Excess Winter Mortality in England and Wales, 2010/11 (Provisional) and 2009/10 (Final)

Coverage: **England and Wales**
Date: **22 November 2011**
Geographical Area: **Region**
Theme: **Health and Social Care**
Theme: **Population**

Key findings

- There were an estimated 25,700 excess winter deaths in England and Wales in 2010/11, virtually unchanged from the previous winter.
- As in previous years, there were more excess winter deaths in females than in males in 2010/11.
- Between 2009/10 and 2010/11 male excess winter deaths increased to 11,200, but female deaths fell to 14,400.
- The majority of deaths occurred among those aged 75 and over; however, deaths in this age group fell between 2009/10 and 2010/11, whereas deaths in persons aged under 75 increased.
- The excess winter mortality index was highest in Wales in 2010/11, whereas in the two previous winters it was highest in the South East of England.

Summary

In common with other countries, more people die in England and Wales in the winter than in the summer. This bulletin presents provisional figures of excess winter deaths (also referred to as excess winter mortality – EWM) in England and Wales for the winter period 2010/11, and final figures for the winter period 2009/10. Historical trends from 1950/51 onwards are also presented for comparison.

Method for calculating excess winter mortality

Excess deaths

The ONS standard method defines the winter period as December to March, and compares the number of deaths that occurred in this winter period with the average number of deaths occurring in the preceding August to November and the following April to July:

EWM = winter deaths - average non-winter deaths

This produces the number of excess winter deaths, which is then rounded to the nearest 10 for final data and to the nearest 100 for provisional data.

Excess winter mortality index

The EWM index is calculated so that comparisons can be made between sexes, age groups and regions, and is calculated as the number of excess winter deaths divided by the average non-winter deaths, expressed as a percentage:

EWM Index = (EWM / average non-winter deaths) x 100

The EWM index is presented with 95 per cent confidence intervals, which are calculated as:

EWM index ± 1.96 x (EWM Index / √ EWM)

More details about how EWM is calculated are available in Background note 2.

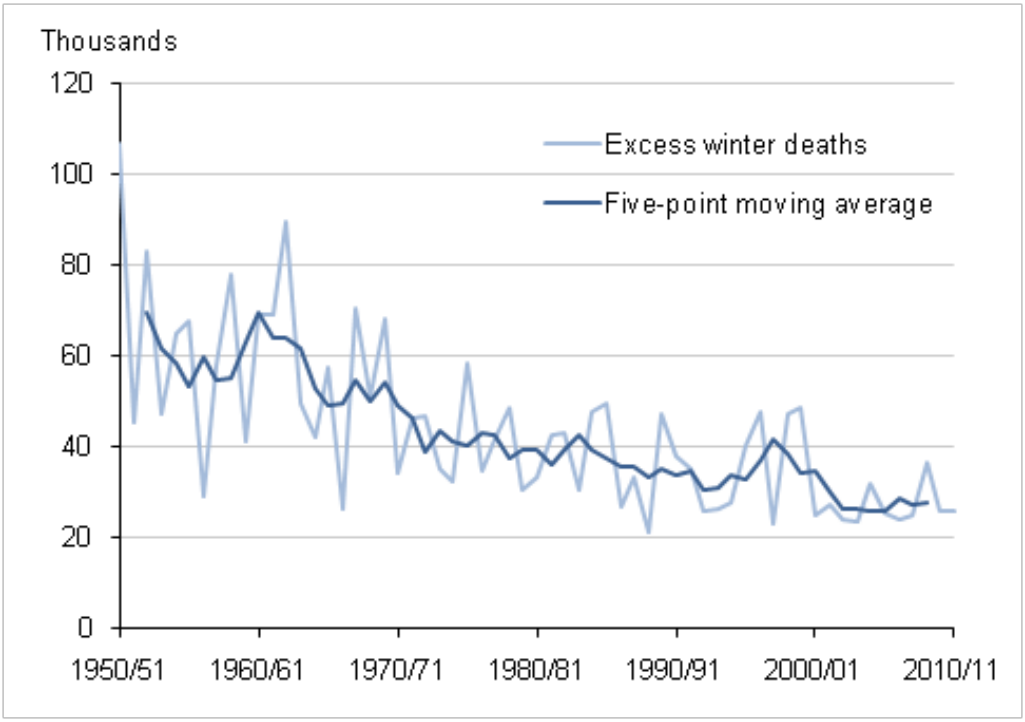
Results

EWM in England and Wales

In England and Wales there were an estimated 25,700 more deaths in the four months of winter 2010/11 than in the non-winter period, which amounts to 17 per cent more deaths in winter compared with the non-winter period. This figure is very similar to the previous winter of 2009/10 when there were 25,810 excess winter deaths. However, the number of excess winter deaths in the two most recent winters were about 30 per cent lower than the level seen in 2008/09 when there were 36,450 excess winter deaths.

