

Excess Winter Mortality, 2020-2021

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More people die in the winter than the summer. This paper presents estimated excess winter mortality (EWM) by comparing the winter months of December to March with the average of the four-month periods before and after this period. Analysis includes data by sex, age, region and cause of death.

Key Points

- In the winter period (December to March) of 2020/21 there were 6,340 deaths in Northern Ireland, the second highest number of winter deaths in the last 10 years. Comparing this with the average number of deaths for the two adjacent, 'non-winter' four-month periods (the previous August to November 2020 and the following April to July 2021), the seasonal increase in mortality (i.e. excess winter mortality) for winter 2020/21 was estimated to be 1,120. This was 590 more than the corresponding estimate for the previous winter (530¹ in 2019/20), and higher than levels seen since winter 1999/2000, with the exception of 2017/18 when a large influenza epidemic took place.
- Without the impact of the Covid-19 pandemic, excess winter mortality in winter 2020/21 is estimated to have been 200 (Figure. 2), the lowest since EWM records started in 1980/81. This is because the majority of deaths caused by Covid-19 in the year being analysed took place in the winter, therefore greatly inflating the overall total of winter deaths, especially compared to the non-winter period.
- EWM continued to be higher in females compared with males, with females accounting for 53.4 per cent (600) and males counting for 46.6 per cent (520) of the excess winter mortality in 2020/21.
- The leading cause of excess winter deaths was 'all other causes', due to Covid-19 deaths being categorised in this group, accounting for 83.3 per cent of the excess winter mortality in 2020/21.
- In Northern Ireland, deaths in the winter months were 21.4 per cent higher than in the adjacent non-winter months – this proportion is referred to as the EWM Index (EWMI). The Health & Social Care Trust with the highest EWMI was the Southern Trust, with 41.4 per cent more deaths occurring in the winter months. In comparison, the lowest EWMI was in the Belfast Trust where 7.7 per cent more deaths occurred in the winter months, than in the non-winter months.
- The highest regional EWMI in 2020/21 was in the Mid-Ulster Local Government District, where 44.0 per cent more deaths occurred in the winter months than in the non-winter months. Ards & North Down had the lowest EWMI, with 7.3 per cent more deaths occurring in the winter months.

¹ Note this differs from the published figure for 2019/20 as further 'occurrence' data has been received since its publication

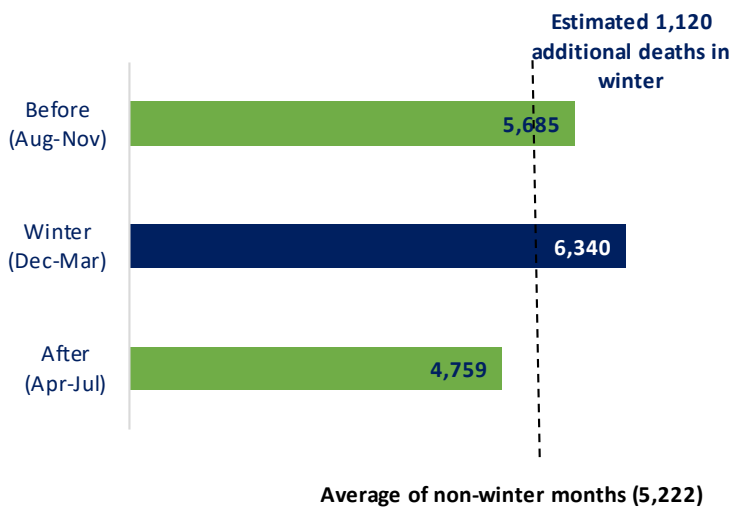
Contents

Key Points	1
Excess Winter Mortality 2020/21	3
Impact of Covid-19 on Excess Winter Mortality	3
Over Time	2
Cause of Death	3
What You Need to Know	4
Excess winter mortality (EWM) in Northern Ireland – trends overtime	6
Influenza	6
Estimating the impact of Covid-19 on Excess Winter Mortality	7
Excess winter mortality Index (EWMI) in Northern Ireland	7
Excess winter mortality by sex and age	9
Excess Winter Mortality by Underlying Cause of Death	11
Excess Winter Mortality by Area	12
Health and Social Care Trust	12
Local Government District (LGD)	12
Links to relevant publications	14
List of Tables and Charts	14
Contact Details	14

Summary

Excess Winter Mortality 2020/21

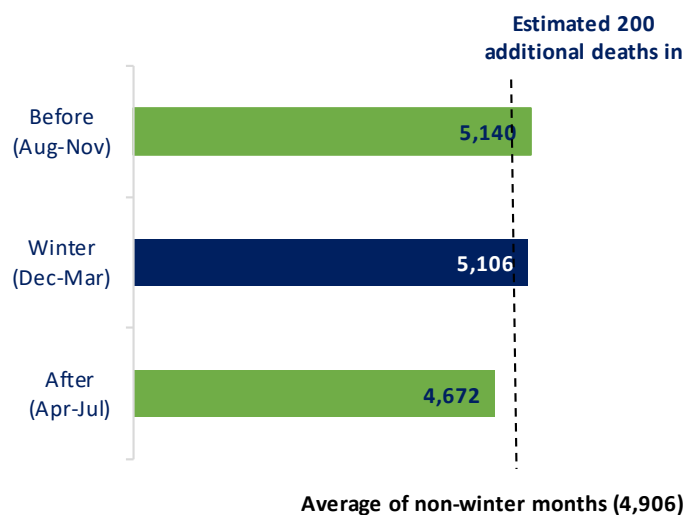
Figure 1: Deaths before, during and after winter 2020/21



The 6,340 deaths in Northern Ireland in the four months of winter 2020/21 (December to March) is the second highest number of winter deaths in the last 30 years. Comparing this with the average for the two adjacent, 'non-winter' 4-month periods (5,222), the seasonal increase in mortality (i.e. the excess winter mortality or 'EWM') for winter 2020/21 was approximately 1,120. There has only been one higher EWM in the last 20 years (2017/18 at 1,620)

