

Excess mortality and Covid-19 related deaths in Northern Ireland: March 2020 to August 2022

Key Points

- There were an estimated 3,662 excess deaths from 1 March 2020 to 31 August 2022, 9.2% above expected levels (average deaths for the same period over the last five years). In the same period, there were 4,845 Covid-19 related deaths.
- Excess deaths were highest in April/May 2020, October 2020 to January 2021, and August 2021 to November 2021. Deaths were below expected levels in March/April 2021 and January/February 2022.
- The estimate of excess deaths for females (1,528 or 7.6% above expected levels) was markedly lower than that for males (2,134 or 10.9% above expected levels), with a smaller difference in the number of Covid-19 related deaths (2,571 males compared to 2,274 females).
- Just under three-quarters of excess deaths (74.0%) and Covid-19 related deaths (73.8%) were those aged 75 and over. The estimate of excess deaths for females (1,528) was markedly lower than that for males (2,134), with a smaller difference in the number of Covid-19 related deaths (2,571 males compared to 2,274 females).
- The majority of Covid-19 related deaths (69.8%) occurred in hospital. The number of Covid-19 related deaths in hospital (3,381) was four times larger than hospital excess deaths (832). In contrast, the majority of excess deaths (3,001 or 81.9%) occurred at home.
- Armagh City, Banbridge & Craigavon LGD had the largest estimate of excess deaths (471), accounting for 12.9% of the total estimate of excess deaths. The highest excess deaths as a proportion of expected deaths (11.8%) was observed in Mid Ulster, Causeway Coast & Glens, and Armagh City, Banbridge & Craigavon LGDs, while Belfast LGD had the lowest proportion (4.1%).
- Excess deaths were higher in rural areas (12.5%) compared to urban areas (7.6% above historic levels); excess deaths in rural areas (1,455) outnumbered its Covid-19 related deaths (1,410).
- From March 2020 to December 2021, the number of deaths where Covid-19 was found to be the underlying cause (3,500) was similar to excess mortality in this period (3,447). Noteworthy levels of excess deaths were found for malignant neoplasm (276 or 3.4% above historical levels) and diseases of the digestive system (224 or 14.9% above historical levels).

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Introduction

The Northern Ireland Statistics & Research Agency (NISRA) publishes official statistics on the number of deaths registered in Northern Ireland¹. Due to the coronavirus (Covid-19) pandemic, the NISRA [weekly deaths release](#) has been supplemented with deaths relating to Covid-19, that is, where Covid-19 or suspected Covid-19 was mentioned anywhere on the death certificate, including in combination with other health conditions. Additional analysis has been published, which provides a further breakdown of Covid-19 related mortality rates by age, sex and geographical areas².

This bulletin reports on excess mortality based on deaths occurring from the start of the pandemic (March 2020) to August 2022 in Northern Ireland, an approach that does not rely on the availability or quality of population estimates or cause of death information. It is for this reason that ‘excess mortality’ is often used as a standard indicator when comparing deaths between countries³.

This report is an Official Statistics publication and statistics are produced to high professional standards set out in the [Code of Practice for Official Statistics](#).

The statistics are:

- produced to meet identified user needs;
- well explained and readily accessible;
- produced according to sound methods; and
- managed impartially and objectively in the public interest and are produced free from any political interference.

The production of this report has been supported by the Administrative Data Research Northern Ireland (ADR NI), further details on which are provided in the [background notes](#).

¹ [Official death statistics for Northern Ireland](#)

² [Covid-19 related deaths in Northern Ireland, March 2020 to October 2021](#)

³ For example, see ‘[Understanding excess mortality](#)’ by the Health Foundation

Covid-19 in Northern Ireland

The first confirmed case in Northern Ireland was reported on 28 February 2020⁴. Cases continued to rise in early March and the first Covid-19 related death occurred on 18 March 2020. Based on deaths registered up to 12 October 2022, there have been 4,845 Covid-19 related deaths in Northern Ireland up to 31 August 2022.

The term 'Covid-19 related deaths' used in this bulletin reflects where Covid-19 or 'suspected' or 'probable' Covid-19 was mentioned anywhere on the death certificate, including in combination with other health conditions. A subsection of these deaths, where Covid-19 was found to be the underlying cause of death, are referred to as Covid-19 deaths.

Excess mortality methodology

Excess mortality is considered to be a good measure of the impact of the Covid-19 pandemic, as it does not rely on the availability or interpretation of the (primary and secondary) causes of death. It captures deaths from all causes, which may be related to a range of factors associated with the pandemic, for example, changes in the availability or uptake of health care services including screening and diagnosing, or the impact of 'lock-down' on health. Some of these effects may take months or years to be fully understood.

Excess Deaths

Excess mortality is the difference between actual deaths from all causes in a period minus the expected number of deaths. It is therefore a mathematical concept; it is not possible to identify if an individual death was an excess death. For example, to determine the estimate of excess deaths which occurred in Belfast, we look at the number of deaths which occurred in Belfast for the period of interest (March 2020 to August 2022) and subtract from this the five-year average number of deaths. This means that excess deaths may in some cases be a negative number. In contrast, the analysis of Covid-19 related deaths to which this report makes comparisons, is based on individual deaths where Covid-19 was included on the death certificate. These cannot be automatically classed as excess deaths. Therefore, the two analyses should not be combined or differenced as this will not yield valid conclusions. Note that in this report, excess deaths are rounded to the nearest whole number. Unrounded figures are presented in the accompanying spreadsheet.

Excess Winter Mortality

Excess Winter Mortality (EWM)⁵ is the difference between the actual number of winter deaths in the four-month period December to March and the expected number of deaths. The latter is the average of the number of deaths in the two four-month periods which precede winter (August to November) and follow winter (April to July). As such, it is a measure of seasonality. The latest Excess Winter Mortality figures for Northern Ireland relate to the winter of 2020/2021.