Figure 1. Excess winter deaths: by year and five-year central moving average, 1950/51–2010/11

England and Wales



Source: Office for National Statistics

Notes:

1. EWM figures are based on deaths occurring in each period.
2. Data include non-residents who died in England or Wales.

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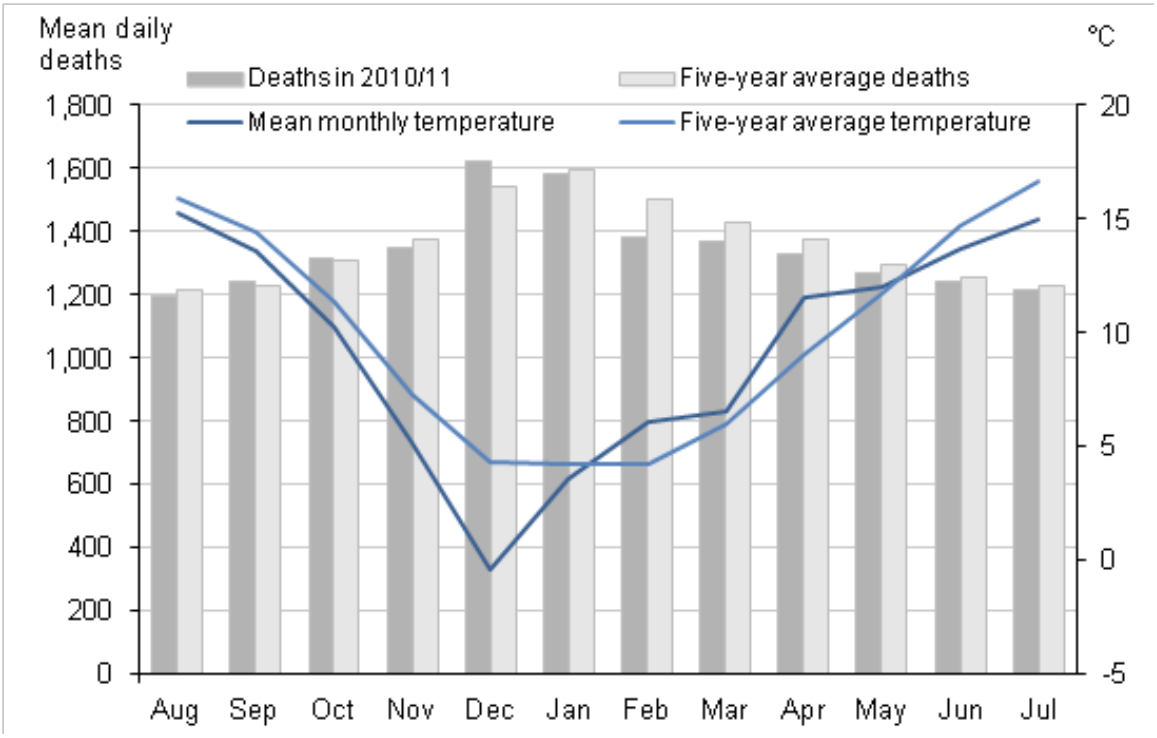
Historical trends in EWM are presented in Figure 1 for deaths registered in England and Wales between 1950/51 and 2010/11. A five-year moving average is also presented to smooth out any short-term fluctuations. This shows that a sharp drop in EWM occurred between 1960/61 and 1973/74, with a more gradual decrease between 1973/74 and 1998/99. There were a relatively high number of deaths in the winters of 1998/99 and 1999/2000. Since then the downward trend seems to have levelled off, with an average of 26,700 excess winter deaths each year.

Figure 2. Mean number of daily deaths each month and mean monthly temperatures, August 2010 to July 2011

England and Wales



Notes:

1. The mean number of daily deaths is based on deaths occurring in each month. Numbers of deaths from January to July 2011 are provisional, and have been adjusted to take account of late registrations (see Background note 2).
2. Five-year averages for each month are calculated using data from the previous five years, excluding the current year.
3. Mortality data include non-residents who died in England or Wales.
4. Source: Office for National Statistics and The Met Office

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When monthly mortality data for 2010/11 were compared with the five-year average of deaths occurring between 2005/06 and 2009/10 in the relevant months (Figure 2), the number of deaths were about the same as, or lower than, average in every month apart from December 2010. Closer examination revealed that there was a period from 26 November 2010 to 8 January 2011 when deaths exceeded the five-year average by around 75 deaths per day.

