

Winter Mortality, 2021-2022

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More people die in the winter than the summer. This paper presents estimated additional winter deaths by comparing the months of December to March 2021/22 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 2021/22 there were 5,907 deaths in Northern Ireland, a decrease of 499 from the 6,406 deaths occurring in winter 2020/21. Comparing this with the average number of deaths for the two adjacent, 'non-winter' four-month periods (the previous August to November 2021 and the following April to July 2022), the seasonal increase in mortality (i.e., winter mortality (WM)) for winter 2021/22 was estimated to be 250. This was 780 fewer than the corresponding estimate for the previous winter (1,030¹ in 2020/21), and the lowest on record.
- Estimates have also been provided taking out the impact of the Covid-19 pandemic. This is because the majority of deaths caused by Covid-19 in the year being analysed took place in the non-winter months, therefore inflating the overall total of non-winter deaths, especially compared to the winter period. Without the impact of Covid-19, winter mortality in winter 2021/22 is estimated to have been 320 (Figure. 2), the second lowest since winter mortality records started in 1980/81.
- Winter mortality is usually higher in females compared with males; however, this trend was reversed in winter 2021/22 with females accounting for 38.2 per cent and males counting for 61.8 per cent of the additional 250 winter deaths that occurred in 2021/22.
- The leading cause of additional winter deaths was 'dementia and Alzheimer's disease', accounting for 65.2 per cent of the additional winter mortality in 2021/22.
- In Northern Ireland, deaths in the winter months were 4.4 per cent higher than in the adjacent non-winter months (WM) – this proportion is referred to as the WM Index (WMI). The Health & Social Care Trust with the highest WMI was the Northern Trust, with 7.7 per cent more deaths occurring in the winter months. In comparison, the lowest WMI was in the South-Eastern Trust where 0.8 per cent more deaths occurred in the winter months, than in the non-winter months.

¹ Note this differs from the published figure for 2020/21 as further 'occurrence' data has been received since its publication

- The highest regional WMI in 2021/22 was in the Mid and East Antrim Local Government District, where 14.7 per cent more deaths occurred in the winter months than in the non-winter months. Fermanagh and Omagh had the lowest WMI, with 3.4 per cent fewer deaths occurring in the winter months.

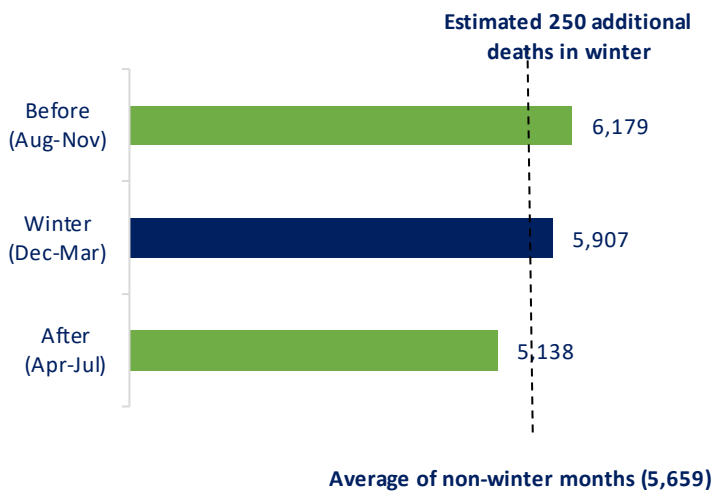
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Summary

Winter Mortality 2021/22

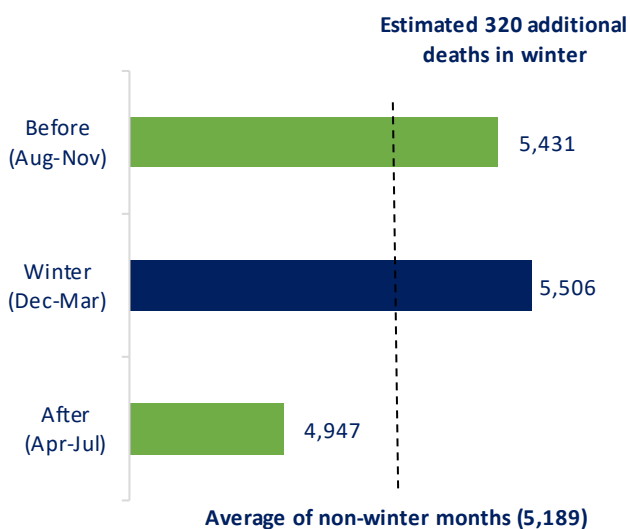
Figure 1: Deaths before, during and after winter 2021/22



The 5,907 deaths in Northern Ireland in the four months of winter 2021/22 (December to March) is a fall from the 6,406 deaths in Winter 2020/21. Comparing this with the average for the two adjacent, 'non-winter' 4-month periods (5,659), the seasonal increase in mortality (i.e., the winter mortality) for winter 2021/22 was approximately 250, the lowest on record. However, a rise in deaths due to Covid-19 in the adjacent non-winter months impacted the number of 'additional' winter deaths observed.