Impact of Covid-19 on Excess Winter Mortality

Figure 2: Deaths (excluding deaths from Covid-19) before, during and after winter 2020/21

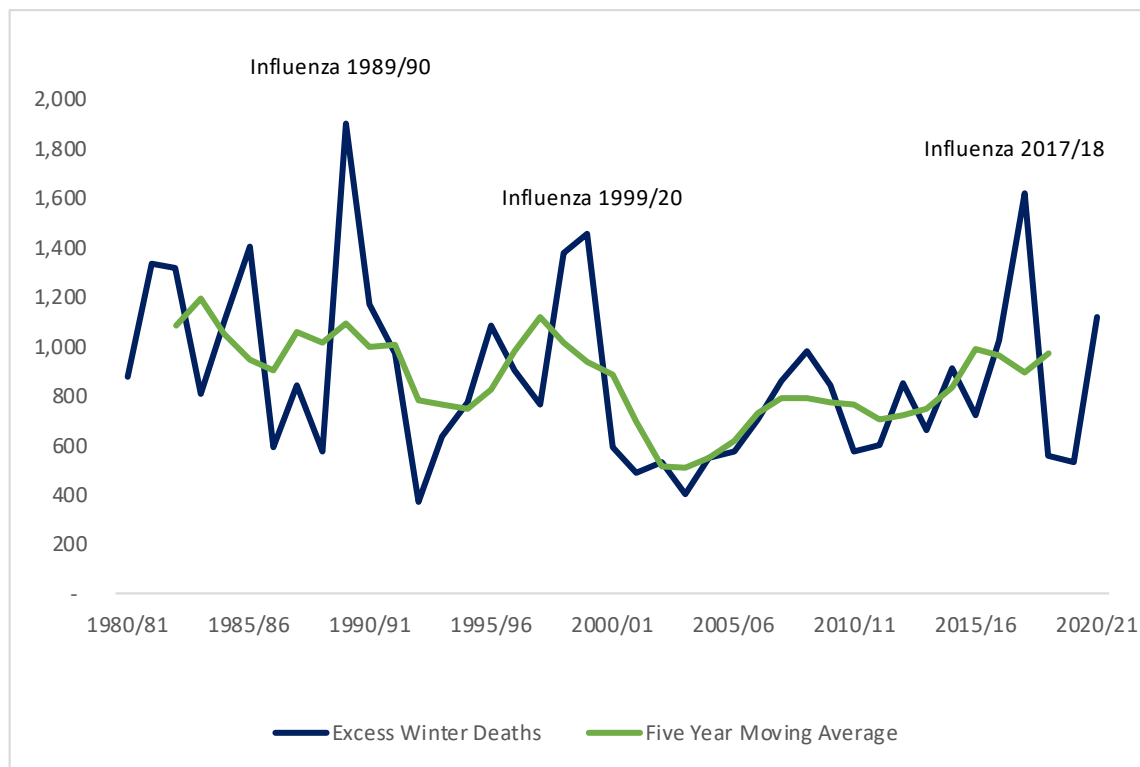


Covid-19 is still having a sizable impact on mortality in Northern Ireland, but we can approximate what the excess winter mortality would have been if the pandemic had not happened. A relatively crude way of doing this is by removing all deaths where Covid-19 was the *underlying cause of death* from the analysis and re-calculating EWM. (We must remember, however, that we cannot determine the number of these deaths which would have occurred even in absence of the pandemic.)

As a result, the estimate of excess winter mortality for 2020/21 would decrease to 200, the lowest in EWM records. The effect of Covid-19 has been to inflate the number of deaths in winter months, whilst not inflating the non-winter months either side to the same scale. This is similar the impact we've seen when influenza epidemics have taken hold.

Over Time

Figure 3: Excess Winter Mortality and 5-Year Central Moving Average, Northern Ireland, 1980/81 to 2020/21

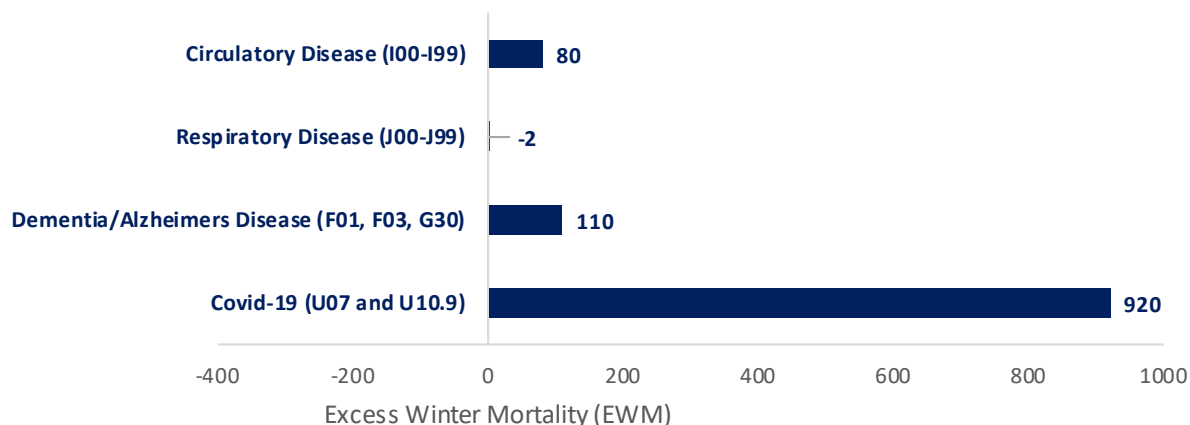


The long-term trend in excess winter mortality has been generally downward, but EWM can fluctuate greatly from winter to winter, with highest numbers of excess winter deaths seen in years which have experienced influenza outbreaks.

The five-year moving average of excess winter mortality was 968 in 2018/19 (based on years 2016/17 to 2020/21) (Figure 3).