⁴ Public Health Agency [Covid-19 surveillance reports](#)

⁵ [Excess winter mortality in Northern Ireland](#)

Excess mortality can be expressed as a number or as a proportion of the expected number of deaths, which in this analysis is defined as the average number of deaths for the same period over the previous five years. The estimate of excess deaths allows for any potential under- or over-counting of Covid-19 deaths and is therefore useful when comparing the effect of the pandemic in different populations. Excess deaths are distinctly different from Excess Winter Mortality, which is a measure of seasonality (see below for further detail).

Deaths in 2020 were compared to the average number of deaths in the previous five years, 2015 to 2019. A similar approach for 2021 meant that the 2020 pandemic year is included in the five-year average (2016-2020). Likewise, the reference period for 2022 deaths (2017-2021) includes two pandemic years. This approach is currently used for weekly death statistics in Northern Ireland. Other countries have chosen alternative time periods (see Tables 1a and 1b). Although the resulting annual average differences are relatively small, they could be amplified in some months, certain geographical areas and age cohorts when deriving excess mortality due to the inclusion of 2020 (and 2021), which in turn might dampen the resultant excess mortality figures in Northern Ireland.

Table 1a: Expected deaths for 2021 using different methods

Time period used for average deaths	Expected deaths	Compared to 2016-20 average	Used by
2016-2020	16,001	-	NISRA weekly deaths
2015-2019	15,596	-405	Office for National Statistics , National Records of Scotland
2016-2019	15,646	-355	Eurostat

Table 1b: Expected deaths for January-August 2022 using different methods

Time period used for average deaths	Expected deaths	Compared to 2017-21 average	Used by
2017-2021	10,426	-	NISRA weekly deaths
2016-2019, 2021	10,216	-210	Office for National Statistics , National Records of Scotland
2016-2019	10,069	-357	Eurostat

A period with excess mortality can be followed by another period where the number of deaths is below expected levels. A period of high mortality rate might reduce the size of the most susceptible population, say the very elderly or those with underlying health problems, leading to fewer deaths compared to previous years in the following period.

The analysis in this report is based on deaths that occurred (based on date of death) from 1 March 2020 to 31 August 2022 (rather than the date the deaths were registered), comparing the number of deaths to the average of equivalent months in the previous five years. To allow for delays in the death registration process, the report takes account of registrations up to 12 October 2022 and also builds this period into the five-year average for a more valid comparison. Further information on the methodology is presented in Annex A.

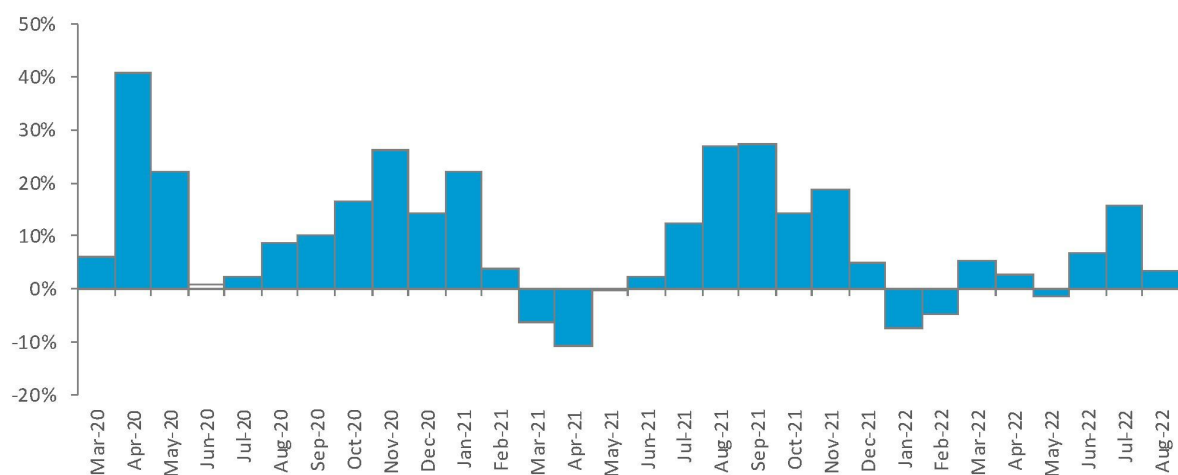
Excess deaths – March 2020 to August 2022

Excess deaths have been reported on a registration date basis in the [weekly death reports](#), and can be derived from [monthly death registrations](#). From March 2020 to August 2022 inclusive, 43,544 deaths were registered, which was 3,753 more (+9.4%) than the average over the previous five years of 39,791 deaths in corresponding months.

By considering deaths which occurred in this 30-month period (March 2020 to August 2022), including those registered up to the 12 October 2022, 42,812 deaths occurred during this time. This figure is slightly lower than the number of registrations (43,544) in the same period due to registration delays. After accounting for this registration lag period (see Annex A), excess deaths are estimated to be 3,662 deaths or 9.2% higher than in previous years.

Monthly excess deaths figures can be best presented as a proportion of expected deaths, that is the average of the same month in the previous five years (see Figure 1). This would account for seasonal mortality, which is generally higher in winter months.

