

Winter Mortality, 2022-2023

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The number of deaths can vary depending on the season and, in particular, tend to increase in the winter. This paper presents estimated additional winter deaths by comparing the months of December to March 2022/23 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 2022/23 there were 6,199 deaths in Northern Ireland, an increase of 149 from the 6,050 deaths occurring in winter 2021/22. Comparing this with the average number of deaths for the two adjacent, 'non-winter' four-month periods (the previous August to November 2022 and the following April to July 2023), the seasonal increase in mortality (i.e., Winter Mortality (WM)) for winter 2022/23 was estimated to be 940. This was 740 more than the corresponding estimate for the previous winter (200 in 2021/22).¹
- The Covid-19 pandemic has impacted the previous three years' WM estimates due to the unexpectedly high number of deaths in the non-winter months of 2020 and 2021 as well as increased Covid-19 related deaths in winter 2020/21. This makes direct annual comparisons with the 2022/23 estimate difficult, the latter having had minimal impact from Covid-19 related deaths due to more stable numbers across the year. Annex 1 details how removing deaths due to Covid-19 impacts WM.
- WM is usually higher in females compared with males, and this was the case in winter 2022/23 with females accounting for 54.8 per cent and males counting for 45.2 per cent of the additional 940 winter deaths that occurred in 2022/23.
- Two causes of death, circulatory disease, and respiratory disease, together accounted for just over half of the additional WM in 2022/23, at 26.4 and 26.3 per cent respectively, whilst dementia/Alzheimer's disease, which was the leading cause of additional WM the previous winter, accounted for 16.1 per cent of the additional WM this year.
- In Northern Ireland, deaths in the winter months were 17.8 per cent higher than in the adjacent non-winter months (WM) – this proportion is referred to as the Winter Mortality Index (WMI). The Health & Social Care Trust with the highest WMI was the Northern Trust, with 21.2 per cent more deaths

¹ This will differ from the previously published total for 2021/22 and it is based on death occurrences. The current figure includes any deaths registered since the last publication on 15 December 2022.

occurring in the winter months. In comparison, the lowest WMI was in the South-Eastern Trust where 15.5 per cent more deaths occurred in the winter months, than in the non-winter months.

- The highest regional WMI in 2022/23 was in the Causeway Coast and Glens Local Government District, where 27.3 per cent more deaths occurred in the winter months than in the non-winter months. Ards and North Down had the lowest WMI, with 14.7 per cent fewer deaths occurring in the winter months.

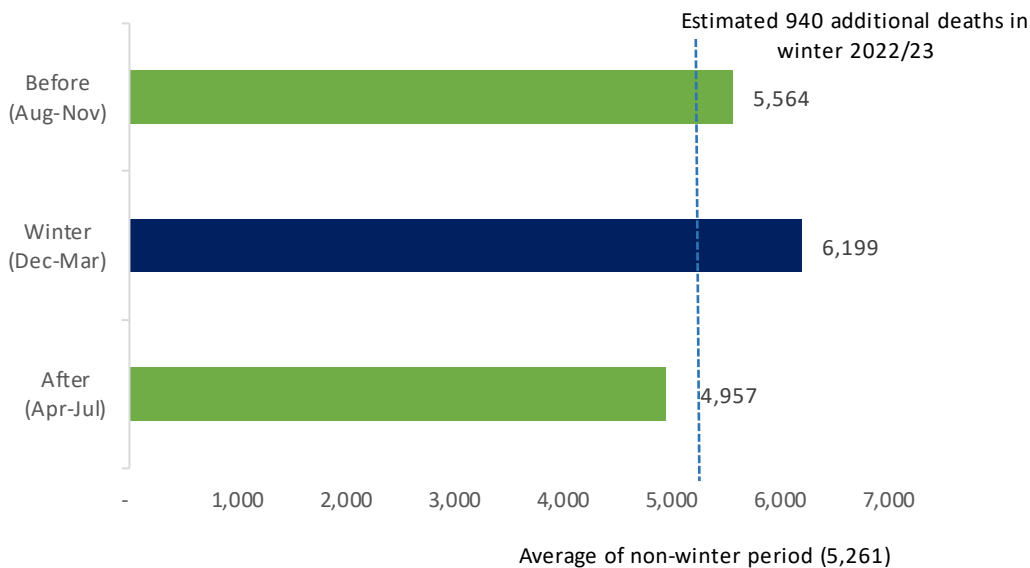
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Summary