Cause of Death

Figure 4: Approximate Excess Winter Mortality by Cause of Death, Northern Ireland, 2020/21



'All other causes of death' (mostly comprising Covid-19 deaths) was the leading cause of EWM in 2020/21. The EWM level attributed to other causes of death is usually around 200-300, however in 2020/21 the EWM level of all other causes of death was 930. Respiratory diseases, which is commonly the leading cause of EWM, actually had a negative value and index for 2020/21. This means that there were more deaths due to respiratory diseases in the non-winter months, than the winter.

Covid-19 had a large impact on the estimate of winter mortality in 2020/21 by inflating the number of deaths in the winter period.

What You Need to Know

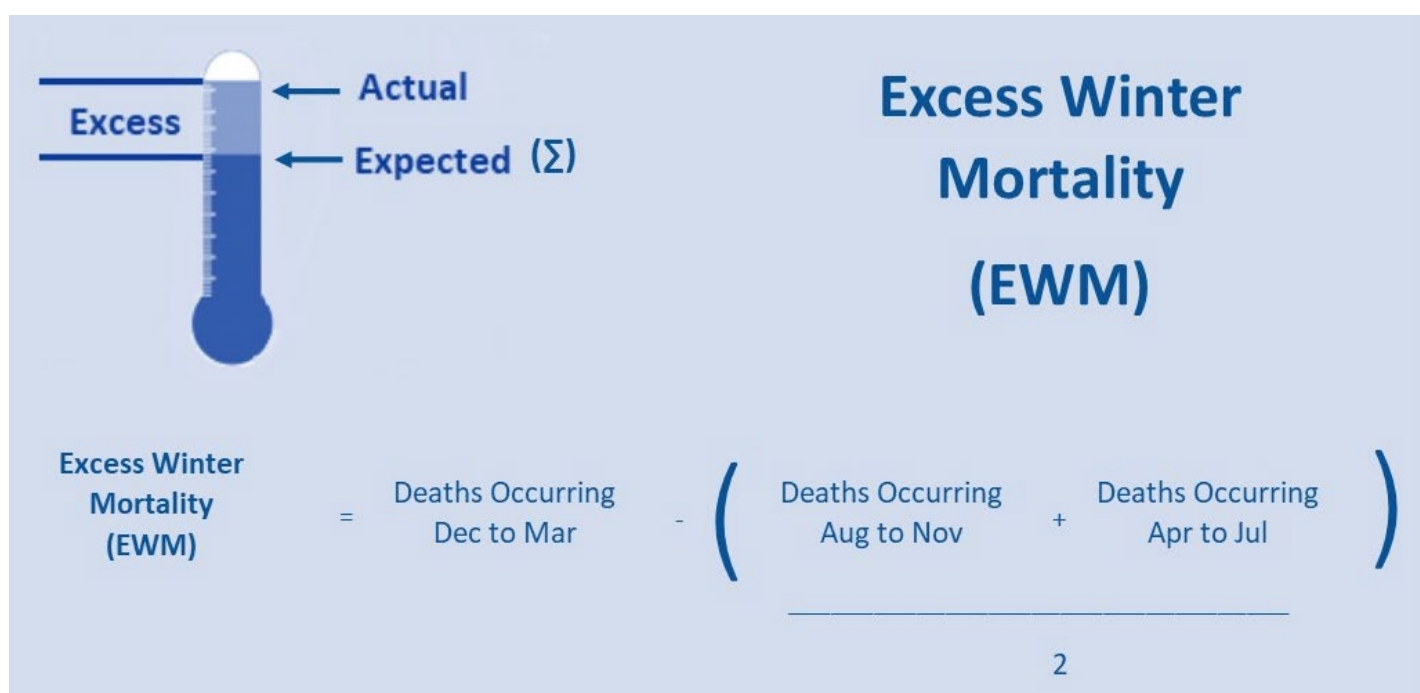
This statistical bulletin presents provisional figures for **excess winter mortality (EWM)** and the **excess winter mortality index (EWMI)** in Northern Ireland for the winter period 2020/2021. Historical trends from 1980/1981 onwards are also provided for comparison. Provisional figures are presented by sex, age, cause of death and geographical area. All figures are based on death **occurrences** (the date on which a death occurred) rather than death **registrations** (the date on which a death was registered) in order to more accurately assign the death to the appropriate season to reduce any influence of registration delay.

However, because the figures are occurrence-based, this means data could be incomplete because of registration delays. These figures are therefore provisional and the series will be revised each year to take account of late registrations. These revisions will be largest for the most recent year. Figures are also rounded to the nearest ten which helps account for differences in the numbers of days in non-winter/ winter periods in different years.

Figures by underlying cause (e.g. Covid-19) presented in this report will differ from those previously published as registered up to 30th September 2021², as they are occurrence-based and include deaths that happened up to and including 31st July 2021.

EWM and the EWMI are both mathematical concepts; it is therefore not possible to identify if an individual death was an excess winter death. Equally, deaths can be attributed to specific causes (circulatory, respiratory etc.), yet cannot be automatically classed as excess deaths.

The following outlines the calculations used to create EWM. EWM is a statistical measure of the increase in mortality during winter months (December to March) compared with non-winter months (preceding August to November and following April to July).



² Registrar General Quarterly Tables, Q3, 2021 <https://www.nisra.gov.uk/publications/registrar-general-quarterly-tables-quarter-3-2021>

The Excess Winter Mortality Index (EWMI) is calculated as EWM divided by the average non-winter deaths expressed as a percentage. The EWMI is calculated separately for each population subgroup to enable comparisons between sexes, age groups and areas. The EWMI shows the percentage of extra deaths that occurred in the winter and is reported to one decimal place.

EWM Index

$$\text{EWM Index} = \left(\frac{\text{Excess Winter Mortality (EWM)}}{\text{Average non-winter deaths}} \right) \times 100$$

Differences between EWM and Excess Mortality Estimates

NISRA published *Excess Mortality and Covid-19 Related Deaths in Northern Ireland March to December 2020* on 4 March 2021 (and will publish an update of the report on 24 February covering the period March 2020 to December 2021). Estimates in that report are based on estimates of **Excess Mortality**, the difference between actual deaths in 2020 and the expected number of deaths in this period based on the average number of deaths observed in the same period over the previous five years. This measure is distinctly different from Excess Winter Mortality, which is a measure of seasonality within a 12-month period.