Figure 1: Excess deaths as proportion of average deaths in the previous five years, by month, March 2020 to August 2022



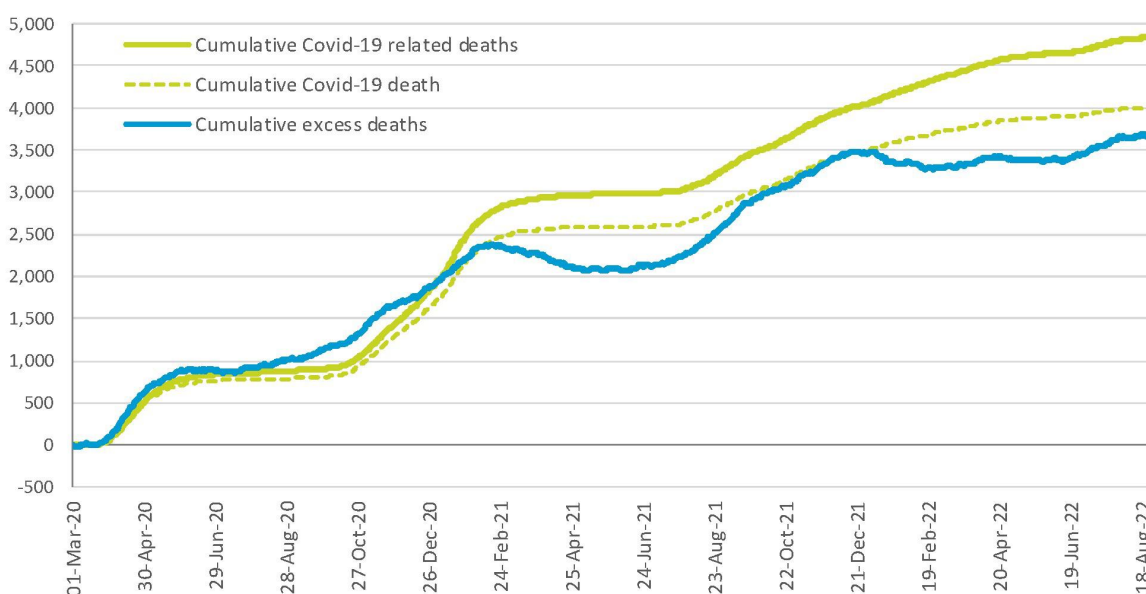
Excess deaths were at their highest at the start of the pandemic, with deaths in April 2020 being 40.9% above expected levels. They remained high in May 2020. During June and July, the number of deaths were at broadly similar levels to the average over the previous five years. For the remainder of the 2020, there continued to be more deaths than expected based on the previous five years, and this persisted until January 2021.

From March to April 2021, excess mortality was negative: deaths were lower than expected based on average deaths from 2016 to 2020. This can only in part be explained by the effect of including 2020 in the average death calculation. Negative excess deaths are more likely due to high levels of excess deaths in the previous months. Excess deaths rose again from July to November 2021. In 2022, deaths returned to expected levels with occasional periods where deaths were lower (January/February) or higher (July) than expected.

Over the period March 2020 to August 2022, there were 3,662 excess deaths, compared to 4,845 deaths that included a mention of Covid-19 on the death certificate. The difference between those two figures was 1,183 deaths or roughly a quarter (24.4%) of Covid-19 related deaths. Note that this gap will be smaller when considering deaths where Covid-19 is the underlying cause of death. Latest figures suggest that there have been 4,006 deaths up to 31 August 2022 where Covid-19 was the underlying cause of death, and thus still higher than current estimates of excess deaths. Further analysis can be found in the section [excess deaths by cause of death](#).

An alternative presentation of excess deaths is as cumulative totals of daily figures. Starting from 1 March 2020, excess deaths of subsequent days are added. Figure 2 shows the cumulative excess deaths occurring from 1 March 2020 to 31 August 2022, based on registrations up to 12 October 2022. It also presents the cumulative number of Covid-19 related deaths in this period, as well as deaths where Covid-19 was found to be the underlying cause of death (Covid-19 deaths).

Figure 2: Cumulative estimate of excess deaths, Covid-19 related deaths and Covid-19 deaths, March 2020 to August 2022



All series follow a broadly similar pattern: there are three periods with rapid increases of Covid-19 related deaths (April/May 2020, October 2020 to February 2021, and August to December 2021) that also see increases in cumulative excess deaths. There are two periods with relatively few Covid-19 related deaths, where cumulative excess deaths are flat (July to October 2020) and even declining (March to July 2021)⁶. On 2 January 2021, cumulative covid-19 related deaths became larger than cumulative excess deaths, and remained so thereafter.

⁶ The Office for National Statistics found a similar decline in England and Wales from March to Jun 2021, see Figure 3 of [‘Excess mortality and mortality displacement in England and Wales: 2020 to mid-2021’](#).

Excess deaths by age and sex

Excess deaths can be calculated for sub-populations, for example, based on socio-demographic characteristics and geography. Figure 3 shows both excess deaths and Covid-19 related deaths by age group.

Figure 3: Excess deaths and Covid-19 related deaths, by age group, March 2020 to August 2022

