associated with cold homes. Available at: <https://www.nice.org.uk/guidance/ng6/chapter/1-Recommendations#recommendation-7-discharge-vulnerable-people-from-health-or-social-care-settings-to-a-warm-home>

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- The Academy of Medical Sciences (see slide 20 reference)

References (4)

Slide 23

- Tsai J, et al (see slide 18 reference)

Slide 25

- The Academy of Medical Science (see slide 20 reference)
- Public Health England, Excess mortality in England, week ending 11 September 2020 - Experimental Statistics [Internet]. 2020 Sep. Available from: <https://fingertips.phe.org.uk/static-reports/mortality-surveillance/excess-mortality-in-england-latest.html>

Slide 26

- The Health Foundation, People are avoiding hospital because they are nervous of catching COVID. June 2020. Available at: <https://www.health.org.uk/news-and-comment/news/people-are-avoiding-hospital-because-they-are-nervous-of-catching-covid>
- The Health Foundation, Public perceptions of health and social care in light of COVID-19. July 2020. available at: <https://www.health.org.uk/publications/reports/public-perceptions-of-health-and-social-care-in-light-of-covid-19-july-2020>
- Wu, J et al, Place and causes of acute cardiovascular mortality during the COVID-19 pandemic. BMJ 2020. available at: <https://heart.bmj.com/content/early/2020/09/28/heartjnl-2020-317912>

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- NICE Guideline 6 [NG6], (see slide 21 reference)

About Public Health England

Public Health England exists to protect and improve the nation's health and wellbeing, and reduce health inequalities. We do this through world-leading science, knowledge and intelligence, advocacy, partnerships and the delivery of specialist public health services. We are an executive agency of the Department of Health and Social Care, and a distinct delivery organisation with operational autonomy to advise and support government, local authorities and the NHS in a professionally independent manner.

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Published: October 2020

PHE publications gateway number: GW-1662