Winter Mortality 2022/23

Figure 1: Deaths before, during and after winter 2022/23

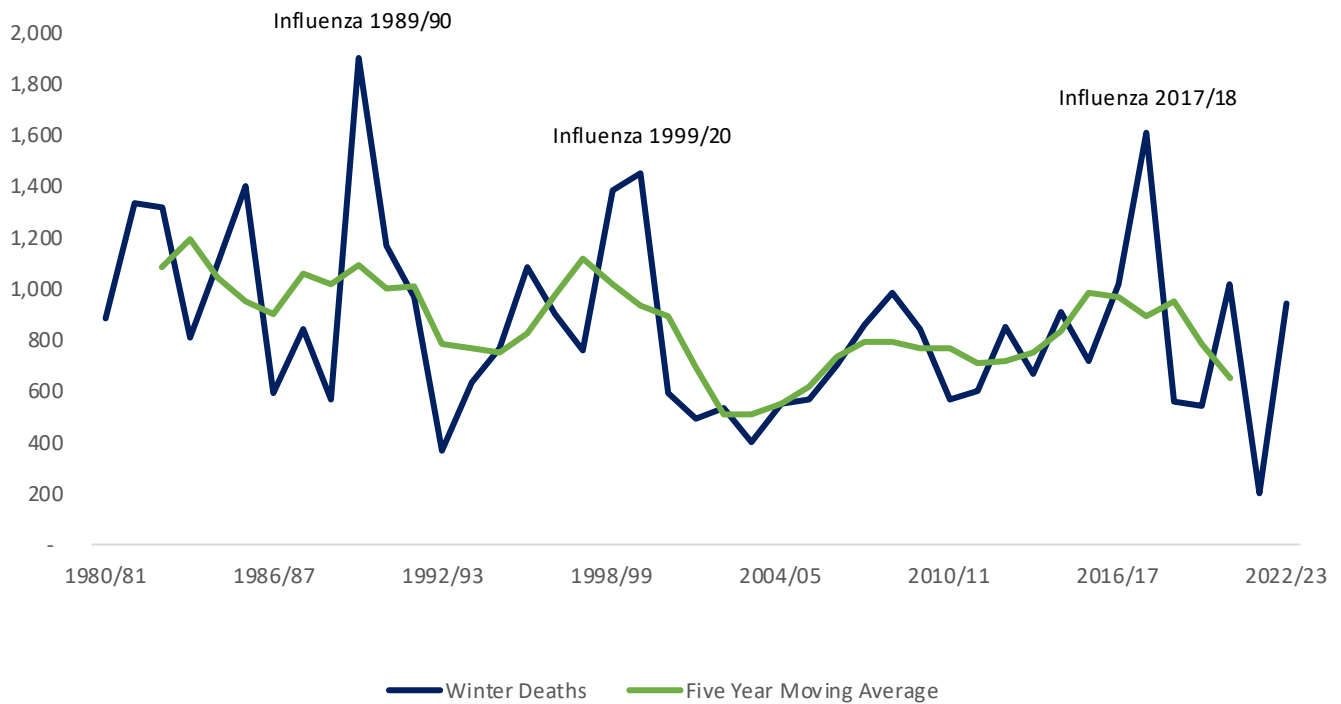


The 6,199 deaths in Northern Ireland in the four months of winter 2022/23 (December to March) is a rise on the 6,050 deaths in Winter 2021/22. Comparing this with the average for the two adjacent, 'non-winter' 4-month periods (5,261), the seasonal increase in mortality (i.e., the WM) for winter 2022/23 was approximately 940. This contrasts with the previous winter (2021/22) when 200 'additional' winter deaths occurred, however it is still lower than 2020/21 when 1,020 'additional' winter deaths occurred. However, direct comparisons with the pandemic period should be treated with caution as WM during this period was impacted by unusual trends in deaths within and outside the winter periods in 2020 and 2021. Deaths related to Covid-19 were not found to have the notable impact on WM in 2022/23 as previous years.

See Annex 1 for more information on the impact of Covid-19 deaths on WM in 2022/23.

Time Trend Analysis

Figure 3: Winter Mortality and 5-Year Central Moving Average, Northern Ireland, 1980/81 to 2022/23



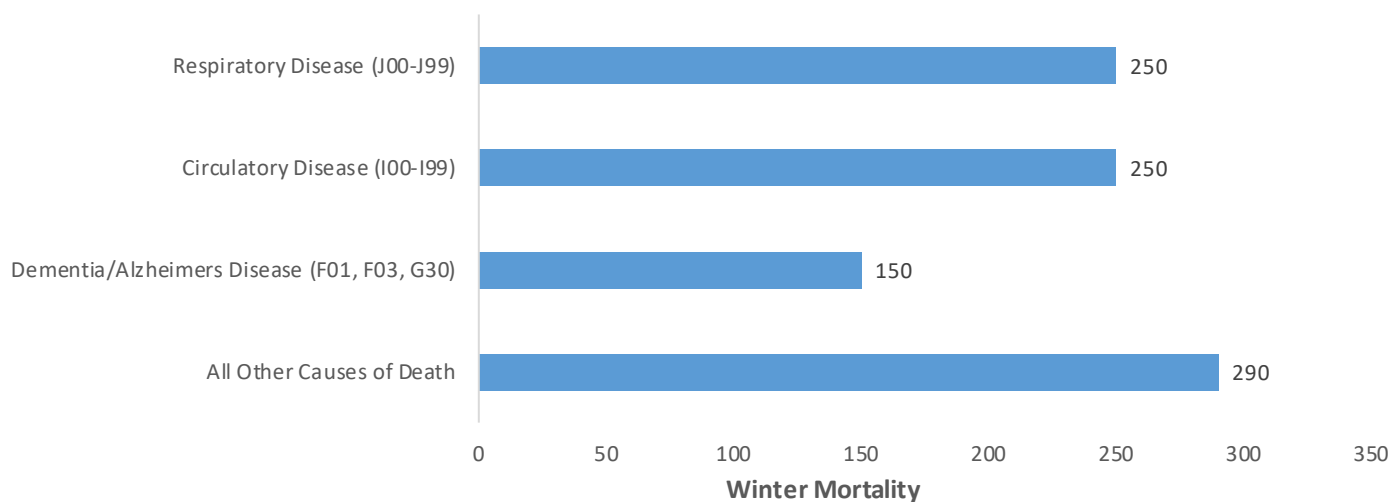
The long-term trend in WM has been generally downward, but WM can fluctuate greatly from winter to winter, with highest numbers of additional winter deaths seen in years that have experienced influenza outbreaks.