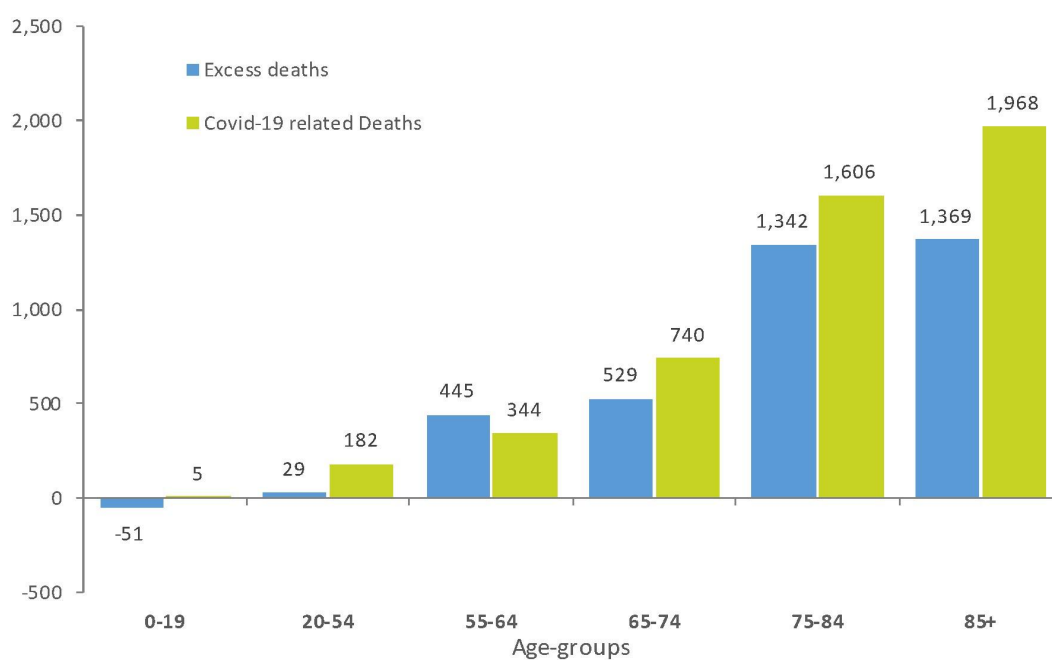


Figure 3 shows that both excess deaths and Covid-19 related deaths increase by age. Around three-quarters of excess deaths (74.0%; 2,711 out of 3,662) and Covid-19 related deaths (73.8%; 3,574 out of 4,845) are accounted for by those aged 75 and over. Only for the age group 55-64 years were excess deaths (445) higher than Covid-19 related deaths (344).

There were 51 negative excess deaths for those aged under 20 years, indicating that the number of deaths in this group in the 30 months from March 2020 to August 2022 was 12.3% lower than the five-year average of previous years. However, the expected number of deaths in this age group was low and were predominately infant deaths and deaths due to external causes⁷, both of which could have longer registration delays as many are referred to the coroner. Deaths of those aged 20 to 54 could also be affected by this delay, as nearly a third⁸ of deaths in this age group are known to be due to external causes of mortality (for example, traffic accidents, suicide, and drug related deaths).

The estimate of excess deaths for females (1,528) was markedly lower than that for males (2,134), with a smaller difference in the number of Covid-19 related deaths (2,571 males compared to 2,274 females – see Figure 4). Male deaths in the 30-month period were 10.9% above expected levels, compared to 7.6% for females.

⁷ See Table 6.4 of the [Registrar General Annual Report 2019](#)

⁸ Table 6.4 of the [Registrar General Annual Report 2019](#) shows that 29.9% (388 out of 1,296) of deaths aged 20 to 54 died of external causes.

Figure 4: Excess deaths and Covid-19 related deaths, by sex, March 2020 to August 2022

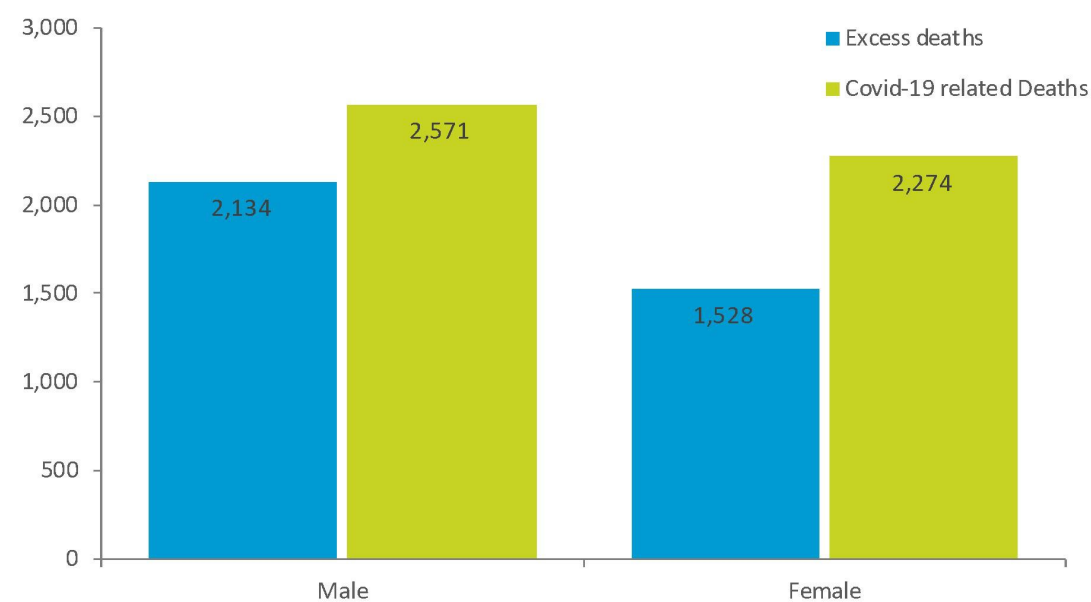
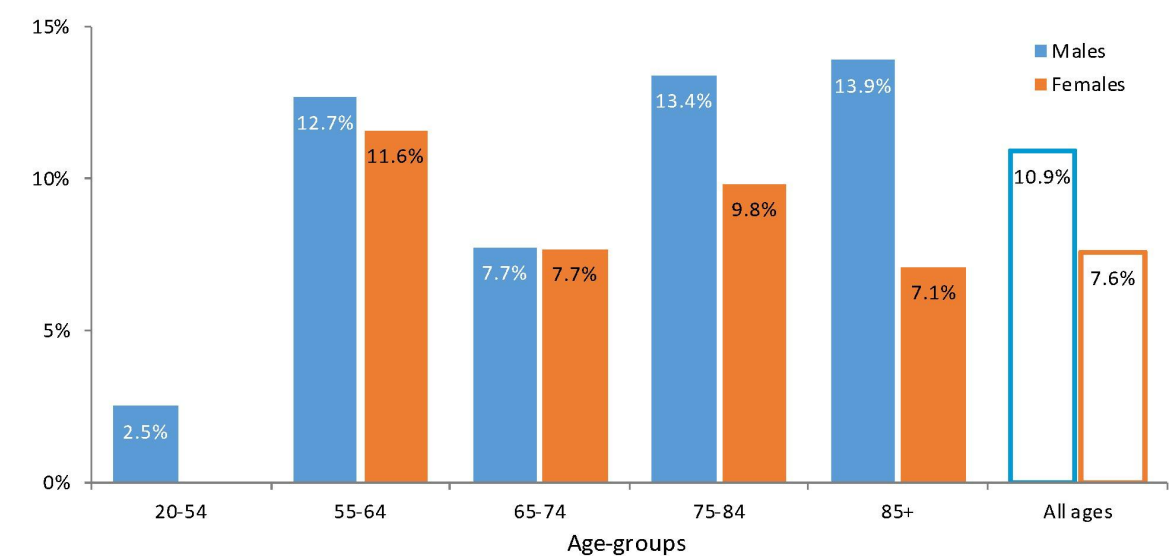