Impact of Covid-19 on Winter Mortality

Figure 2: Deaths (excluding deaths from Covid-19) before, during and after winter 2021/22

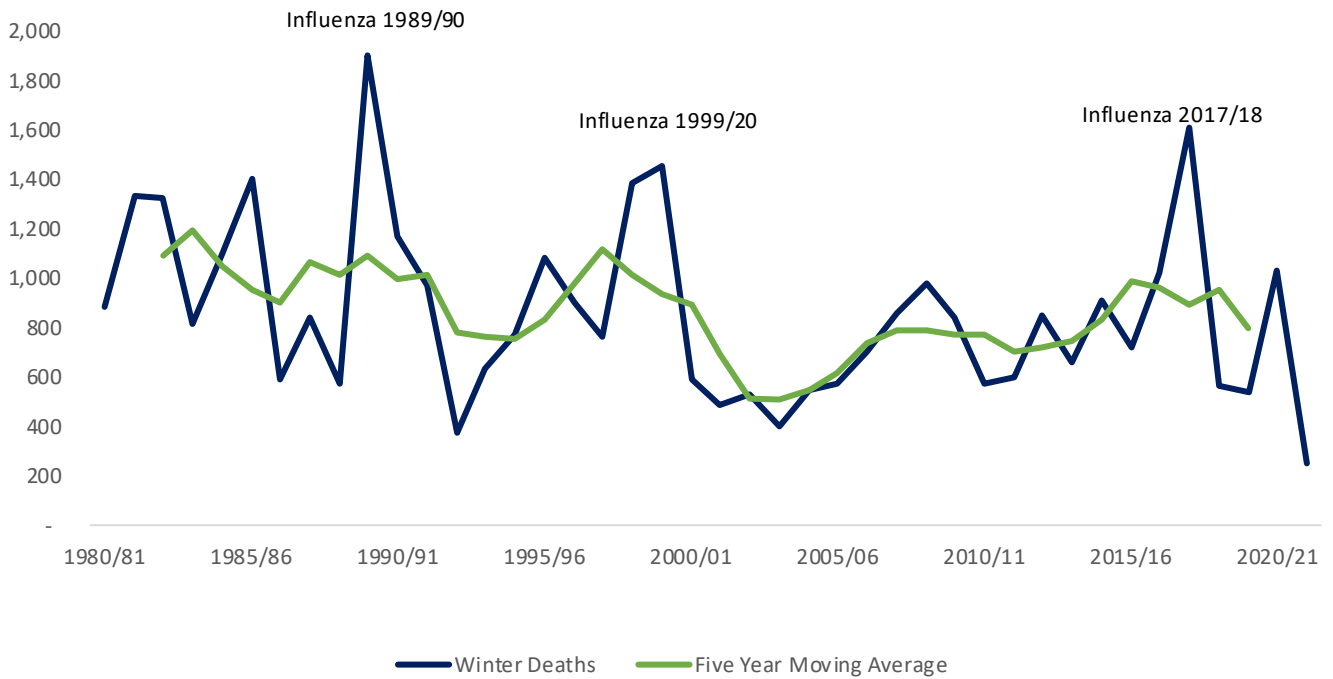


Covid-19 is still having an impact on mortality in Northern Ireland, but we can approximate what the additional winter mortality would have been if the pandemic had not happened. A relatively crude way of doing this is by removing all deaths where Covid-19 was the *underlying cause of death* from the analysis and re-calculating winter mortality. (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 the increase in winter mortality for 2021/22 would be 320, the second lowest level of additional winter deaths on records (excluding Covid-19 deaths). The effect of Covid-19 has been to inflate the number of deaths in non-winter months (August to November 2021 specifically), whilst not inflating the winter months to the same scale. This is similar to the impact seen on winter deaths in 2019/20 when the pandemic started in 2020.

Time trend analysis

Figure 3: Winter Mortality and 5-Year Central Moving Average, Northern Ireland, 1980/81 to 2021/22