The five-year moving average of WM in 2020/21 was 651 (based on years 2018/19 to 2022/23) (Figure 3). This is the lowest moving average of WM recorded since 2005/06 (based on years 2003/04 to 2007/08).

Cause of Death

The following chart shows how additional winter deaths in 2022/23 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, 2022/23



Whilst dementia/Alzheimer's Disease was the leading cause of WM the previous winter (accounting for just over a quarter of the additional winter deaths in 2021/22), respiratory disease and circulatory disease contributed to just over half of the additional winter deaths in 2022/23. Additional winter deaths due to all other causes of death rose from -80 additional winter deaths in 2021/22 (i.e., 80 fewer than the average number observed in non-winter months) to 290 in winter 2022/23.

Covid-19 accounted for 60 (or 6.0 per cent) of all additional winter deaths in winter 2022/23 and was therefore not a leading cause. For this reason, it has been included within the 'All Other Causes' category in Fig 4 above. This is in stark contrast to the previous 3 winters when deaths due to Covid-19 were the primary driver of the direction and scale of WM.

What You Need to Know

This statistical bulletin presents provisional figures for Winter Mortality (**WM**) and the Winter Mortality Index (**WMI**) in Northern Ireland for the winter period 2022/2023.

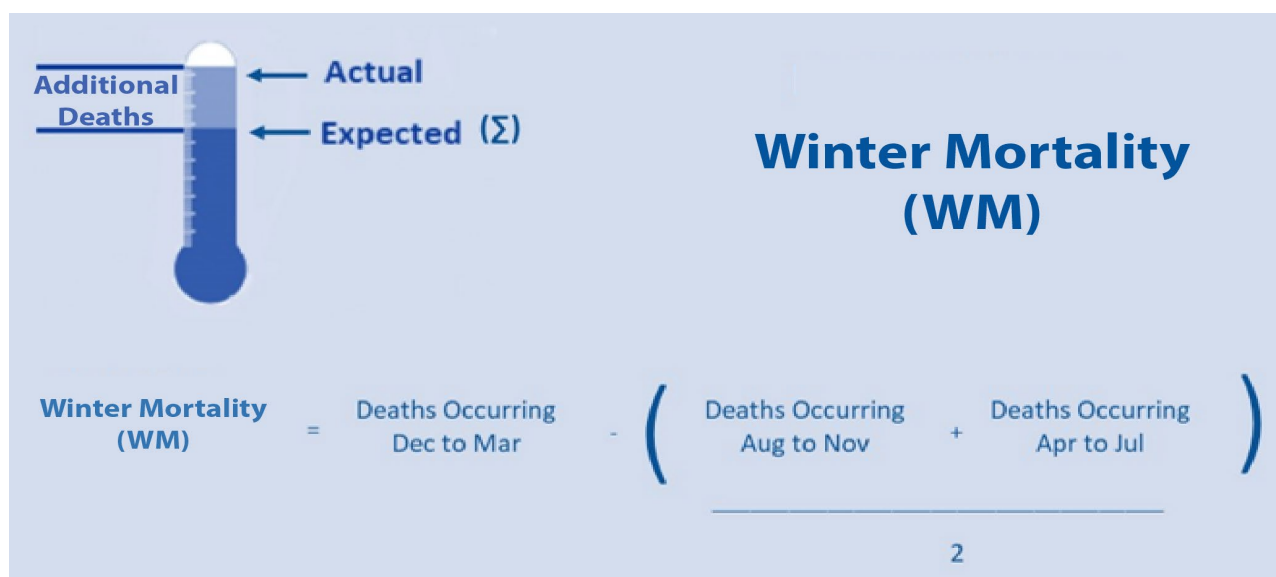
Historical trends from 1980/1981 onwards are also provided in the accompanying [spreadsheet](#) for comparison. Provisional figures are presented by sex, age, cause of death and geographical area. All figures are based on death **occurrences** (the date on which a death occurred) rather than death **registrations** (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 they are occurrence-based and include deaths that happened up to and including 31st July 2023 based on deaths registered up to 30th September 2023².

WM 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 WM. WM 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, 2023 <https://www.nisra.gov.uk/publications/registrar-general-quarterly-tables-quarter-3-2023>

The WMI is calculated as the number of deaths taking place in the winter months (WM) 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

**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 December 2022 in March 2023. There is currently no plan for further updates to the report. Estimates in the 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 WM, which is a measure of seasonality within a 12-month period.

Excess Mortality is currently defined as:

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

It should be noted however that a UK working group was set up in early 2023 to look at the current method of calculating excess mortality. The current method is relatively easy to understand but does not account for a number of factors that put excess mortality into context, such as:

- the size of the population – deaths presented as a number do not give an indication of population size. A rate gives a clearer steer as to the level of mortality, making it easier to make comparisons across countries;
- the age structure of the population – age is the biggest factor in predicting mortality therefore the age structure of the population should be taken into consideration when comparing deaths and excess deaths across different countries, or different regions; and
- trends in mortality – the current method can be skewed by years of high and/or low mortality.

A paper outlining the findings from the working group looking at excess deaths mortality and recommended new UK-wide methodology is planned for release in coming months. The new methodology will subsequently be implemented in the NISRA weekly deaths tables in 2024.