Figure 5 below shows excess deaths by sex and age group as a proportion of the average number of deaths in the previous five years.

Figure 5: Excess deaths as proportion of average deaths in the previous five years, by sex and age group, March 2020 to August 2022



Over all ages, excess deaths were 9.2% above expected levels during the 30-month period. Excess deaths as a proportion of the five-year average are higher for males in all age groups (except ages 65 to 74 years), with the highest relative excess deaths observed in those age 85 and over (13.9%). For females, excess deaths as a proportion of expected deaths (11.6%) were highest for those aged 55 to 64 (older working age).

Excess deaths by place of death

Over two-thirds (69.8%) of the 4,845 Covid-19 related deaths from March 2020 to August 2022 occurred in hospital, compared to 20.8% in care homes and 8.6% at home. A small fraction (0.8%) occurred elsewhere, including hospices, non-medical communal establishments and non-domestic settings.

To reiterate, excess deaths is the difference between actual deaths from all causes in a period minus the expected number of deaths. Figure 6 shows (a) the average number of deaths from March 2020 to August 2022 in the previous five years, broken down by place of death, and (b) deaths from March 2020 to August 2022, broken down by place of death and split into Covid-19 related deaths and non Covid-19 deaths. Note that for the calculation of excess deaths in 2021 and 2022, expected deaths use 2020 and 2021 data as part of the five-year average, and thus include a small number of Covid-19 related deaths.

Figure 6: Deaths from March 2020 to August 2022 by place of death, compared to average of previous five years

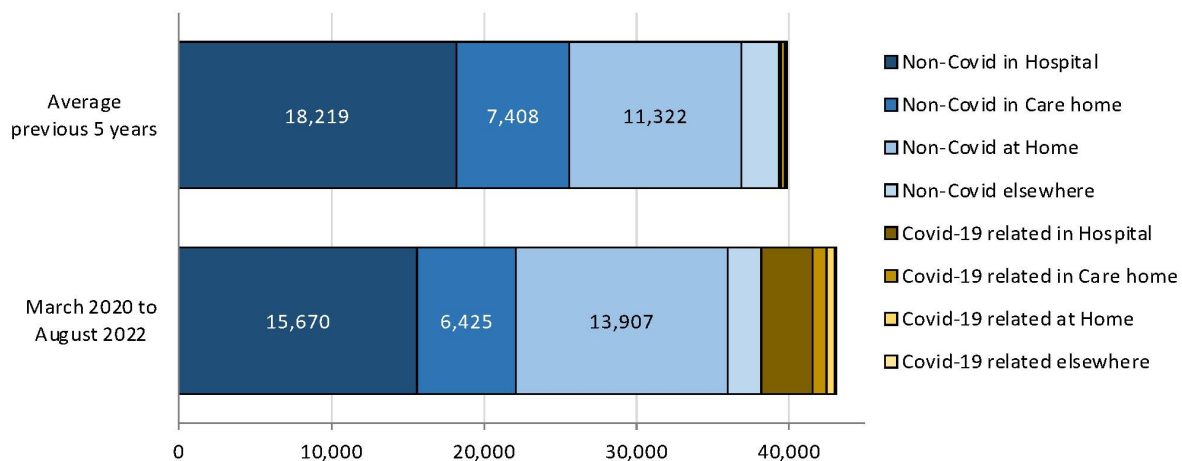


Figure 6 shows that excess deaths from March 2020 to August 2022 (3,662) were smaller than the number of the Covid-19 related deaths in this period (4,845). It also shows that for deaths that were not Covid-19 related, a shift occurred in the number of deaths that occurred in hospitals and to a lesser extent care homes, towards home addresses. Combining these effects leads to excess deaths at home being greater than the Covid-19 related deaths at home. Excess deaths and Covid-19 related deaths for these places of death are shown in Figure 7.

Excess deaths in hospitals (832) are much lower than the Covid-19 related deaths in hospital (3,381). Care homes had also smaller levels of excess deaths (25) compared to Covid-19 related deaths (1,008). In contrast, the estimate of excess deaths at home (3,001) was around seven times the number of Covid-19 related deaths at home (416) and accounts for 81.9% of the total excess deaths over the period. There were fewer deaths in hospices from March 2020 to August 2022 compared to the previous five years (205 deaths or 16.0% below historic levels).