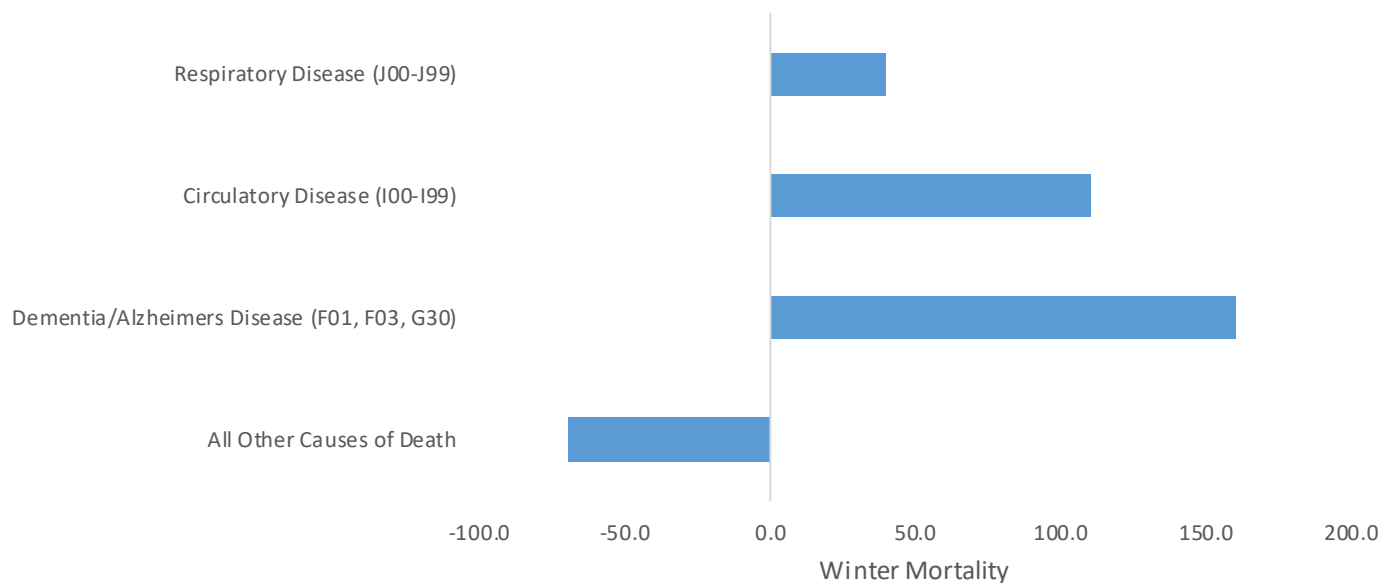
The long-term trend in winter mortality has been generally downward, but winter mortality can fluctuate greatly from winter to winter, with highest numbers of additional winter deaths seen in years which have experienced influenza outbreaks.

The five-year moving average of winter mortality was 796 in 2019/20 (based on years 2017/18 to 2021/22) (Figure 3).

Cause of Death

The following chart shows the how additional winter deaths in 2021/22 are comprised by cause, compared with the average number observed in the non-winter months.

Figure 4: Approximate Change in Winter Deaths by Cause of Death, Northern Ireland, 2021/22



The profile of the causes of winter mortality deaths has changed since the Covid-19 pandemic, resulting in variations in leading causes each winter. Dementia/Alzheimer's Disease was the leading cause of winter mortality in 2021/22. The winter death level attributed to other causes of death now mostly comprises Covid-19 deaths which has driven large variations in the levels. In 2021/22 the winter deaths due to all other causes of death was -70 (i.e., 70 fewer than the average number observed in non-winter months). This is a fall from a total of 880 additional deaths seen in winter 2020/21 due to 'other causes' (mainly Covid-19). Respiratory diseases, which are commonly the leading cause of additional winter deaths, saw 40 additional respiratory deaths in winter 2021/22 compared with non-winter months.

Covid-19 had an impact on the estimate of winter mortality in 2021/22 by inflating the number of deaths in the non-winter period.

What You Need to Know

This statistical bulletin presents provisional figures for **winter mortality** (formerly referred to as **Excess Winter Mortality** or **EWM**) and the **winter mortality index (WMI)** in Northern Ireland for the winter period 2021/2022. Statistical Offices across the UK took the decision to rename this statistic due to the increased interest in general excess deaths and the potential for both statistics to become confused. Additionally, with an increase in deaths at different times of the year due to the pandemic, there is potential for deaths in wintertime to not be in excess when compared with non-winter months resulting in a negative number or index.

Historical trends from 1980/1981 onwards are also provided in the accompanying [spreadsheet](#) 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.

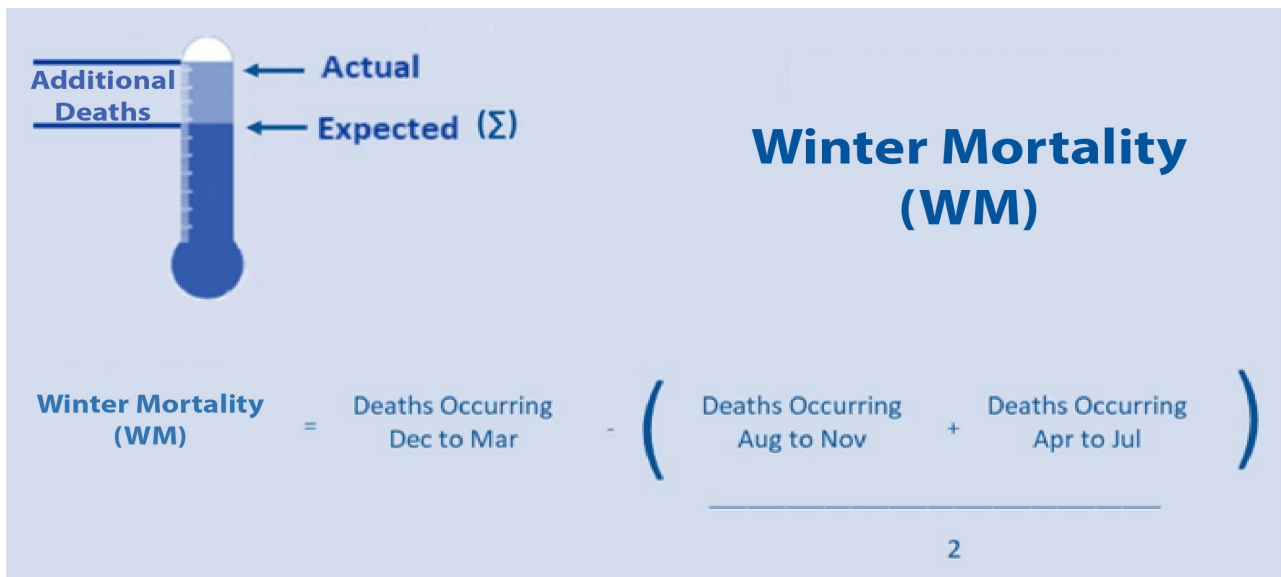
However, because the figures are occurrence-based, this means data could be incomplete because of registration delays. These figures are therefore provisional, and the series will be revised each year to take account of late registrations. These revisions will be largest for the most recent year. Figures 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 2022², as they are occurrence-based and include deaths that happened up to and including 31st July 2022.