Please note that winter mortality estimates in this bulletin are rounded to the nearest 10, but percentages are calculated based on the unrounded 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 2022/23, there were an estimated 940 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 2021/22 was 200³.

The seasonal increase in mortality has been calculated for the last 42 winters from 1980/81. The 2021/22 WM figure of 200 was the lowest of those 42 winters and was a result of a higher number of deaths occurring in non-winter months linked to the Covid-19 pandemic. 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 WM 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 1,610 for 2017/18, which was the largest number of additional winter deaths since 1999/2000, both coinciding with influenza outbreaks. Also, in 2020/21 there were an additional 1,020 winter deaths observed, above the observed 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 WM. 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.

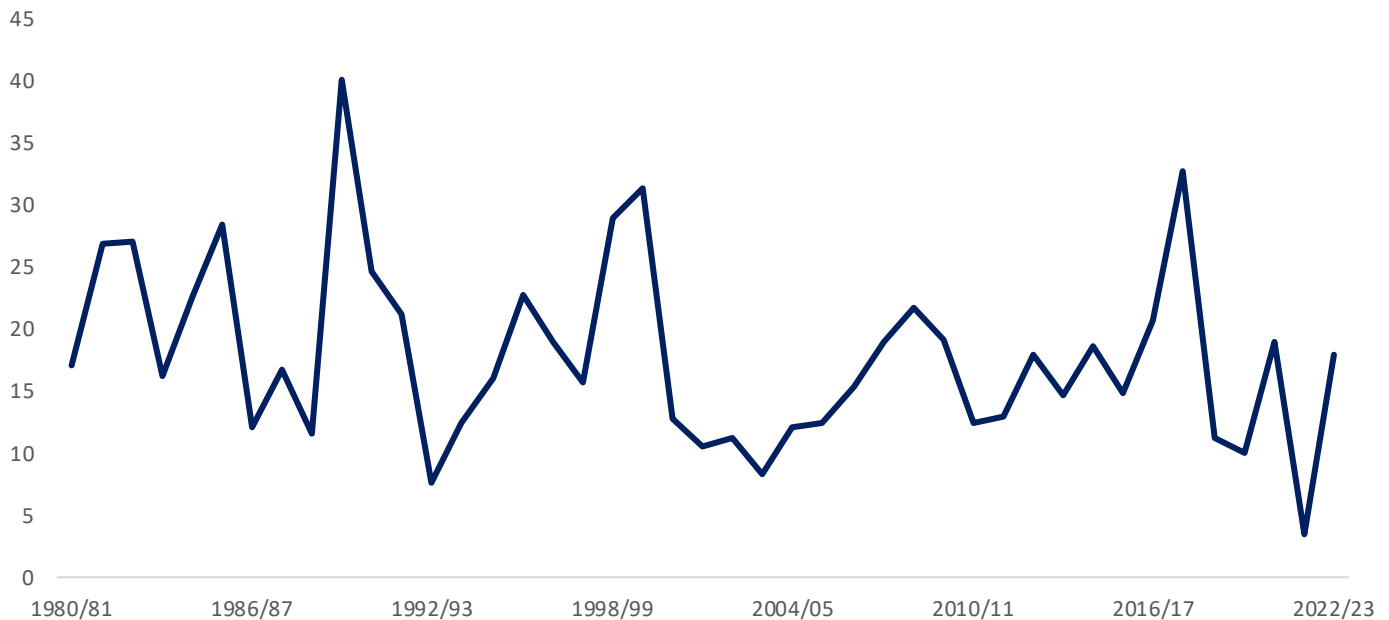
³ This will differ from the previously published total for 2021/22 and it is based on death occurrences. The current figure includes any deaths registered since the last publication on 15 December 2022 .

⁴ Registrar General Annual Report, Northern Ireland, 2022 [Registrar General Annual Report | Northern Ireland Statistics and Research Agency \(nisra.gov.uk\)](#)

Winter Mortality Index (WMI) in Northern Ireland

A 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 2022/23.

Figure 6: WMI, Northern Ireland, 1980/81 to 2022/23



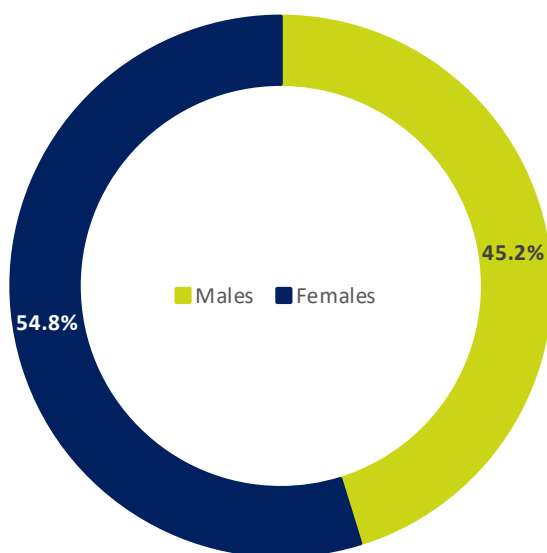
The WMI for Northern Ireland in 2022/23 was 17.8 per cent, which means that 17.8 per cent more deaths occurred in the winter months compared with the non-winter months. The index peak was in 1989/90 (40.1 per cent) whilst 2017/18 showed the most recent spike at 32.8 per cent. The 2021/22 index of 3.5 per cent was the lowest WMI over the 43-year period which, as already mentioned, was due to an increased number of deaths in the non-winter periods linked with the pandemic.