Excess Mortality is defined as:

$$\text{Actual total Deaths from all causes} - \text{Average number of total deaths for the same period over the last 5 years}$$

Please note that EWM numbers in the bulletin are rounded to the nearest 10, but percentages are calculated based on the actual numbers.

Excess winter mortality (EWM) in Northern Ireland – trends over time

It is often the case that more people die in the winter than in the summer. In the winter period (December to March) of 2020/21, there were an estimated 1,120 excess winter deaths in Northern Ireland (Figure 3), compared with the average for the non-winter periods (previous August to November and the following April to July). The corresponding figure for 2019/20 was 530³.

The seasonal increase in mortality has been calculated for the last 41 winters from 1980/81. The 2020/21 excess winter mortality figure of 1,120 was the ninth highest in those 41 winters, and the second highest seen in the previous ten winters. The series peak (1,900) in 1989/90 corresponded with a major influenza outbreak. (Figure 3 and table 1 in the accompanying spreadsheet).

The long-term trend in winter mortality has been generally downward, but it can fluctuate greatly from year to year. A five-year moving average is included in Figure 3 above, to generally smooth out short-term fluctuations and make the trend over time clearer. There have been unusually high numbers of excess winter deaths in some years, including 1,020 for 2016/17 and 1,620 for 2017/18, which was the largest value since 1999/2000, all coinciding with influenza outbreaks.

Influenza

Influenza outbreaks do not necessarily result in many deaths directly attributed to this cause (less than 100 deaths are registered each year in Northern Ireland with influenza recorded as the underlying cause⁴), but looking at deaths over time, as shown in Figure 3, the impact of influenza can be clearly seen on excess winter mortality. This is particularly evident in the statistics in 1989/90, 1999/2000 and 2017/18 when the last major influenza outbreaks happened in Northern Ireland.

The number of influenza deaths may also be indirectly linked to excess winter deaths due to wider respiratory and circulatory related issues arising as a result of influenza infection. These diseases, as well as having direct effects, increase vulnerability to other diseases and conditions, which can result in hospitalisation or death. Those with underlying health conditions and the elderly are at greatest risk of developing complications.

³ This will differ from the previously published total for 2019/20 and it is based on death occurrences. The current figure includes any deaths registered since the last publication on 18 November 2020.

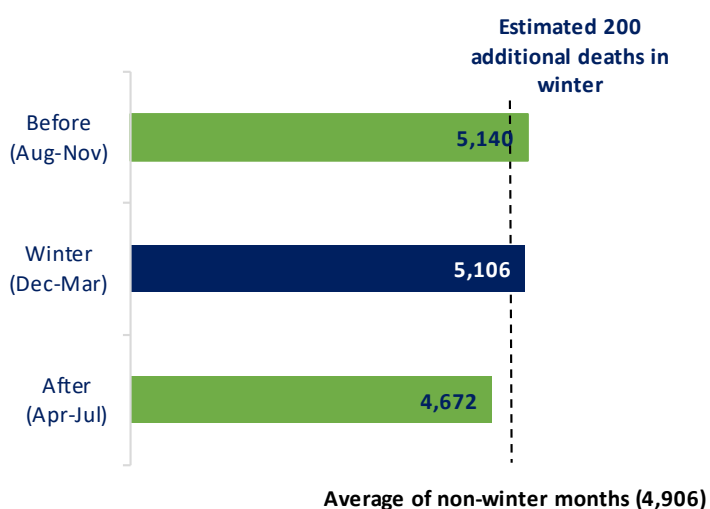
⁴ Registrar General Annual Report, Northern Ireland, 2020 [Registrar General Annual Report | Northern Ireland Statistics and Research Agency \(nisra.gov.uk\)](#)

Estimating the impact of Covid-19 on Excess Winter Mortality

Covid-19 is having a continuing impact on mortality in Northern Ireland. In the 2019/20 publication, the inflation effect of Covid-19 on deaths occurring in the non-winter months was noted in terms of reducing the EWM and EWMI. However, for 2020/21 the majority of deaths due to Covid-19 occurred in winter months so has instead inflated the EWM and EWMI. We can estimate this impact on EWM in 2020/21 by removing all deaths where Covid-19 was the underlying cause of death and re-calculating EWM.

Over 1,230 deaths occurred where Covid-19 was determined to be the underlying cause of death from December 2020 to March 2021, 545 from August to November 2020, and 87 from April to July 2020. Removing these from the calculation leads to an EWM of approximately 200 (Figure 5). In this scenario, the Northern Ireland EWMI decreases from 21.4 to 4.1 per cent, moving from one of the highest of the last 41 winters, to the lowest.