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

The following outlines the calculations used to create winter mortality. Winter mortality 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, 2022 <https://www.nisra.gov.uk/publications/registrar-general-quarterly-tables-quarter-3-2022>



The Winter Mortality Index (WMI) is calculated as the number of deaths taking place in the winter months (winter mortality) divided by the average non-winter deaths expressed as a percentage. The WMI is calculated separately for each population subgroup to enable comparisons between sexes, age groups and areas. The WMI shows the percentage of additional or fewer deaths that occurred in the winter and is reported to one decimal place.

WM Index

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

Differences between winter mortality and Excess Mortality Estimates

NISRA published Excess Mortality and Covid-19 Related Deaths in Northern Ireland March to August 2022 on 27 October 2022 (and will publish an update of the report in early 2023 covering the period March 2020 to December 2022). Estimates in that report are based on estimates of Excess Mortality, the difference between actual deaths in a defined period 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 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 winter mortality numbers in this bulletin are rounded to the nearest 10, but percentages are calculated based on the actual numbers.

Winter mortality (WM) 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 2021/22, there were an estimated 250 additional 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 2020/21 was 1,030³.

The seasonal increase in mortality has been calculated for the last 42 winters from 1980/81. The 2021/22 winter mortality figure of 250 was the lowest of those 42 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, to generally smooth out short-term fluctuations and make the trend over time clearer. There have been unusually high numbers of additional winter deaths in some years, including 1,020 for 2016/17 and 1,610 for 2017/18, which was the largest value since 1999/2000, all coinciding with influenza outbreaks. Also, in 2020/21 there were an additional 1,030 deaths observed, above the expected number based on the average from non-winter months, which coincided with a peak in the Covid-19 pandemic.

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 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 additional 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 2020/21 and it is based on death occurrences. The current figure includes any deaths registered since the last publication on 15 December 2021.

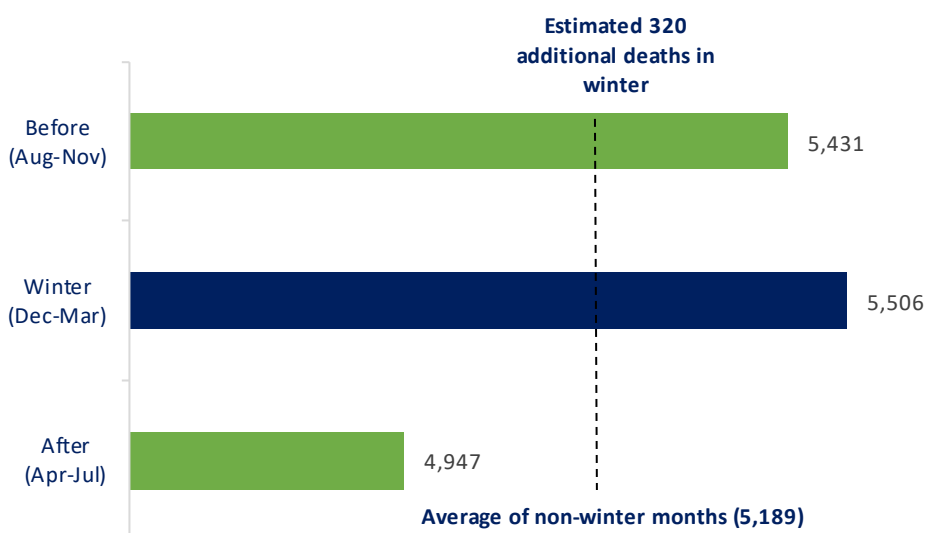
⁴ Registrar General Annual Report, Northern Ireland, 2021 [Registrar General Annual Report | Northern Ireland Statistics and Research Agency \(nisra.gov.uk\)](#)

Estimating the impact of Covid-19 on 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 winter mortality and WMI relative to the high level of non-winter deaths. However, for 2020/21 the majority of deaths due to Covid-19 occurred in winter months so instead inflated the additional winter deaths and WMI. Winter mortality in 2021/22 has been impacted by Covid-19 in the same way as that observed in 2019/20 where it has been deflated somewhat relative to the increase in deaths in non-winter months where the cause was Covid-19. We can estimate this impact on winter mortality in 2021/22 by removing all deaths where Covid-19 was the underlying cause of death and re-calculating winter mortality.