Winter Mortality by Sex and Age

Of the estimated additional 940 winter deaths in 2022/2023, 45.2 per cent were among males and 54.8 per cent among females (Figure 7). 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.

Looking at the WMI, as with most years the WMI for females was higher than males. In 2022/23 16.5 per cent in males and 19.2 per cent in females (see table 3 in the accompanying spreadsheet for time series data).

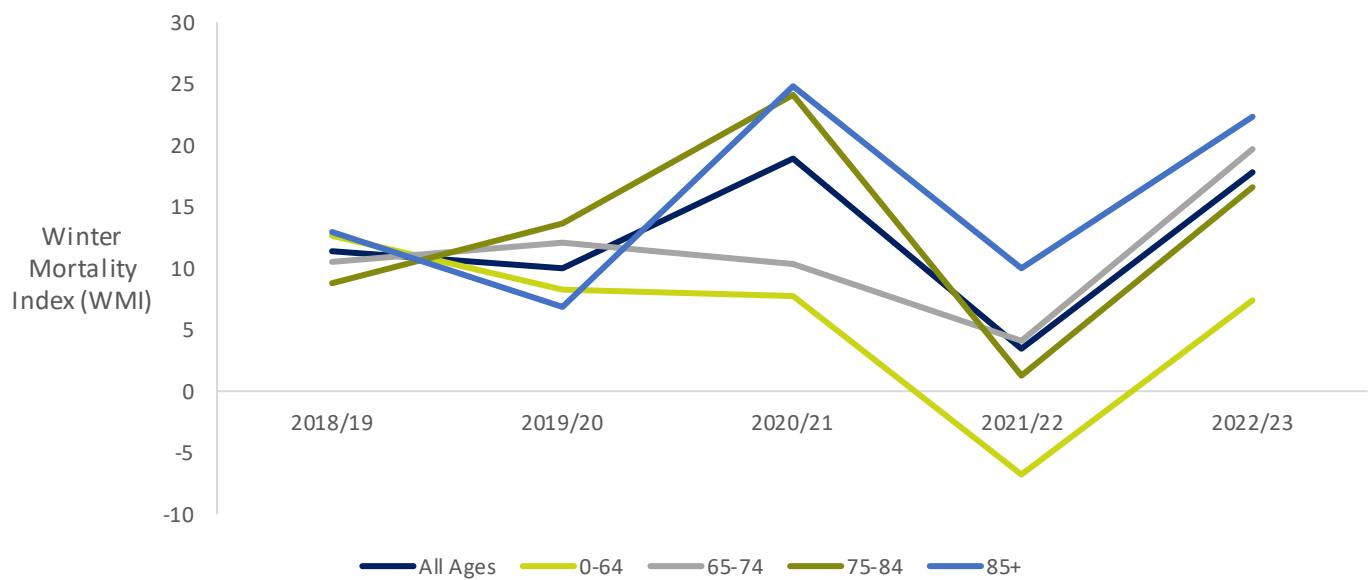
Figure 7: Composition of additional winter deaths by sex, Northern Ireland, 2022/23



In 2022/23, 75.5 per cent of the estimated 940 additional winter deaths involved people aged 75 and over, with 46.8 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), then reached a low in 2019/20 at 6.9 per cent, and it reached a smaller peak again in 2020/21 (coinciding with a peak in the covid pandemic that winter) at 24.8 per cent. The WMI for this age group rose from 10.1 per cent in 2021/22 to 22.4 per cent in 2022/23.

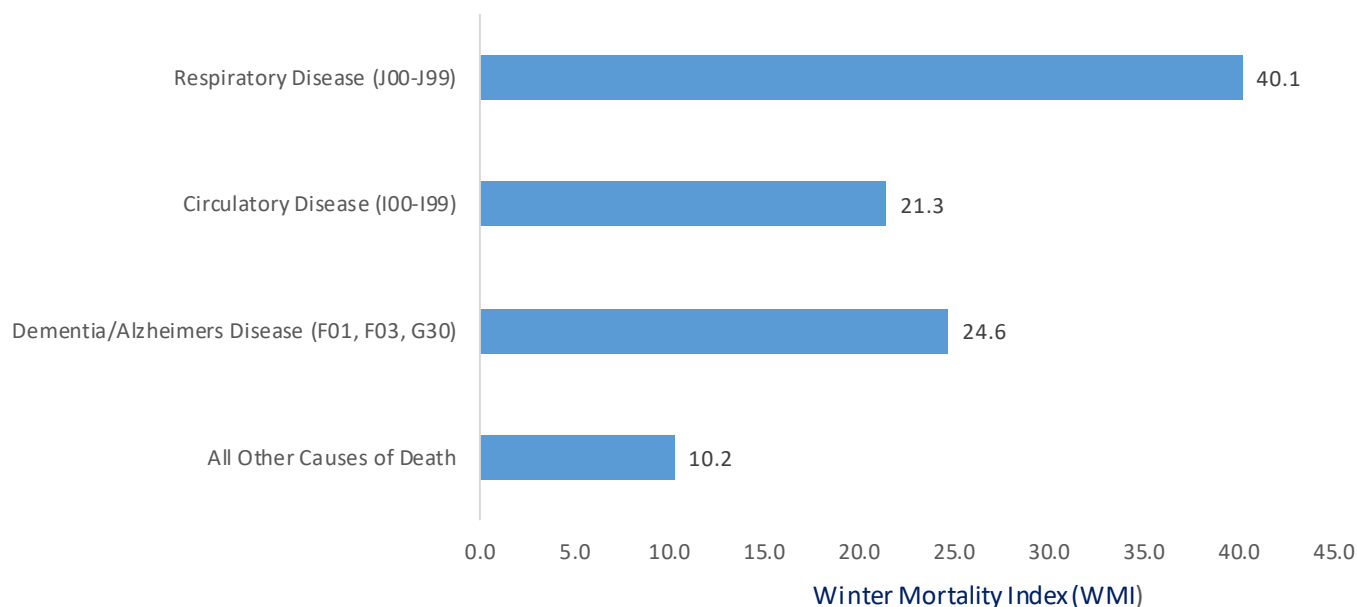
Figure 8: WMI by age group, 2018-2019 to 2022/23