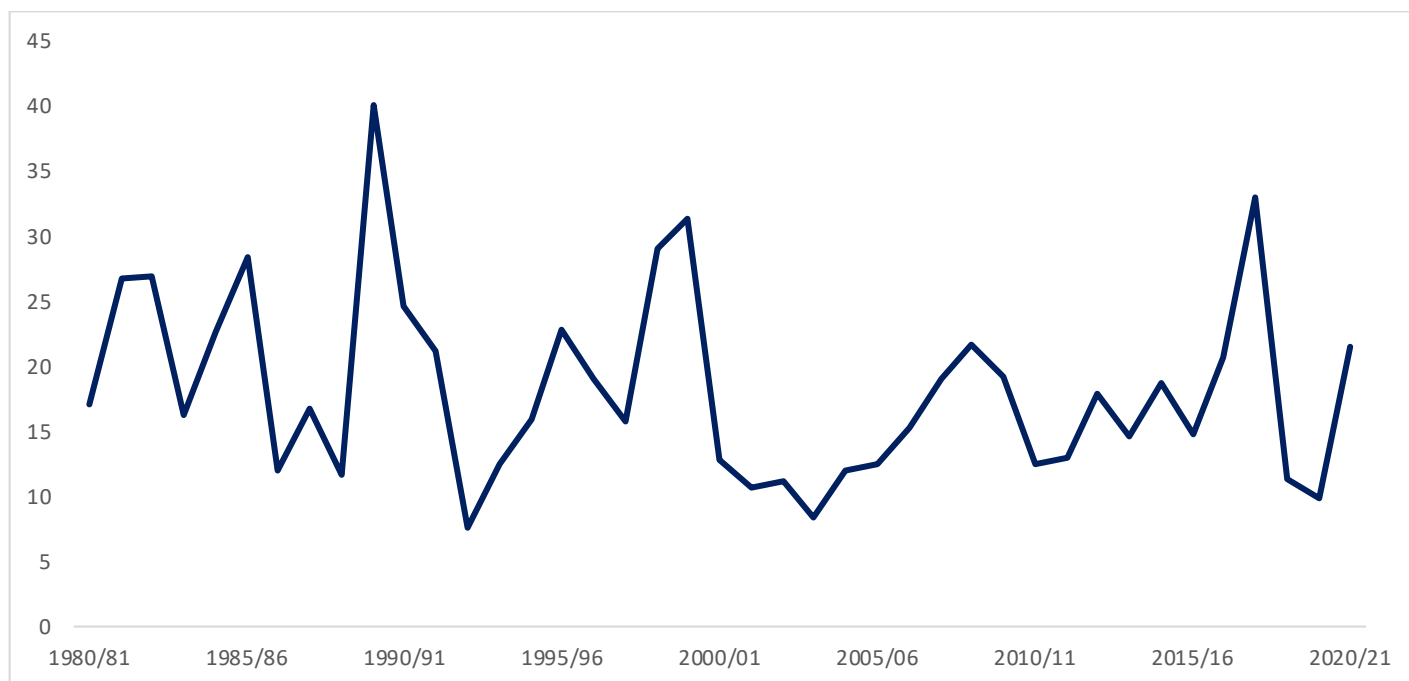
Figure 5: Deaths (excluding Covid-19 deaths) before, during and after winter 2020/21



Excess winter mortality Index (EWMI) in Northern Ireland

An excess winter mortality index (EWMI) is calculated for each sub-population group separately, in order to allow comparisons across key demographics such as sexes, age groups and regions. EWMI is the number of excess winter deaths (unrounded) divided by the average non-winter deaths, expressed as a percentage (for that sub-group). Figure 6 shows the EWMI for Northern Ireland from 1980/81 to 2020/21.

Figure 6: Excess Winter Mortality Index, Northern Ireland, 1980/81 to 2020/21



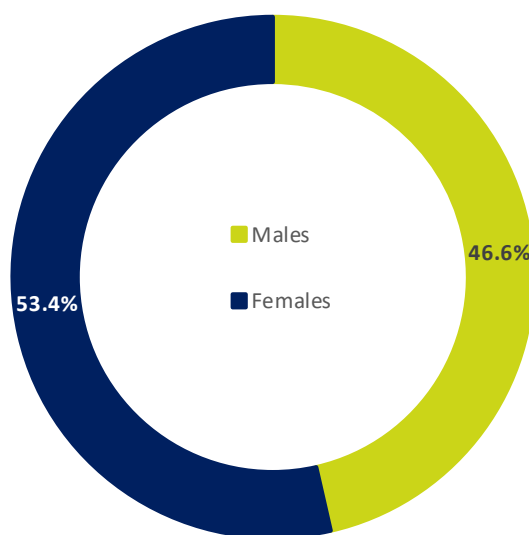
The EWMI for Northern Ireland in 2020/21 was 21.4 per cent, which means that 21.4 per cent more deaths occurred in the winter months compared with the non-winter months. The index peak was in 1989/90 (40.1 per cent) whilst 2017/18 showed the most recent spike at 33.0 per cent. The lowest EWMI over the 40-year period was 7.6 per cent (1992/93).

Excess winter mortality by sex and age

Of the estimated 1,120 excess winter deaths in 2020/2021, 46.6 per cent (520 deaths) were among males and 53.4 per cent (600 deaths) among females (Figure 7). Excess winter deaths are generally higher in females than males, which may partly be explained by the higher proportion of females aged 85 years and over in the general population compared with males; 64.8 per cent of the population aged 85 years and over are female according to the 2020 mid-year population estimates.

Looking at the EWMI, there was an increase from the previous year for both sexes. The EWMI for males moved from 8.5 per cent in 2019/20 to 19.9 per cent in 2020/21, and from 11.1 per cent for females to 23.0 per cent (see table 3 in the accompanying spreadsheet).