Figure 7: Excess deaths and Covid-19 related deaths, by place of death, March 2020 to August 2022

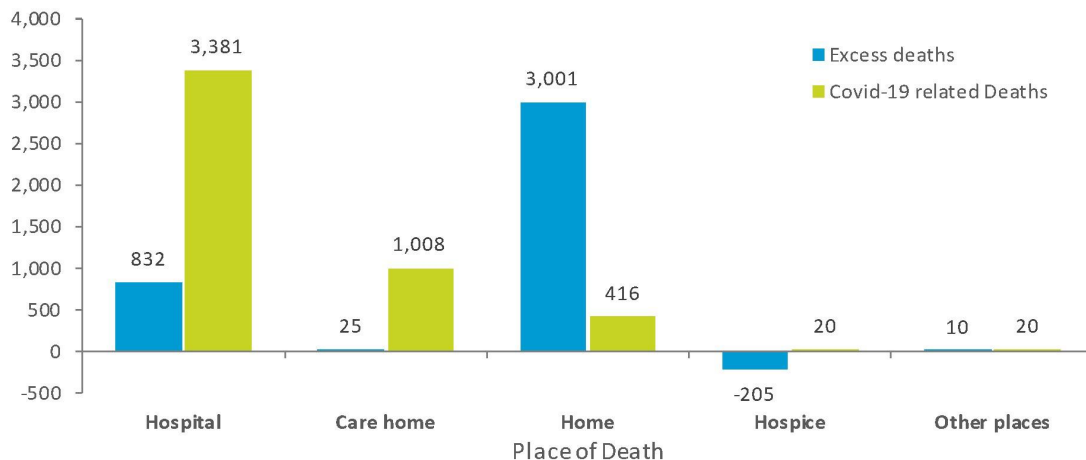
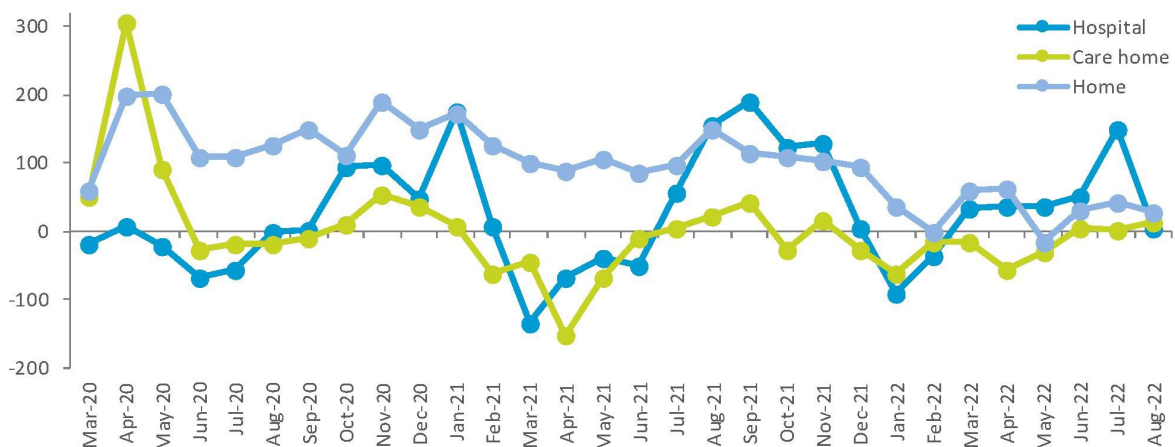


Figure 8 shows excess deaths for each month March 2020 to August 2022 in hospitals, care homes, and at home. Excess deaths in hospitals were around zero or negative from March to September 2020, as well as from February to June 2021, and December 2021 to May 2022: there were fewer deaths in hospital compared to the average number of deaths in hospital in the previous five years. From October 2020 to January 2021, and again from July to November 2021, excess deaths in hospital were positive.

Figure 8: Excess deaths, by month and place of death, March 2020 to August 2022



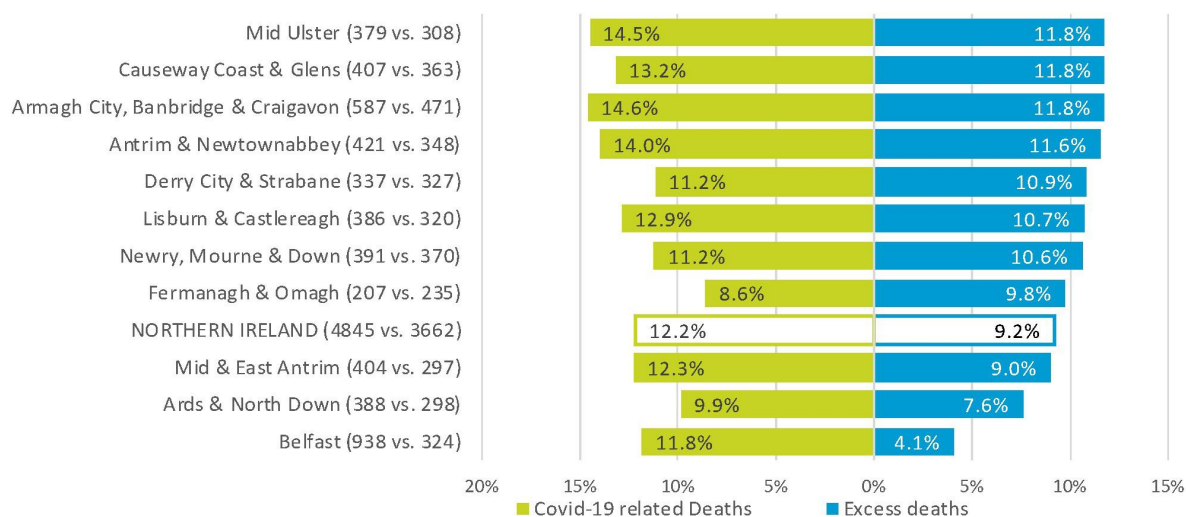
Excess deaths at home have remained at substantial positive levels from April 2020 to December 2021, given that in the previous five years, on average around 350 people died at home each month. In 2022, there were still more deaths at home compared to the 2017-2021 average, although at a lower level than the previous two years.

Excess deaths in care homes peaked in April 2020 with 305 deaths, indicating that the number of deaths in this month was 126.6% higher than the average number of deaths in the April of the previous five years (241). From June 2021 to August 2022, monthly deaths were around expected levels in care homes. The trough in April 2021 can in part be explained by the peak of April 2020, which together with April deaths in 2016 to 2019 was used to calculate expected deaths.