Winter Mortality by Underlying Cause of Death

Figure 9 shows the composition of the 2022/23 WMI for the three leading underlying causes of additional winter deaths: respiratory diseases (defined as ICD-10 codes J00 to J99), circulatory diseases (defined as International Classification of Diseases, 10th Revision (ICD-10) codes I00 to I99), and dementia/Alzheimer's disease (F01, F03 and G30), along with the WMI for all remaining causes (grouped into the category 'All Other Causes of Death').

Figure 9: WMI by Cause of Death, Northern Ireland, 2022/23



Circulatory disease and respiratory disease were the two joint leading causes of additional winter deaths in 2022/23 having each accounted for 250 deaths each, totalling 500 of the 940 (or 52.7 per cent) of the additional winter deaths in Northern Ireland in 2022/23.

Respiratory disease had the highest WMI of the three leading causes of additional winter deaths, at 40.1 per cent. This means that there were 40.1 per cent more deaths due to respiratory disease occurring in the 2022/23 winter period compared with the non-winter 4-month periods to either side of the winter.

This compares to a WMI of 24.6 per cent for dementia/Alzheimer's disease, and 21.3 per cent for circulatory disease in 2022/23.

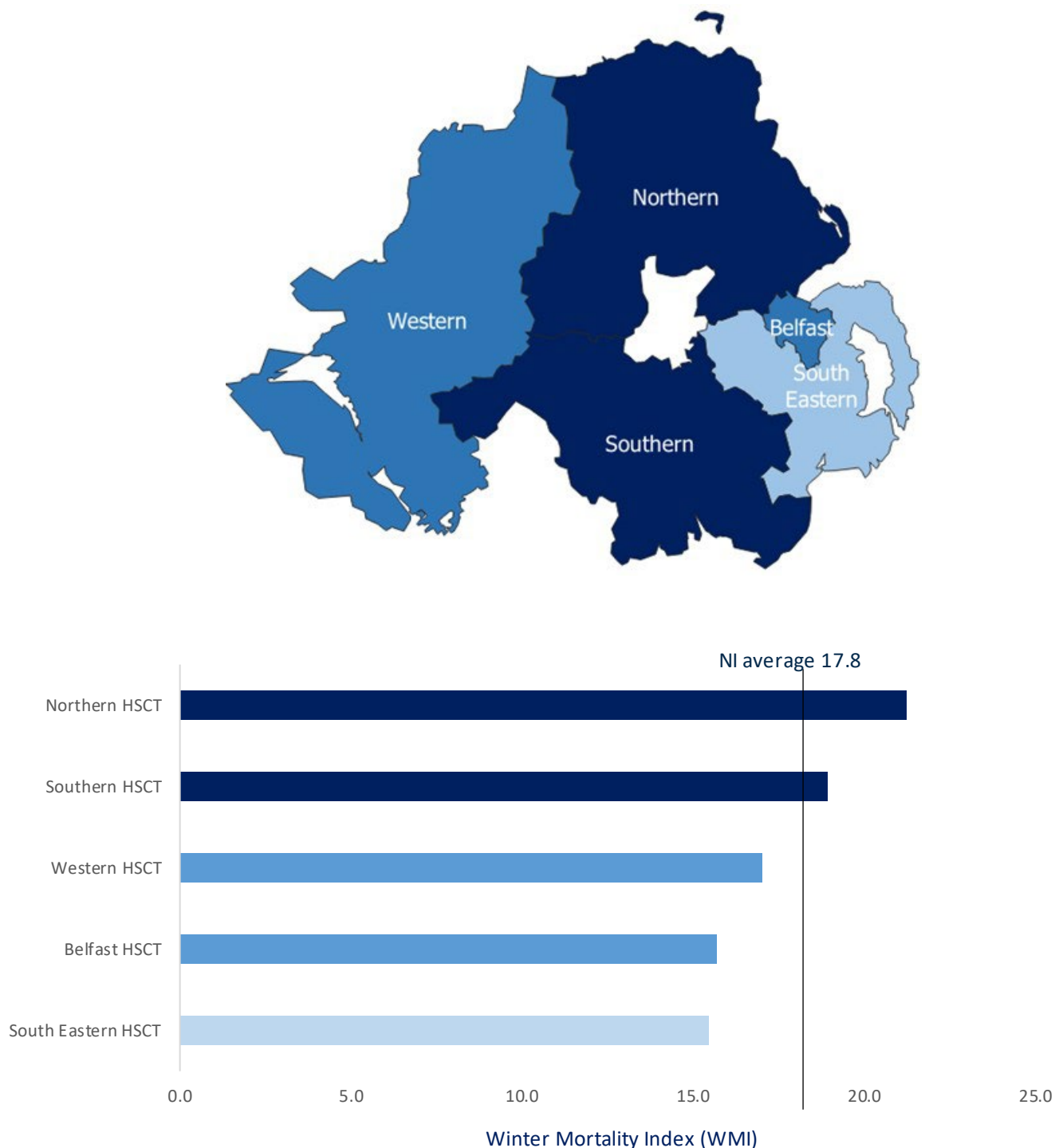
In 2022/23, Covid-19 was not a leading underlying cause of additional winter mortality and is therefore included in the 'All Other Causes of Death' category in Figure 4 above.