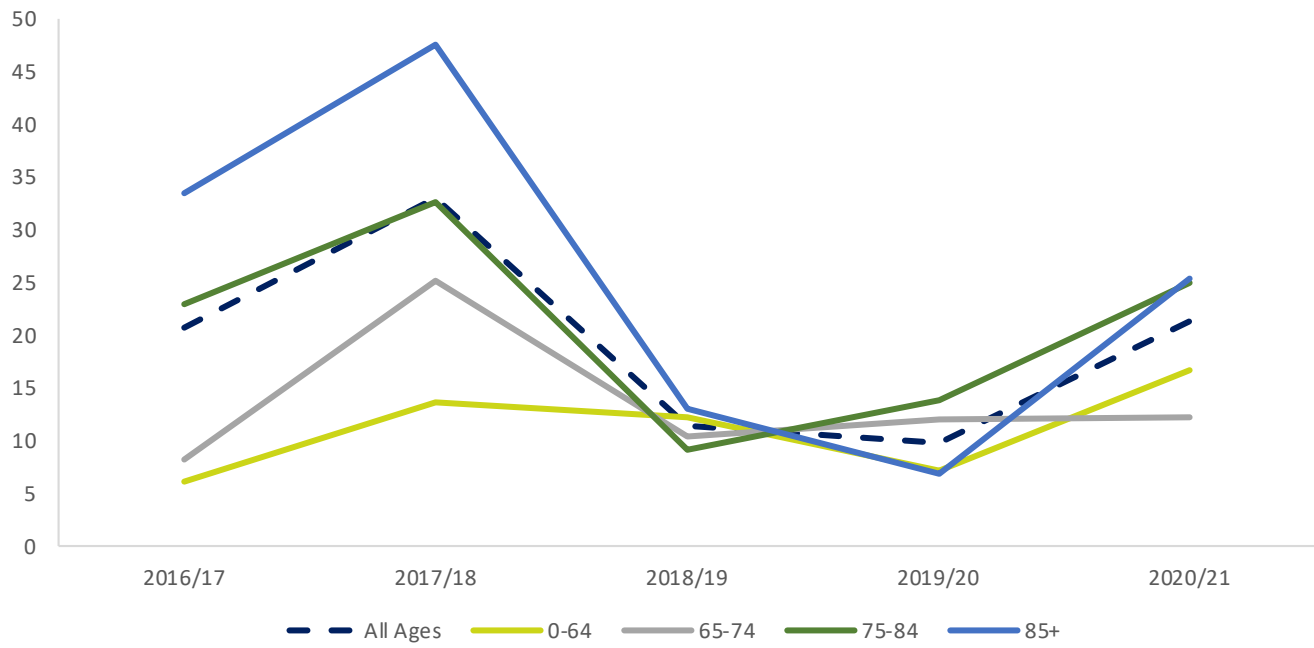
Figure 7: Excess Winter Mortality by Sex, Northern Ireland, 2020/21



In 2020/21, 76.9 per cent (860) of the estimated 1,120 excess winter deaths involved people aged 75 and over, with 42.0% (470) being in the 85 and over age group (Figure 8).

Using the EWMI (Figure 8) to compare with previous winters, for those aged 85 and over, the index most recently peaked at 47.6 per cent in 2017/18 (coinciding with the influenza outbreak that winter). It then fell to 13.1 per cent in 2018/19 and 6.9 per cent in 2019/20, which is the lowest EWMI on record reported for this age group. The impact of Covid-19 will have contributed to this finding, as the largest number of Covid-19 related deaths in Northern Ireland at 10th December 2021 were those in the 85 and over age group (see [Weekly Deaths Bulletin](#) for further details).

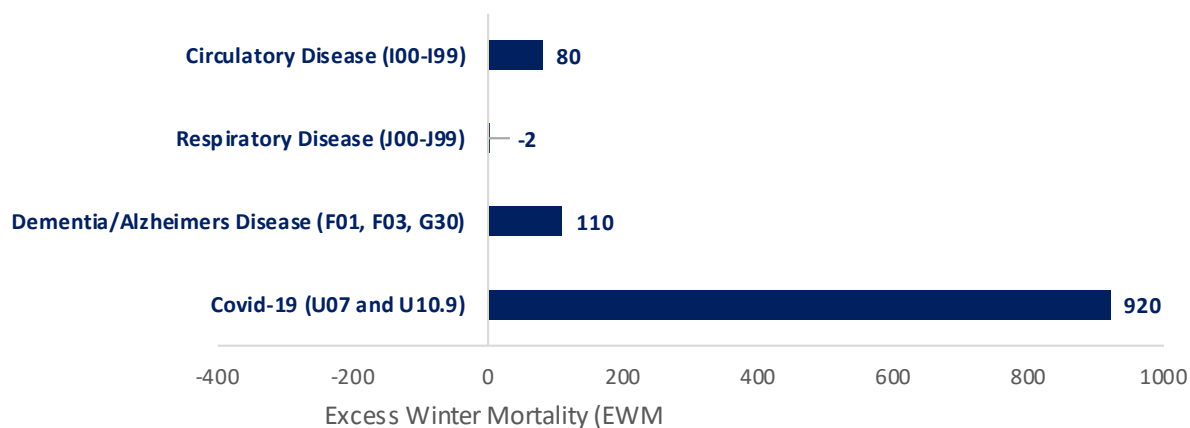
Figure 8: Excess Winter Mortality Index by age group, 2016-2017 to 2020/21



Excess Winter Mortality by Underlying Cause of Death

Figure 9 shows the composition of the 2020/21 EWM by the leading underlying causes of death: circulatory diseases (defined as International Classification of Diseases, 10th Revision (ICD-10) codes I00 to I99), respiratory diseases (defined as ICD-10 codes J00 to J99) dementia and Alzheimer's disease (F01, F03 and G30) and Covid-19 (U07 and U10.9).

Figure 9: Excess Winter Mortality by Cause of Death, Northern Ireland, 2020/21



Deaths due to all other causes (930 deaths of the 1,120 total excess winter deaths) was the leading cause of EWM in 2020/21 accounting for 83.3 per cent of all excess winter deaths in Northern Ireland. This proportion is much higher than previous years when it has ranged between 14% and 42% over the last 15 years, with the exception of last year where the level deaths due to 'other' causes was actually less than in non-winter months.) Of these 930 excess winter deaths due to other causes, Covid-19 (defined as ICD-10 codes U07 and U10.9) accounts for the vast majority (920).

According to the EWMI, there were 31.3 per cent more deaths due to other causes in the 2020/21 winter period compared with the non-winter months. The equivalent proportion in 2019/20 was -4.8 per cent and there were fewer deaths with this cause in winter months than in non-winter months.

Dementia/Alzheimer's disease and circulatory diseases were the second and third biggest contributors to 2020/21 Northern Ireland EWM respectively, accounting for 9.4 per cent (110) and 7.5 per cent (80) of total excess winter deaths in Northern Ireland.

The EWMI indicates that in 2019/20 there were 18.7 per cent more dementia/Alzheimer's disease deaths and 7.0 per cent circulatory deaths occurring in the winter months than the non-winter months.