Excess deaths by Local Government District

NISRA publishes weekly numbers of deaths by Local Government District (LGD) based on the date of registration, providing counts for all deaths and Covid-19 related deaths. Deaths are attributed to Districts based on the usual address of residence⁹. In this report, for each District, excess deaths are calculated on an occurrence basis, and compared to the number of Covid-19 related deaths. Figure 9 presents both figures as a proportion of the average number of deaths in the previous five years.

Figure 9: Covid-19 related deaths and excess deaths as proportion of average deaths, by Local Government District, March 2020 to August 2022

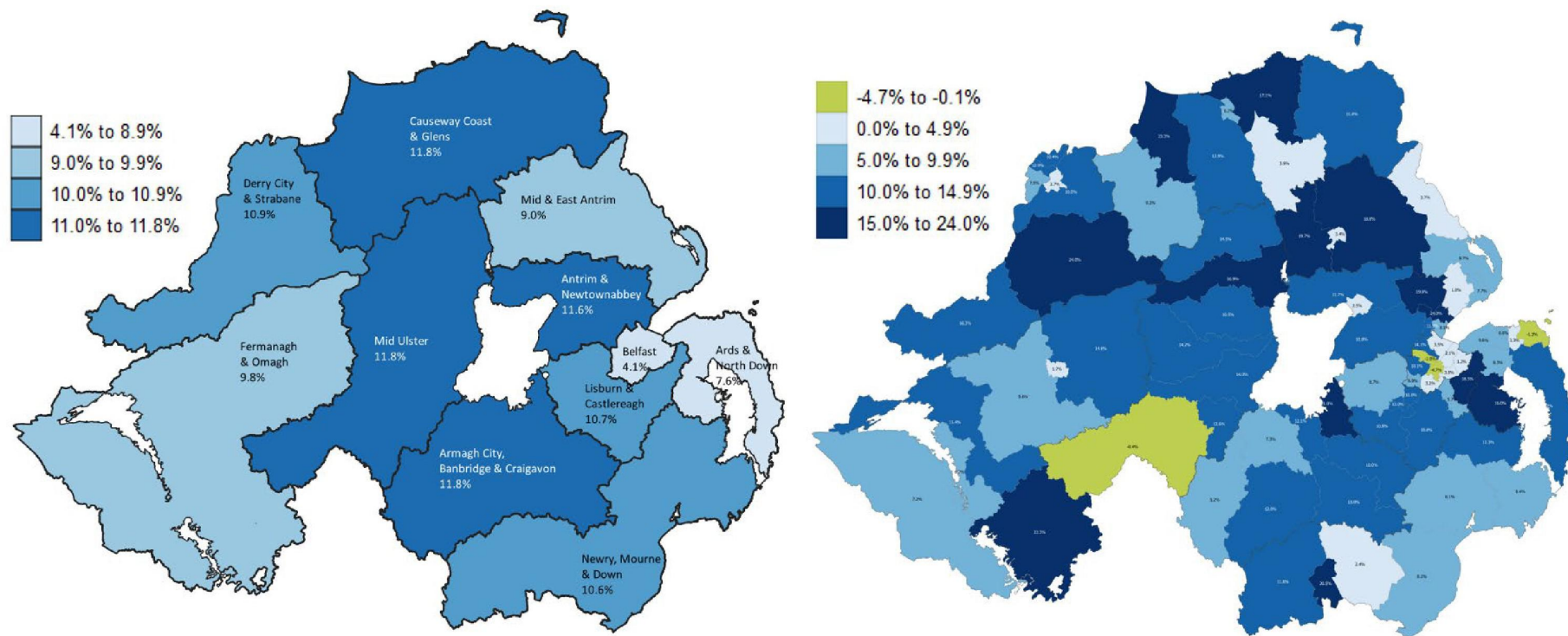


Armagh City, Banbridge & Craigavon LGD has the largest estimate of excess deaths (471), accounting for 12.9% of excess deaths in Northern Ireland (3,662). The highest excess deaths as a proportion of average deaths in the previous five years (11.8%) occurred in Mid Ulster, Causeway Coast & Glens and Armagh City, Banbridge & Craigavon LGDs. Belfast LGD had the smallest excess deaths as a proportion of historic deaths (4.1%). Only in Fermanagh & Omagh LGD did excess deaths (235) exceed the number of Covid-19 related deaths (207). By contrast, Belfast LGD saw excess deaths being nearly a third (34.6%) of the number of Covid-19 related deaths.

Figure 10 shows a map of excess deaths relative to average deaths in the previous five years by Local Government Districts, as well as their constituent District Electoral Areas, to demonstrate the variability in excess mortality within areas. Further information is available in the accompanying [Excel file](#).

⁹ For a small number of deaths where the address is missing or outside Northern Ireland, the place of death is used to allocate to a geographical area.