Over 400 deaths occurred where Covid-19 was determined to be the underlying cause of death from December 2021 to March 2022, 750 from August to November 2021, and 190 from April to July 2022. Removing these from the calculation leads to an estimated additional WM of approximately 320 (Figure 5). In this scenario, the Northern Ireland WMI increases from 4.4 to 6.1 per cent, moving from the lowest of the last 42 winters, to the second lowest after 2020/21 (excluding Covid-19 deaths).

Figure 5: Deaths (excluding Covid-19 deaths) before, during and after winter 2021/22



Winter mortality Index (WMI) in Northern Ireland

A winter mortality index (WMI) is calculated for each sub-population group separately, in order to allow comparisons across key demographics such as sexes, age groups and regions. WMI is the number of winter deaths (unrounded) divided by the average non-winter deaths, expressed as a percentage (for that sub-group). Figure 6 shows the WMI for Northern Ireland from 1980/81 to 2021/22.

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



The WMI for Northern Ireland in 2021/22 was 4.4 per cent, which means that 4.4 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 32.8 per cent. The 2021/22 index is the lowest WMI over the 42-year period.

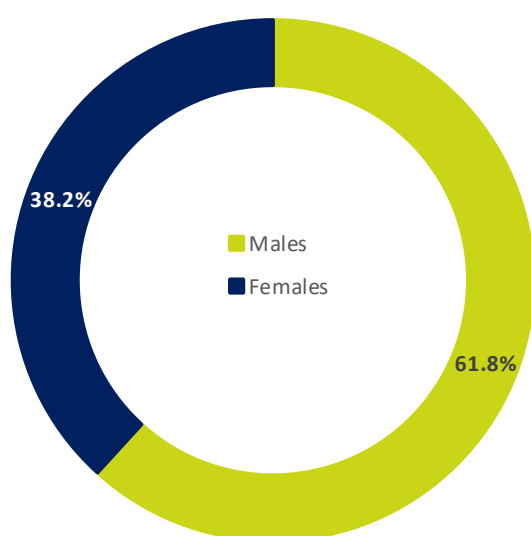
Winter mortality by sex and age

Of the estimated additional 250 winter deaths in 2021/2022, 61.8 per cent were among males and 38.2 per cent among females (Figure 7). However, 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.

That trend was reversed in winter 2021/22 when males accounted for a higher proportion of the additional deaths that occurred. This could be linked, in part, to the Covid-19 pandemic where deaths to Covid-19 were generally higher among males than females, especially in the earlier stages.

Looking at the WMI, there was a decrease from the previous year for both sexes. The WMI for males changed from 16.7 per cent in 2020/21 to 5.5 per cent in 2021/22, and from 21.7 per cent for females to 3.3 per cent (see table 3 in the accompanying spreadsheet).

Figure 7: Winter Mortality by Sex, Northern Ireland, 2021/22

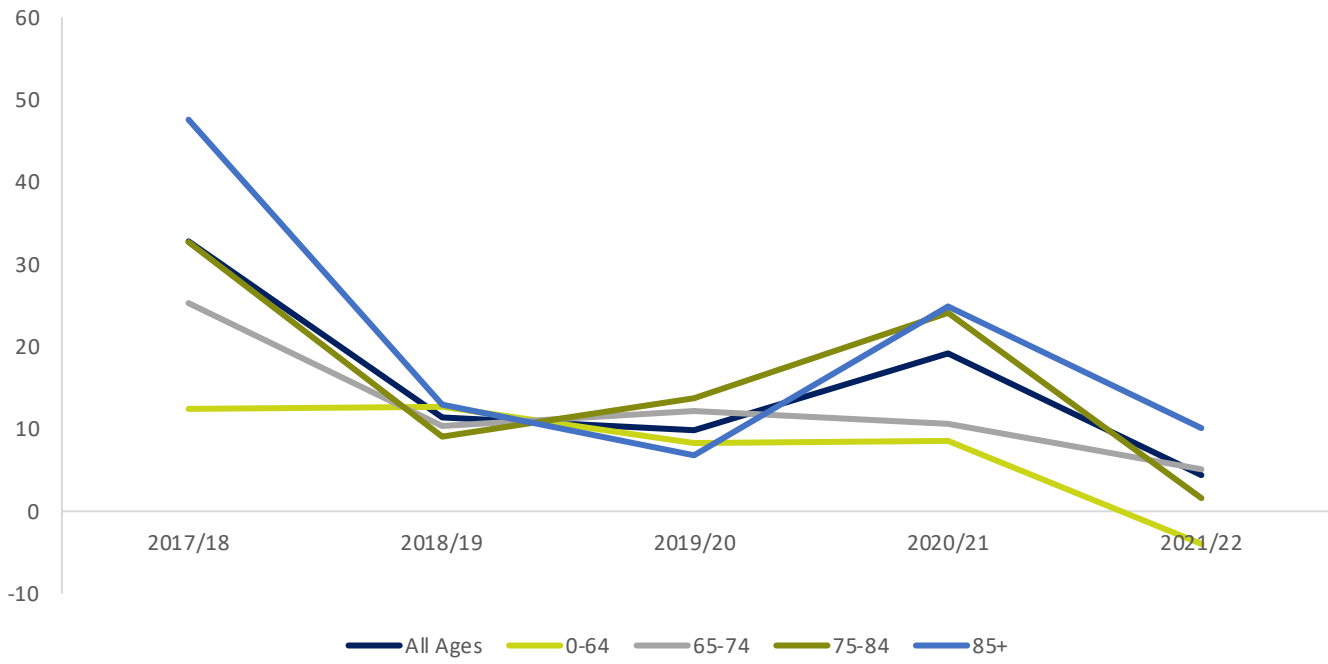


In 2021/22, 94.4 per cent of the estimated 250 additional winter deaths involved people aged 75 and over, with 83.3 per cent being in the 85 and over age group.