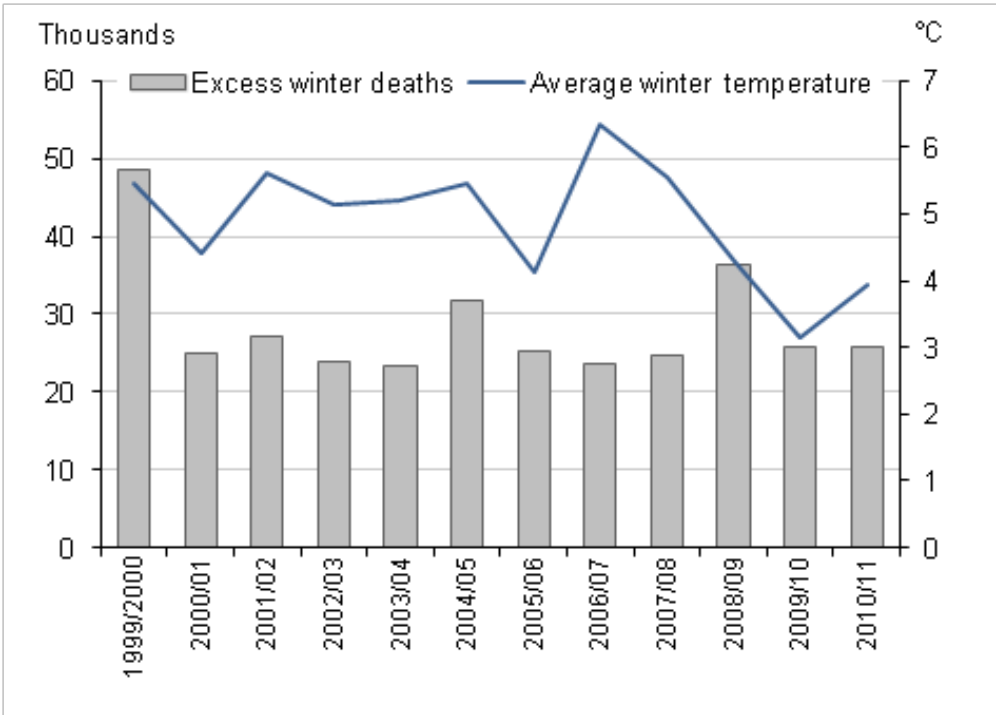
This increase in deaths coincided with a period of exceptionally cold weather and a rise in influenza-like illness (ILI – measured using the Royal College of General Practitioners influenza-like illness consultation rate). Temperatures began to fall on 24 November and remained below zero on most days until 27 December (Met Office Hadley Centre Central England Temperature Data, 2011). Deaths peaked on 30 December and remained above average for more than a week after

temperatures began to rise. This lag effect is well recognised in the literature (Donaldson and Keatinge, 1997).

The numbers of deaths by month, sex and age group for regions of England and Wales in 2010, are available to download from the ONS website (42.5 Kb Excel sheet).

Figure 3. Excess winter deaths and average winter temperature, 1999/2000–2010/11

England and Wales



Notes:

1. EWM figures are based on deaths occurring in each period.
2. Mortality data include non-residents who died in England or Wales.
3. Mean winter temperature is calculated using average monthly temperatures from December to March.
4. Source: Office for National Statistics and The Met Office