Winter Mortality by Area

Health and Social Care Trust

In 2022/2023, the Trust with the highest WMI was the Northern Trust with 21.2 per cent more deaths having occurred there in the winter months, compared with the non-winter months. The next highest WMI was in the Southern Trust with a WMI of 18.9 per cent. The South Eastern Trust experienced the lowest WMI of all the Trusts in 2022/23 where 15.5 per cent more deaths occurred in the winter months of 2022/23, than in the non-winter months. The Northern Ireland index was 17.8 per cent.

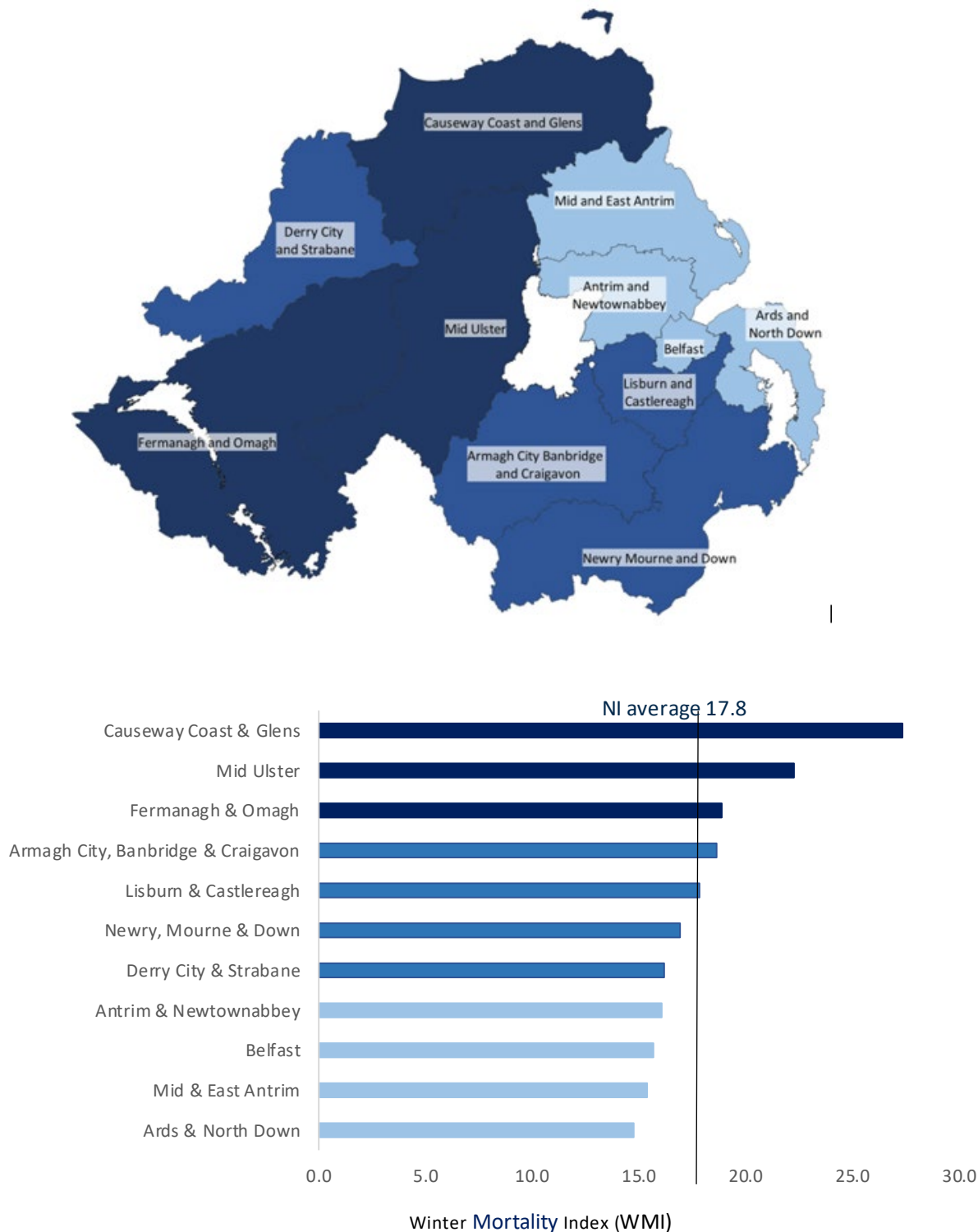
Figure 10: WMI by Health & Social Care Trust, Northern Ireland, 2022/23



Local Government District (LGD)

Figure 11 shows that Mid and East Antrim LGD had the lowest regional WMI in 2022/23 (at 15.4 per cent). In contrast, Causeway Coast and Glens district had the highest WMI in 2022/23 (at 27.3 per cent). Lisburn and Castlereagh district matched the Northern Ireland WMI of 17.8 per cent, whilst four were below the average and six were above it. The indices also show notable fluctuation over time across all of the districts (see Table 6 in accompanying spreadsheet).