Using the WMI (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), with a smaller peak in 2020/21. The impact of Covid-19 will have contributed to this more recent finding, as highest proportion of Covid-19 related deaths in Northern Ireland at 25 November 2022 were those in the 85 and over age group (see [Weekly Deaths Bulletin](#) for further details).

While all age groups experienced a fall in winter mortality in 2021/22 compared with 2020/21, the 0 to 64 age group produced a negative index, meaning that the number of deaths occurring in winter 2021/22 was less than the number that occurred in non-winter months that year.

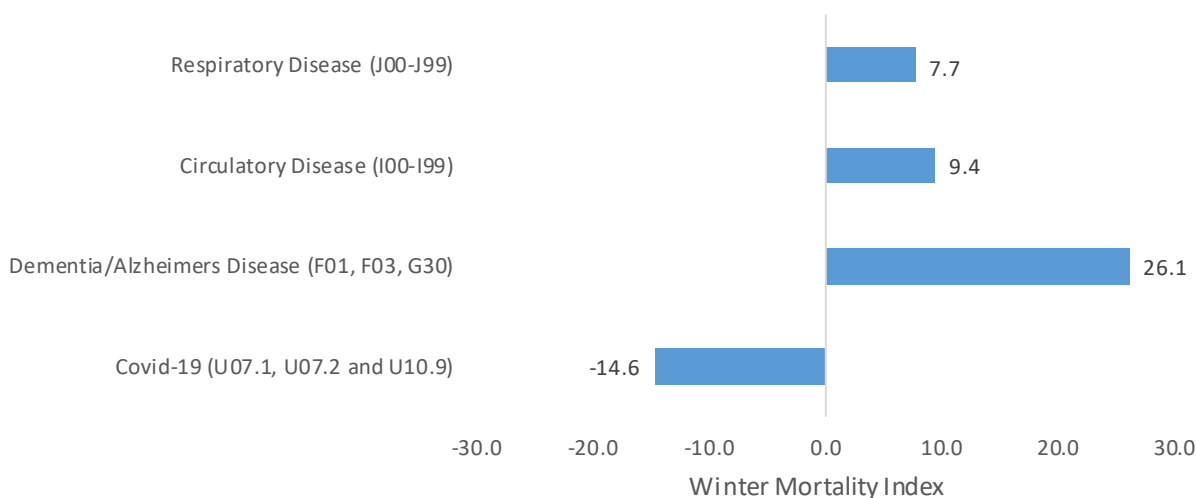
Figure 8: Winter Mortality Index by age group, 2017-2018 to 2021/22



Winter Mortality by Underlying Cause of Death

Figure 9 shows the composition of the 2021/22 winter mortality index 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 (U07.1, U07.2 and U10.9).

Figure 9: Winter Mortality Index (WMI) by Cause of Death, Northern Ireland, 2021/22



Deaths due to Dementia or Alzheimer's disease (160 deaths of the 250 total additional winter deaths) was the leading cause of additional winter deaths in 2021/22 accounting for 65.2 per cent of all additional winter deaths in Northern Ireland.

According to the WMI, there were 26.1 per cent more deaths due to dementia or Alzheimer's disease in the 2021/22 winter period compared with the non-winter months. The index for this cause in 2020/21 was 18.4 per cent.

Circulatory diseases and respiratory diseases were the second and third biggest contributors to 2021/22 Northern Ireland WM respectively, with WMIs of 9.4 and 7.7 per cent respectively.