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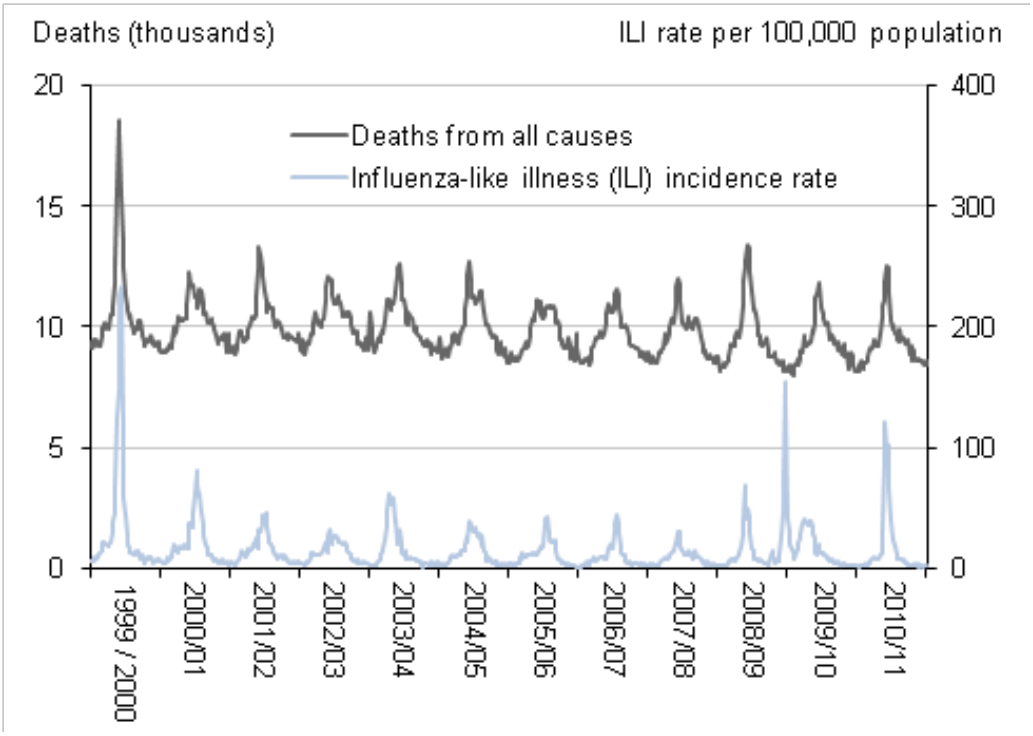
The mean temperature in December 2010 was nearly 5°C lower than the five-year average, but temperatures in January to March 2011 were close to, or slightly above, average. This means that overall the winter of 2010/11 was not as cold as 2009/10, which was the coldest since 1995/96 (The Met Office, 2011). Figure 3 shows that despite the cold and snowy weather, the level of EWM in the previous two winters was similar to years with much milder temperatures.

Figure 4. Weekly deaths from all causes and RCGP Influenza-like Illness (ILI) consultation rates per 100,000 population, 1999-2011

England and Wales



Notes:

1. Mortality data are based on deaths occurring each week. Numbers of deaths from January to July 2011 are provisional, and have been adjusted to take account of late registrations (see Background note 2).
2. Mortality data include non-residents who died in England or Wales.
3. Source: Office for National Statistics and The Royal College of General Practitioners Research and Surveillance Centre.

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The last influenza epidemic occurred in 1999/2000 and was associated with a high level of excess winter deaths. Figure 4 illustrates that ILI activity in the winter of 2010/11 was higher than in many recent winters, but did not reach epidemic levels. The spike in ILI activity associated with the H1N1 ‘Swine flu’ pandemic in summer 2009 can clearly be seen on the graph as, unusually, it coincides with a period of relatively low mortality.

Given the cold weather experienced in 2010/11 and the relatively high levels of influenza-like illness, we might have expected the number of excess winter deaths to be higher. It is possible that the influenza vaccination program (Health Protection Agency, 2010a) may have reduced the impact of influenza on winter mortality.

In addition, according to the English Housing Survey in 2009 a greater proportion of homes had cavity wall insulation and double-glazing compared with 1996, meaning homes are becoming more energy efficient. Also, a greater proportion of homes had modern central heating systems in 2009, compared with 2003 (Department for Communities and Local Government, 2011). These improvements to homes may have altered the relationship between the weather outdoors and winter mortality. It is clear that the relationship between influenza, temperature and EWM is complex.

EWM by sex and age

In 2010/11 there were 11,200 excess winter deaths in males and 14,400 excess winter deaths in females. The majority of these deaths occurred among those aged 75 and over in both sexes, with females aged 85 and over having the greatest number of excess winter deaths. A higher proportion of the female population are aged 75 and over (9 per cent compared with 6 per cent of males in 2010), which may wholly, or partially, explain the higher number of excess winter deaths in women.

In 2010/11 EWM actually decreased significantly in those aged 75 and over, but increased significantly in males aged under 65 and females aged under 75. The number of excess winter deaths in males under 65 more than doubled from 1,030 in 2009/10 to 2,400 in 2010/11. In females, excess winter deaths increased by 40 per cent from 1,070 in 2009/10 to 1,500 in 2010/11.

This pattern is consistent with that seen for influenza-like illness, which affected younger rather than elderly people, so it is likely that much of the increase in EWM in younger people was due to influenza (Health Protection Agency, 2011). Influenza A / H1N1 (2009) and influenza B were the predominant strains circulating last winter. The Health Protection Agency (2010b) suggest that older people may have been exposed to influenza A (H1N1) prior to 1957 and so, unlike younger people, they already had some immune protection against the disease. This is a possible explanation of the unusual pattern of deaths seen last winter.