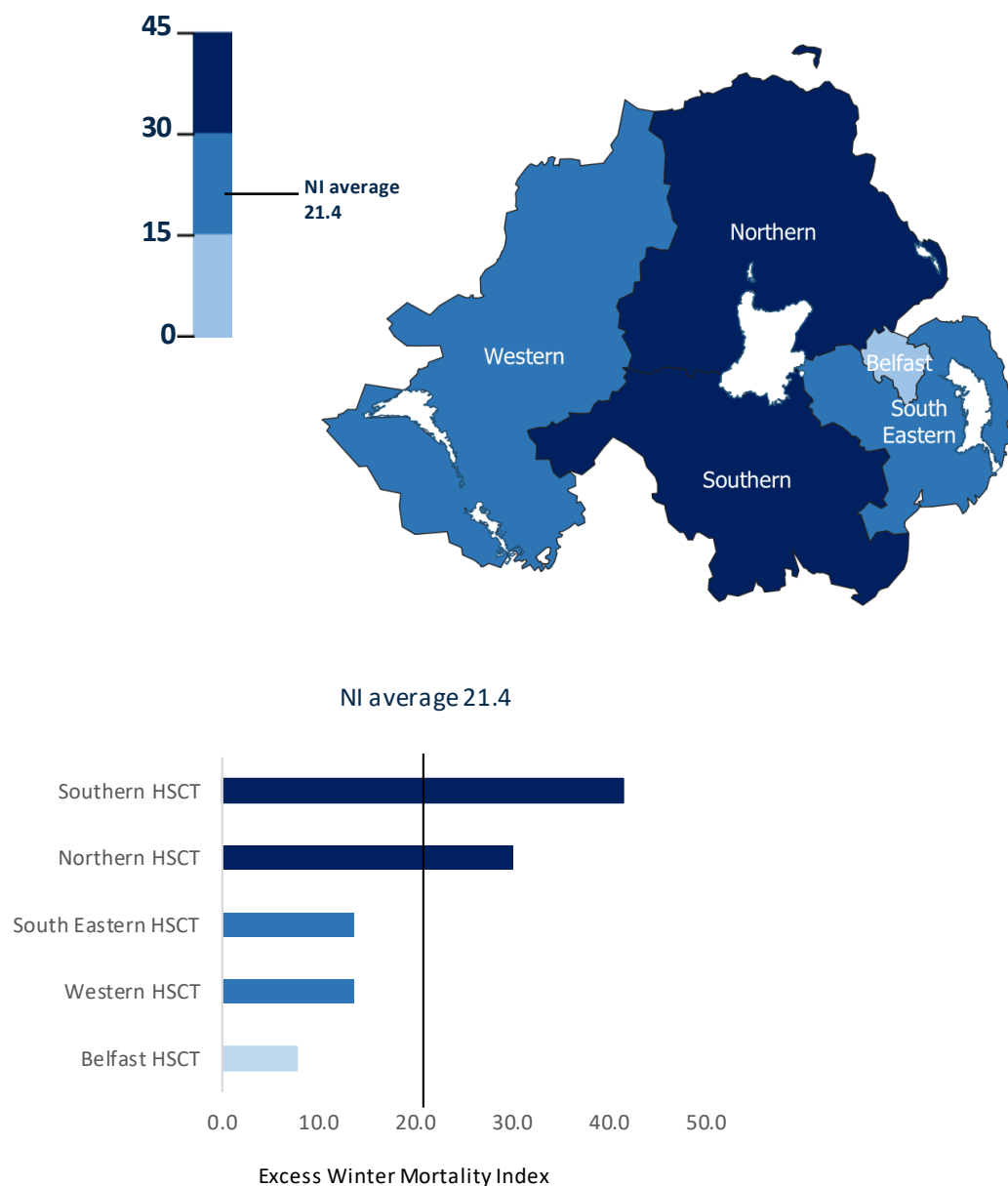
EWM deaths due to respiratory diseases has shown a negative change this year, in that fewer respiratory deaths occurred during winters months of 2020/21 than the non-winter months (-2 deaths or 0.4% fewer deaths). This is a sizeable change from winter 2019/20 when 63.1% more respiratory deaths occurred in winter compared with non-winter months, which was the second highest EWMI on record for respiratory deaths.

Excess Winter Mortality by Area

Health and Social Care Trust

In 2020/2021, the Trust with the highest EWMI was the Southern Trust with 41.4 per cent more deaths occurring in the winter months, compared with the non-winter months, followed by the Northern Trust (EWM Index 30.0 per cent). In comparison, 7.7 per cent more deaths occurred in the winter months, than the non-winter months in the Belfast Trust. The Northern Ireland figure was 21.4 per cent.