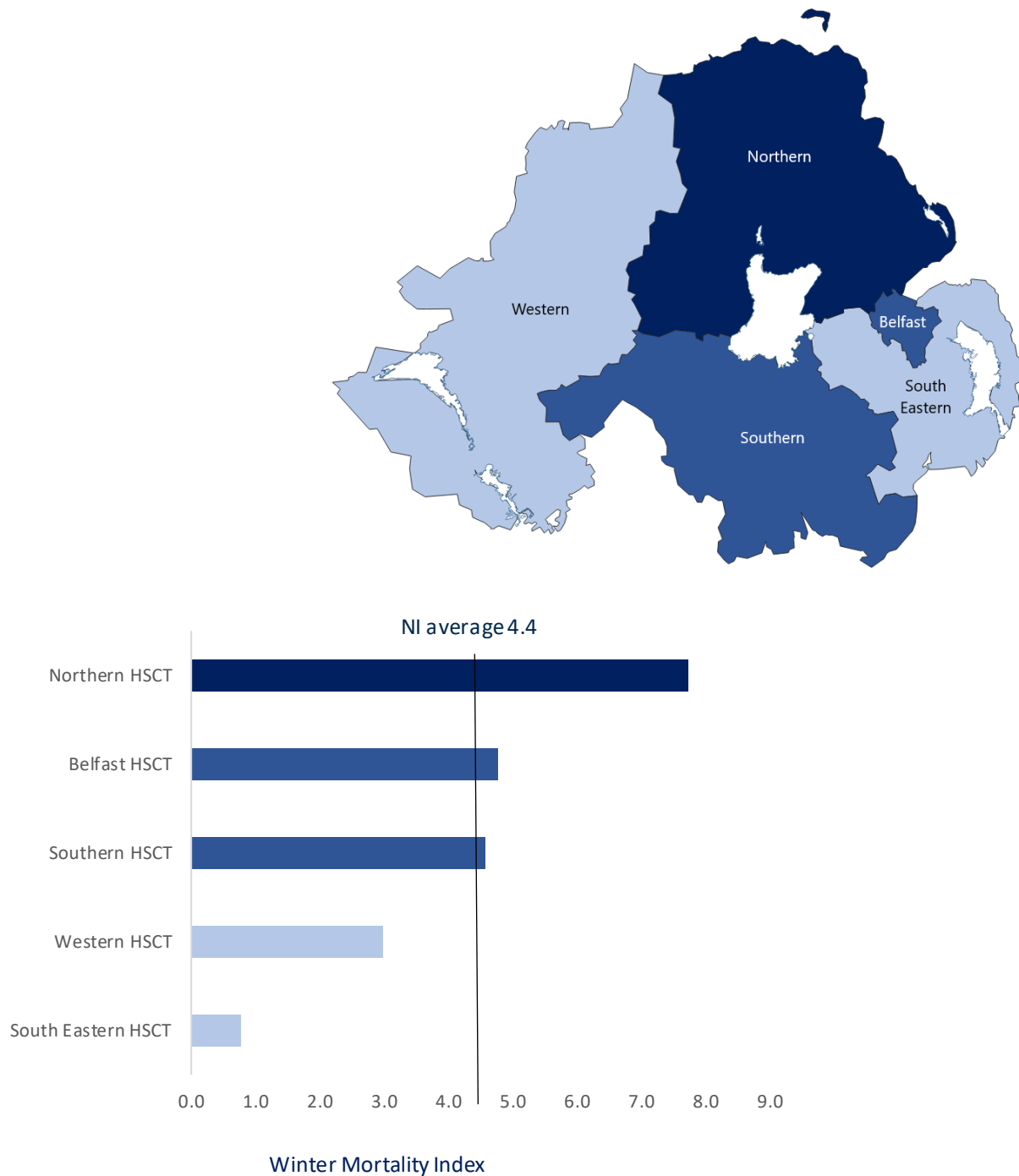
Winter deaths due to Covid-19 has shown a negative change this year, in that fewer Covid-19 deaths occurred during winters months of 2021/22 than the non-winter months (14.6 per cent fewer deaths). This is a sizeable change from winter 2020/21 when 920 more Covid-19 deaths occurred in winter compared with non-winter months.

Winter Mortality by Area

Health and Social Care Trust

In 2021/2022, the Trust with the highest WMI was the Northern Trust with 7.7 per cent more deaths occurring in the winter months, compared with the non-winter months, followed by the Belfast Trust (WM Index 4.8 per cent). In comparison, 0.8 per cent more deaths occurred in the winter months, than the non-winter months in the Southern Trust (which experienced the highest WMI in 2020/21). The Northern Ireland index was 4.4 per cent.