Figure 5. Excess winter deaths: by sex and age group, 2008/09–2010/11

England and Wales

Source: Office for National Statistics

Notes:

1. Figures are based on deaths occurring in each period.
2. Data include non-residents who died in England or Wales.

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EWM by region

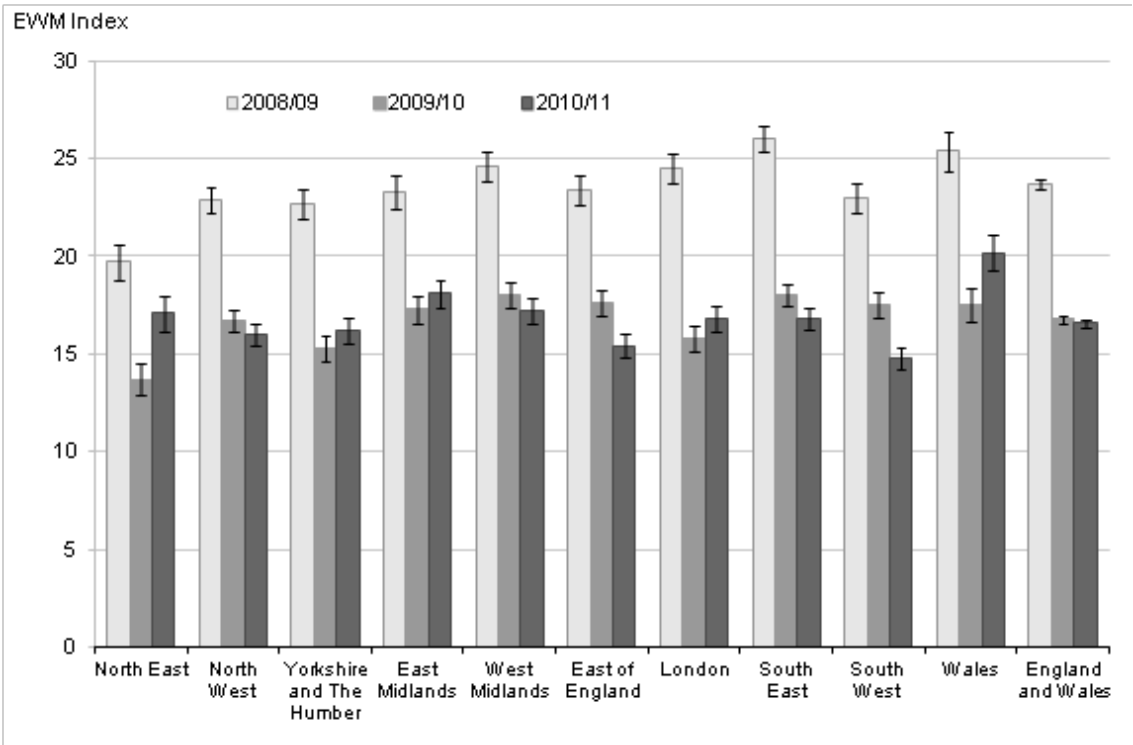
Figure 6 presents the EWM index and confidence limits for English regions and Wales for the last three winters. More detailed data showing the number of excess winter deaths and the excess winter mortality index (EWM index) by age and region of England, and Wales from 1991/92 to 2010/11 is available in Reference Table 2 (42 Kb Excel sheet).

For England and Wales overall, excess winter mortality remained similar to the levels seen in the previous year, but this pattern varied between regions. Five areas showed an increase in EWM between 2009/10 and 2010/11, with the largest percentage point increase occurring in the North East (3.4 percentage points higher). However, this increase in 2010/11 followed very low levels of EWM in the North East in 2009/10. Moreover, EWM in the North East was similar to the England and Wales average in 2010/11. In contrast, five regions had a decrease in EWM between 2009/10 and 2010/11; the region with the largest percentage point decrease was the South West (2.7 percentage points lower).

Wales had the highest EWM index in 2010/11 and was significantly higher than the England and Wales average. Wales also had a large percentage point increase in EWM in 2010/11 (2.7 percentage points higher). Reference Table 2 (42 Kb Excel sheet) shows that this increase occurred in people aged under 75. Furthermore, under 65s in Wales had the highest EWM index of any age group in any region, whereas usually people aged 85 and over have the highest EWM.