Figure 11: WMI by Local Government District, Northern Ireland, 2022/23



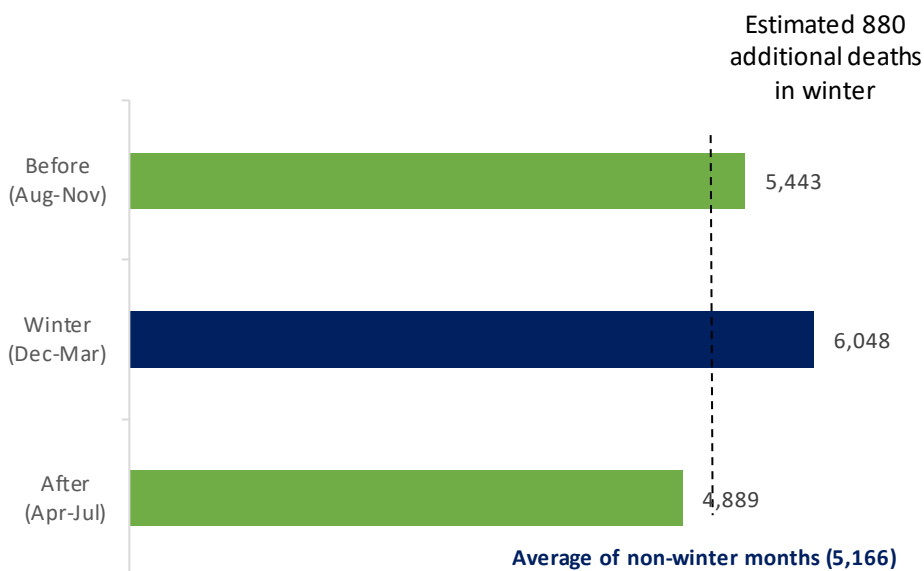
Annex 1: Estimating the Impact of Covid-19 on Winter Mortality

In the 2019/20 and 2021/22 publications, the inflationary effect of Covid-19 on deaths occurring in the non-winter months reduced 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. WM in 2022/23 was not impacted by Covid-19 in the same way as that observed in previous winters as the number of deaths due to covid-19 were relatively stable throughout the year.

As done in previous publications, we can estimate this impact on WM in 2022/23 by removing all deaths where Covid-19 was the underlying cause of death and re-calculating WM.

Over 150 deaths occurred where Covid-19 was determined to be the underlying cause of death from December 2022 to March 2023, 121 from August to November 2022, and 68 from April to July 2023. Removing these from the calculation leads to an estimated additional WM of approximately 880 (compared with 940 when including deaths due to Covid-19). In this scenario, the Northern Ireland WMI decreases from 17.8 to 17.1 per cent.

Figure 5: Deaths (excluding Covid-19 deaths) before, during and after winter 2022/23



Links to Relevant Publications

[Excess Mortality and Covid-19 Related Deaths in Northern Ireland- March 2020 to December 2022](#)

Statistical bulletin | Released March 2023

[Winter mortality in Scotland 2022/23](#)

Statistical bulletin | Released 24 October 2023

Figures for the seasonal increase in mortality in Scotland for winter 2022/23 and earlier years, broken down by age-group, sex, cause of death, Scottish Index of Multiple Deprivation quintile, NHS Board and Local Authority area.

[Winter mortality in England and Wales 2021 to 2022 provisional 2020 to 2021 final](#)

Data tables | Released 19 January 2023

Figures for winter mortality in England and Wales for 2021 to 2022 (provisional) and earlier years (final), broken down by sex, age, cause of death, region and place of death.

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

Statistical Bulletin | Updated weekly

The tables contain summary information and sub-national analysis on the number of deaths registered each week in Northern Ireland, and, specifically, the number of COVID-19 deaths registered. 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 2022/23*

Chart 2 *Deaths (excluding deaths from Covid-19) before, during and after winter 2022/23*

Chart 3 *Winter Mortality and 5-Year Central Moving Average, NI, 1980/81 to 2022/23*

Chart 4 *Winter Mortality by Cause of Death, Northern Ireland, 2022/23*

Chart 5 *Winter Mortality Index, Northern Ireland, 1980/81 to 2022/23*

Chart 6 *Winter Mortality by Sex, Northern Ireland, 2022/23*

Chart 7 *Winter Mortality Index by Age Group, Northern Ireland, 2017/18 to 2022/23*

Chart 8 *Winter Mortality Index by Health & Social Care Trust, Northern Ireland, 2022/23*

Chart 9 *Winter Mortality Index by Local Government District, Northern Ireland, 2022/23*

Contact Details

We welcome feedback from users, please contact:

NISRA Vital Statistics Unit,
Northern Ireland Statistics and Research Agency,
Colby House,
Stranmillis Court,
Belfast BT9 5RR

E-mail: demography@nisra.gov.uk

Telephone: +44 (0)300 200 7836

Twitter: [@NISRA](#)

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Next publication: **Winter 2024**