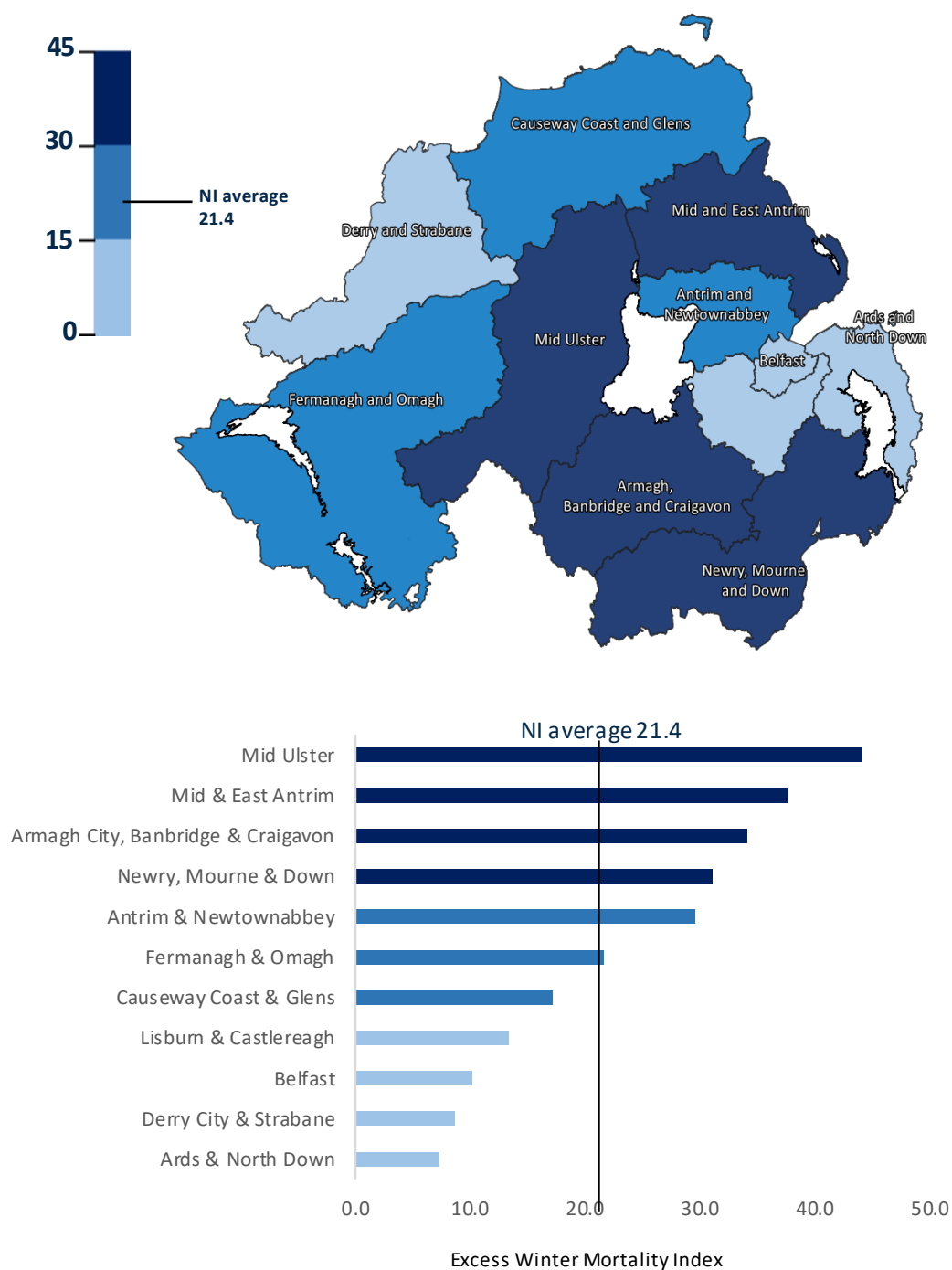
Figure 10: Excess Winter Mortality Index by Health & Social Care Trust, Northern Ireland, 2020/21



Local Government District (LGD)

In 2020/21, the highest regional EWMI was in Mid Ulster LGD, where 44.0 per cent more deaths occurred in the winter months (Figure 11). This was followed by Mid and East Antrim (37.6 per cent). Ards and North Down (7.3 per cent) had the lowest proportion of excess winter deaths in 2020/21 followed by Derry City and Strabane (8.6 per cent). Looking at the regional EWMIs over time there is no one LGD which consistently has a higher proportion of excess winter deaths each year; rather the indices show notable fluctuation over time across the Districts (see Table 6 in accompanying spreadsheet).

Figure 11: Excess Winter Mortality Index by Local Government District, Northern Ireland, 2020/21



Links to relevant publications

[Excess Mortality and Covid-19 Related Deaths in Northern Ireland](#)

Statistical bulletin | Periodically

[Winter mortality in Scotland 2020/21](#)

Statistical bulletin | Released 12 October 2021

Figures for the seasonal increase in mortality in Scotland for winter 2019 to 2020 and earlier years.

[Excess winter mortality in England and Wales 2020/21](#)

Data tables | Released 25 November 2021

Figures for excess winter mortality in England and Wales for winter 2020 to 2021 and earlier years.

[Deaths registered weekly in Northern Ireland, provisional](#)

Statistical Bulletin | Updated weekly

Provisional counts of the number of deaths registered in England and Wales, including deaths involving the coronavirus (Covid-19), by age, sex and region. Data are provisional and in the latest weeks for which data are available.

[Registrar General Quarterly Report](#)

Tables | Updated Quarterly

Provisional statistics on births, deaths, stillbirths, marriages and civil partnerships for each 3-month period in Northern Ireland.

List of Tables and Charts

Data accompanying this bulletin are available from the [Excess Winter Mortality page](#) in Excel format. The spreadsheet includes the following tables and charts

- Table 1: *Number of Deaths Occurring, Number of Excess Winter Deaths and Excess Winter Mortality Index, Northern Ireland*
- Table 2: *Excess Winter Deaths and Excess Winter Mortality Index by age group, Northern Ireland*
- Table 3: *Excess Winter Deaths and Excess Winter Mortality Index by sex, Northern Ireland*
- Table 4: *Excess Winter Deaths and Excess Winter Mortality Index by Cause of Death, Northern Ireland*
- Table 5: *Excess Winter Deaths and Excess Winter Mortality Index by Health and Social Care Trust, Northern Ireland*
- Table 6a: *Excess Winter Deaths by Local Government District, Northern Ireland*
- Table 6b: *Excess Winter Mortality Index by Local Government District, Northern Ireland*
- Chart 1: *Deaths before, during and after winter 2020/21*
- Chart 2: *Deaths (excluding deaths from Covid-19) before, during and after winter 2020/21*
- Chart 3: *Excess Winter Mortality and 5-Year Central Moving Average, NI, 1980/81 to 2020/21*
- Chart 4: *Excess Winter Mortality by Cause of Death, Northern Ireland, 2020/21*
- Chart 5: *Excess Winter Mortality Index, Northern Ireland, 1980/81 to 2020/21*
- Chart 6: *Excess Winter Mortality by Sex, Northern Ireland, 2020/21*
- Chart 7: *Excess Winter Mortality Index by Age Group, Northern Ireland, 2016/17 to 2020/21*
- Chart 8: *Excess Winter Mortality Index by Health & Social Care Trust, Northern Ireland, 2020/21*
- Chart 9: *Excess Winter Mortality Index by Local Government District, Northern Ireland, 2020/21*

Contact Details

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[NISRA Statistics](#)

Next publication: **Winter 2022**