Overall there were substantial year-on-year changes in the rank order of regions for EWM. For example, the North East had the lowest EWM index in the winters of 2008/09 and 2009/10, and the South East had the highest, but in 2010/11 these regions were ranked mid-table and had very similar EWM. Research examining EWM among the elderly found little evidence for any consistent variation by geographical region within the UK (Wilkinson et al, 2004).

Figure 6. Excess winter mortality for regions of England, and Wales, 2008/09–2010/11



Source: Office for National Statistics

Notes:

1. Figures are based on deaths occurring in each period.
2. Figures for English regions and Wales include deaths of persons usually resident in each area, based on boundaries as of August 2011. Figures for England and Wales combined also include deaths of non-residents.

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Final EWM in 2009/10 by underlying cause of death

Information presented earlier in this bulletin refers to provisional EWM figures for 2010/11; this section provides final 2009/10 EWM figures by underlying cause of death. Table 1 shows the number of excess winter deaths and the EWM index by age group for circulatory diseases, respiratory diseases, injury and poisoning and dementia and Alzheimer's disease, in England and Wales for the winters of 2007/08 to 2009/10.

For all of the causes examined, both the number of excess winter deaths and the EWM index decreased between 2008/09 and 2009/10. Circulatory diseases caused the most number of excess winter deaths compared with other causes in 2009/10, accounting for 37 per cent of all excess winter deaths. The number of excess winter deaths from circulatory diseases was about 23 per cent lower than in 2008/09, but about 10 per cent higher than in 2007/08. Table 1 also shows that excess winter mortality from circulatory diseases increases with age.

Respiratory diseases also caused a large number of excess winter deaths in 2009/10 (32 per cent of all excess winter deaths). Moreover, respiratory disease had the largest seasonal effect of all of the causes included in Table 1, as it had the highest EWM index for all of the winters analysed. In 2009/10, 43 per cent more people died from respiratory diseases in the winter compared with the non-winter period. This was similar to 2007/08, but significantly lower than 2008/09 when 74 per cent more people died from respiratory diseases in the winter compared with the non-winter period. The majority of excess winter deaths from respiratory diseases occur in the people aged 75 and over. However, the EWM index shows that a greater seasonal effect is sometimes shown in the youngest and oldest age groups.

Dementia and Alzheimer's disease was one of the leading causes of death in 2010 (ONS, 2011), and also displays marked seasonal effects. In 2009/10 there were 2,420 excess winter deaths from this cause, 22 per cent lower than in 2008/09, but 36 per cent higher than 2007/08. The number of excess winter deaths from dementia and Alzheimer's disease were much higher in people aged 75 and over, but the greatest seasonal effect was seen in people aged 65 to 74. The reasons for the seasonal pattern in deaths from dementia and Alzheimer's disease are not clear. However, it may be related to the greater vulnerability of people with these conditions to respiratory diseases, difficulties with self-care, and falls, all of which may be more important in winter months.

Injury and poisoning deaths include accidental falls, which can be affected by wintry conditions – for example, icy pavements. However, external causes usually only account for a small proportion of all excess winter deaths. Despite the snowy weather in winter 2009/10 the overall number of excess winter deaths from injury and poisoning fell slightly compared with 2008/09. However, in the oldest age group (85 and over) excess winter mortality from injury and poisoning did increase in 2009/10 compared with 2008/09.

A more detailed version of Table 1 (46 Kb Excel sheet) broken down by sex and age group is available to download from the ONS website.

Table 1. Excess winter mortality by age group and underlying cause of death, 2007/08 to 2009/10