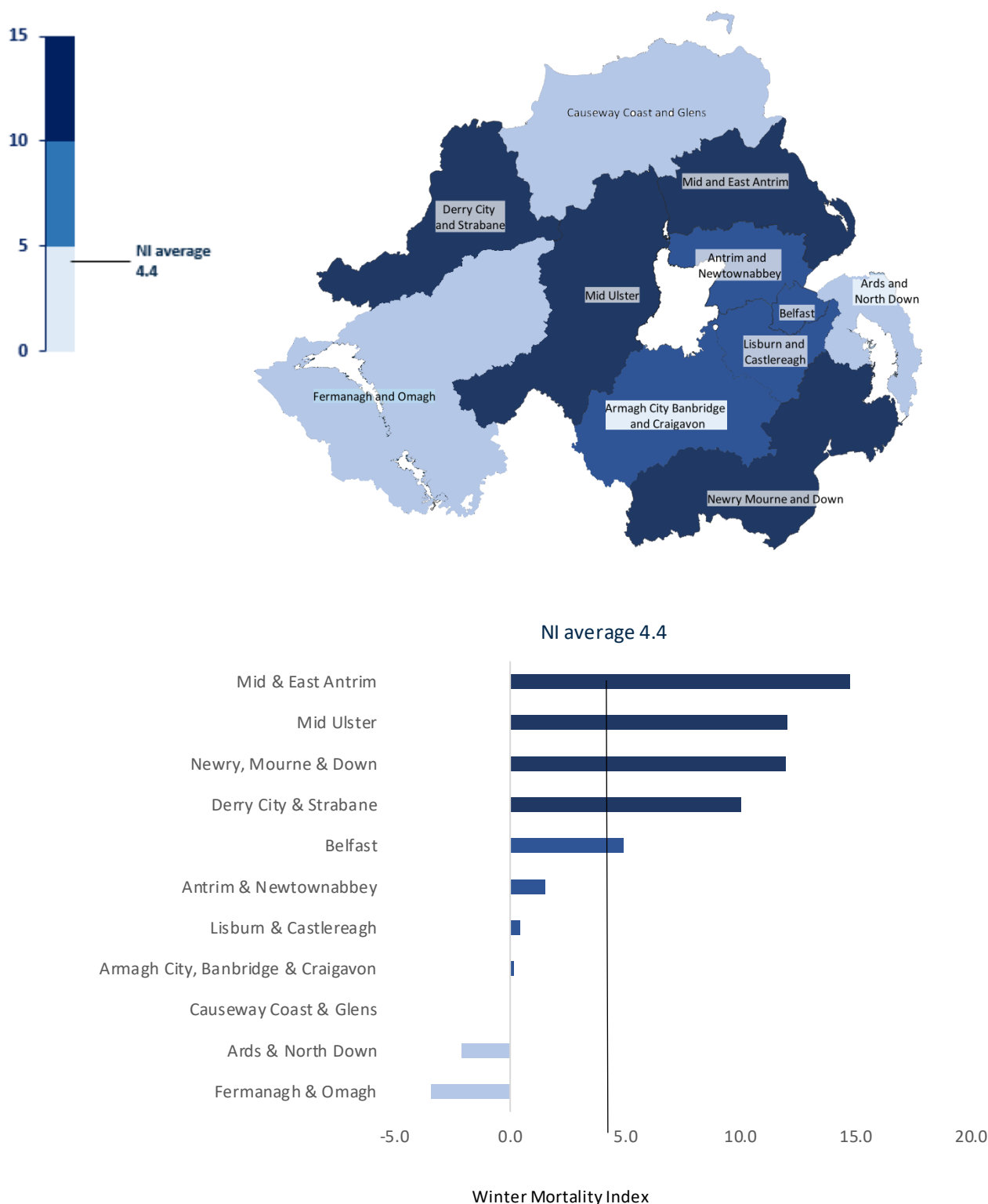
Figure 10: Winter Mortality Index by Health & Social Care Trust, Northern Ireland, 2021/22



Local Government District (LGD)

In 2020/21, the highest regional WMI was in Mid and East Antrim LGD, where 14.7 per cent more deaths occurred in the winter months (Figure 11). This was followed by Mid Ulster (12.0 per cent). Fermanagh and Omagh (-3.4 per cent) had the lowest proportion of winter deaths in 2021/22 followed by Ards and North Down (-2.1 per cent) where both actually had fewer deaths in winter months when compared with non-winter months. Looking at the regional EWMI's over time there is no one LGD which consistently has a higher proportion of winter deaths each year; rather the indices show notable fluctuation over time across the Districts (see Table 6 in accompanying spreadsheet).

Figure 11: Winter Mortality Index by Local Government District, Northern Ireland, 2021/22



Links to relevant publications

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

Statistical bulletin | Periodically

[Winter mortality in Scotland 2021/22](#)

Statistical bulletin | Released 27 October 2022

Figures for the seasonal increase in mortality in Scotland for winter 2021 to 2022 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. The release for 2021 to 2022 is expected for release in January 2023.

[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 [Winter Mortality](#) web page in Excel format. The spreadsheet includes the following tables and charts

Table 1: *Number of Deaths Occurring, Number of Additional Winter Deaths and Winter Mortality Index, Northern Ireland*

Table 2: *Winter Deaths and Winter Mortality Index by age group, Northern Ireland*

Table 3: *Winter Deaths and Winter Mortality Index by sex, Northern Ireland*

Table 4: *Winter Deaths and Winter Mortality Index by Cause of Death, Northern Ireland*

Table 5: *Winter Deaths and Winter Mortality Index by Health and Social Care Trust, Northern Ireland*

Table 6a: *Winter Deaths by Local Government District, Northern Ireland*

Table 6b: *Winter Mortality Index by Local Government District, Northern Ireland*

Chart 1 *Deaths before, during and after winter 2021/22*

Chart 2 *Deaths (excluding deaths from Covid-19) before, during and after winter 2021/22*

Chart 3 *Winter Mortality and 5-Year Central Moving Average, NI, 1980/81 to 2021/22*

Chart 4 *Winter Mortality by Cause of Death, Northern Ireland, 2021/22*

Chart 5 *Winter Mortality Index, Northern Ireland, 1980/81 to 2021/22*

Chart 6 *Winter Mortality by Sex, Northern Ireland, 2021/22*

Chart 7 *Winter Mortality Index by Age Group, Northern Ireland, 2017/18 to 2021/22*

Chart 8 *Winter Mortality Index by Health & Social Care Trust, Northern Ireland, 2021/22*

Chart 9 *Winter Mortality Index by Local Government District, Northern Ireland, 2021/22*

Contact Details

We welcome feedback from users, please contact:

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Next publication: **Winter 2023**