England and Wales

		2007/08		2008/09		2009/10	
		EWM	EWM Index	EWM	EWM Index	EWM	EWM Index
Circulatory	0–64	770	12.8	840	14.6	620	10.8
diseases	65–74	1,070	13.9	1,300	17.9	1,170	16.7
(ICD-10	75–84	2,900	16.1	4,330	26.1	3,150	20.0
I00–I99)	85+	4,010	18.8	6,000	28.8	4,670	22.5
	All ages	8,740	16.5	12,470	24.7	9,610	19.5
Respiratory	0–64	720	45.9	1,130	74.3	470	28.3
diseases	65–74	970	35.5	1,520	55.9	860	31.4
(ICD-10	75–84	2,490	36.7	4,260	67.3	2,540	41.9
J00–J99)	85+	4,170	46.5	7,110	83.3	4,290	50.0
	All ages	8,360	41.6	14,020	73.4	8,160	42.9
Dementia &	0–64	10	8.5	50	71.6	30	41.8
Alzheimer's	65–74	120	38.9	180	56.2	140	42.8
disease	75–84	420	20.7	870	44.3	690	34.3
(ICD-10	85+	1,220	28.4	1,990	46.9	1,570	33.9
F01, F03, G30)	**All ages**	1,780	26.3	3,090	46.8	2,420	34.5
Injury &	0–64	20	0.8	-30	-1.0	-10	-0.5
poisoning	65–74	50	11.2	80	21.6	50	11.3
(ICD-10	75–84	130	15.1	230	30.6	160	21.5
V01–Y89,	85+	230	19.2	320	27.8	340	29.6
U50.9)	**All ages**	420	8.0	600	11.9	530	10.6
All causes	0–64	2,370	8.5	2,950	10.9	2,100	7.8
	65–74	2,930	11.3	3,960	15.6	2,620	10.3
	75–84	7,450	14.9	11,380	24.0	7,830	16.9
	85+	11,940	21.7	18,160	33.6	13,260	24.3
	All ages	24,690	15.6	36,450	23.7	25,810	16.8

Table source: Office for National Statistics

Table notes:

1. Underlying cause of death is defined using the International Classification of Diseases, Tenth Revision (ICD 10). From January 2011 ONS have used an updated version of ICD 10, which will affect the assignment of underlying cause of death for deaths registered after this date. A small number of deaths that occurred in 2010 will have been registered in 2011, so will have been coded using the updated version of ICD 10. More details about the impact of this change are available on the ONS website: www.ons.gov.uk/ons/rel/subnational-health3/results-of-the-icd-10-v2010-bridge-coding-study--england-and-wales--2009/2009/statistical-bulletin--results-of-the-bridge-coding-study.pdf
2. Figures are based on deaths occurring in each period.
3. Figures for England and Wales include deaths of non-residents.

Download table

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(32 Kb)

Causes of excess winter mortality

A study by Healy (2003) showed that EWM varied widely within Europe, with England and Wales both having slightly higher than average EWM. Finland, a country with very cold winters, had the lowest EWM, and Portugal, a country with milder winters, had the highest EWM.

Research suggests that EWM may be higher in countries with a warmer winter climate because people there tend to take fewer precautions against the cold. These countries tend to have homes with poorer thermal efficiency (for example, fewer homes have cavity wall insulation and double glazing), which makes it harder to keep homes warm during the winter (Healy, 2003).

It has been shown that low indoor temperature is associated with higher EWM from cardiovascular disease in England (Wilkinson et al., 2001). The Eurowinter group (1997) reported that compared with people living in countries with cold winters, those from warmer countries were less likely to wear warm protective clothing in cold weather.

Although EWM is associated with low temperatures, conditions directly relating to cold, such as hypothermia, are not the main cause of excess winter mortality. The majority of additional winter deaths are caused by cerebrovascular diseases, ischaemic heart disease and respiratory diseases (The Eurowinter group, 1997 and ONS, 2010). Although cancer causes more than a quarter of all deaths annually, previous research (Johnson and Griffiths, 2003) found that there was no clear seasonal pattern for these deaths.

The cold can have various physiological effects, which may lead to death in vulnerable people. Woodhouse et al (1993) found that colder home temperature was associated with increased blood pressure in older people. The Eurowinter group (1997) noted that cold causes haemoconcentration, which leads to thrombosis, and that cold can also lower the immune system's resistance to respiratory infections. Additionally, the level of influenza circulating in the population increases in winter and in vulnerable groups, such as the elderly or those with pre-existing health problems,

influenza can lead to life-threatening complications, such as bronchitis or secondary bacterial pneumonia (Health Protection Agency, 2010a).

Previous research has shown that although mortality does increase as it gets colder, temperature only explains a small amount of the variance in winter mortality, and high levels of excess winter mortality can occur during relatively mild winters (Brown et al, 2010). Curwen and Devis (1988) showed that both temperature and levels of influenza were important predictors of excess winter mortality. Thus, the relationship between temperature, influenza and winter mortality is complex.

Policy context

There are a number of policies aimed at tackling excess winter mortality, such as winter fuel payments (Directgov, 2011), and the seasonal flu vaccination programme (NHS Choices, 2011). Nevertheless, in his 2009 annual report the Chief Medical Officer noted that although excess winter deaths have declined over the last 50 years, the number is still too high (Donaldson, 2010). He argued that many of these deaths are preventable and that more needs to be done to protect vulnerable people during cold winter months.

This prompted the Government to develop the Cold Weather Plan for England, which was launched on 1 November 2011 (Department of Health, 2011). The plan aims to minimise the health impact of severe winter weather, thus reducing the number of excess winter deaths. It uses a system of cold weather alerts, so that when severe winter weather is forecast (or occurring) health and social care services are prompted to take action.

For example, they should contact people identified to be at risk and ensure that rooms are adequately heated and that people are receiving all the benefits and services to which they are entitled. The plan also aims to raise public awareness of the potential harm caused by severe winter weather, and contains advice about the measures individuals can take to protect themselves.

The Government has also announced that it will be establishing the ‘Warm Homes, Healthy People’ fund for winter 2011/12. This will make money available to local authorities and charities to help them reduce illness and death caused by living in cold homes.

Uses of EWM data

EWM figures are widely used to inform policy, planning and research in the public sector, in particular to measure the effectiveness of cold weather planning. Local authorities and primary care organisations use ONS data to assess levels of excess winter mortality in their area. This may become even more relevant in the future as local authorities are encouraged to bid for money from the ‘Warm Homes, Healthy People’ fund. In addition, charities use excess winter mortality statistics to support a variety of campaigns.

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Background notes

1. Previous analysis compared methods of calculating EWM using different winter and non-winter periods, and found that the different methods produced fairly similar results. However, because the current ONS method includes autumn and spring in the non-winter period, if mortality is high in any of these months, the ONS estimate of EWM is decreased (Johnson and Griffiths, 2003).

2. Mortality data come from the information collected when a death is registered. Most deaths (almost 95 per cent) are registered within one month of the date of occurrence, although violent or unexpected deaths, which need further investigation from a coroner, can take much longer. So that timely EWM figures can be produced, ONS generates a special extract of mortality data in September for deaths that were registered by this month, but which occurred up to the end of July. These figures are then adjusted using the provisional number of deaths from the previous year’s extract, compared with the final number of deaths. This produces a provisional estimated number of deaths for January to July in the current year so that EWM can be calculated for the previous winter. As these figures are provisional they are rounded to the nearest 100 and are only produced at a regional level. Final figures are provided in the following year’s annual excess winter mortality statistical bulletin. Cause of death figures have been produced using final figures (2007/08 to 2009/10) and are rounded to the nearest 10. Figures for local areas based on final figures for 2009/10 are also available on request from the mortality team (contact details below).

   Information about the underlying mortality data, including details on how the data is collected and coded are available in the mortality metadata.

3. Excel workbooks containing the data used to produce Figures 1 to 6 are available to download from the ONS website. Where appropriate, tables contain the number of excess winter deaths, the excess winter mortality index and the upper and lower confidence limits. These limits form a confidence interval around the index, which is a measure of the statistical precision of an estimate and shows the range of uncertainty around the estimated figure. Calculations based on small numbers of events are often subject to random fluctuations. As a general rule, if the confidence interval around one figure overlaps with the interval around another, we cannot say with certainty that there is more than a chance difference between the two figures. Within this statistical bulletin, a difference which is described as ‘significant’, means ‘statistically significant’, assessed by examining the confidence intervals.

4. UK figures are not available as ONS only hold death registration data for England and Wales. National Records of Scotland produce an annual winter mortality report, which is available on their website: www.gro-scotland.gov.uk/statistics/theme/vital-events/deaths/winter-mortality/index.html

5. As a valued user of our statistics, we would welcome feedback on this release. In particular, the content, format and structure. This is in line with the Health and Life Events user engagement

strategy, available to download from the ONS website at:www.ons.gov.uk/ons/guide-method/method-quality/user-engagement/index.html

Please send feedback to:

Mortality Analysis Team

Health and Life Events Division

Office for National Statistics

Government Buildings

Cardiff Road

Newport

Gwent NP10 8XG

Tel: 01633 455341

E-mail: mortality@ons.gov.uk

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10. **Media contact**:

Tel Media Relations Office 0845 6041858

Emergency on-call 07867 906553

E-mail press.office@ons.gov.uk

Statistical contact:

Tel Vanessa Fearn 01633 455341

E-mail Vanessa.fearn@ons.gov.uk, mortality@ons.gov.uk

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Statistical contacts

Name	Phone	Department	Email
Vanessa Fearn	+44 (0)1633 455341	Office for National Statistics	mortality@ons.gsi.gov.uk

Issuing Body:
Office for National Statistics

Media Contact Details:
Telephone: 0845 604 1858
(8.30am-5.30pm Weekdays)

Emergency out of hours (limited service): 07867 906553

Email:
media.relations@ons.gsi.gov.uk