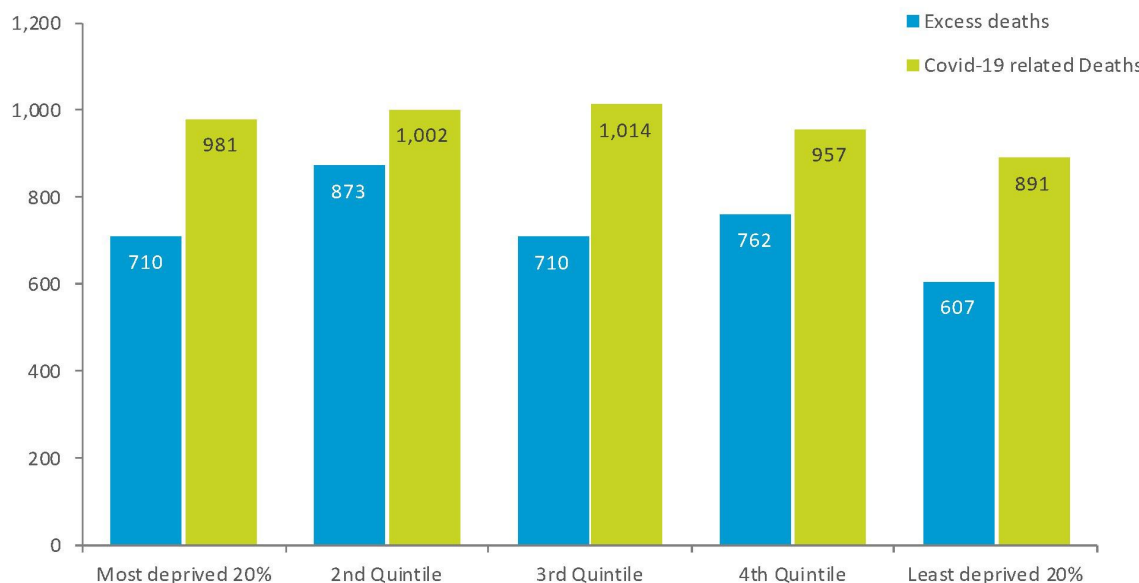
Figure 10: Excess deaths as proportion of average deaths in the previous five years, by Local Government District (left) and District Electoral Areas (right), March 2020 to August 2022



Excess deaths – Deprivation

Excess deaths can also be calculated for grouped small areas with similar characteristics such as Super Output Areas (SOAs) based on their deprivation ranking. Figure 11 shows the excess deaths during the period March 2020 to August 2022 as a proportion of the average number of deaths in the previous five years, for SOAs grouped into deprivation quintiles according to the Northern Ireland Multiple Deprivation Measure 2017.

Figure 11: Excess deaths and Covid-19 related deaths, by deprivation quintiles, March 2020 to August 2022



Excess deaths are highest in the second deprivation quintile and lowest in the least deprived quintile, with the other quintiles at similar levels. The number of Covid-19 related deaths in each quintile were comparable, suggesting that deprivation had no clear effect over the whole period March 2020 to August 2022. In contrast, age-standardised mortality rates (ASMRs) from a separate report¹⁰ showed a clear gradient: the most deprived areas had the highest ASMR for both Covid-19 related deaths and non Covid-19 deaths. This is likely due to higher mortality rate in these areas to start with – least deprived areas have shown a greater increase relative to the five-year average.

Northern Ireland Multiple Deprivation Measures

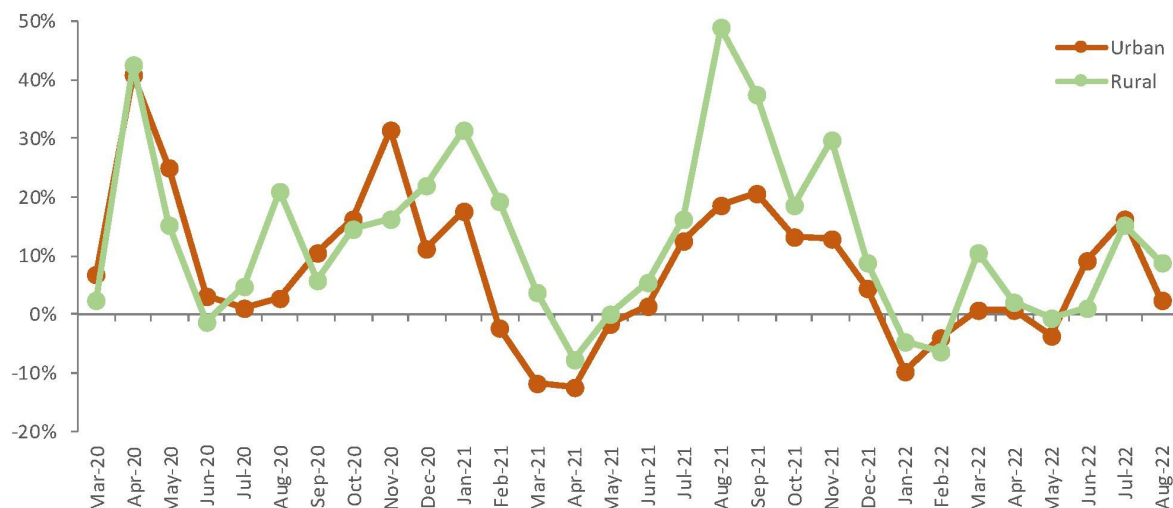
The [Multiple Deprivation Measure \(NIMDM 2017\)](#) is a measure of area disadvantage, combining seven separate domains of deprivation. It was used to assign deaths to one of five groups (or quintiles), ranging from most deprived to least deprived, based on their usual address of residence. If the usual address of the deceased was not provided or the deceased was resident outside of Northern Ireland, the place of death address was used.

¹⁰ Covid-19 related deaths in Northern Ireland, March 2020 to October 2021

Excess deaths by rurality

Super Output Areas can also be grouped into urban, rural and mixed urban/rural areas¹¹. Figure 12 compares excess mortality as a proportion of average deaths between urban and rural SOAs in each month from March 2020 to August 2022.

Figure 12: Excess deaths as a proportion of average deaths, for urban and rural SOAs, by month, March 2020 to August 2022



Most noteworthy is that from December 2020 to January 2022, excess deaths as a proportion of expected deaths has been consistently higher in rural areas compared to urban areas. Over the whole 30-month period, excess deaths in rural SOAs (1,445 or 12.5% above expected levels) exceeded the number of Covid-19 related deaths (1,410). In contrast, the number of Covid-19 related deaths in urban areas (3,086) was greater than their excess deaths (1,896). This suggests that rural areas may be more affected by the indirect effects of the pandemic. Note that in the pre-pandemic years, standardized all-cause mortality rates in rural areas was lower than those in urban areas¹². Further investigations will be required to understand the differences between urban and rural areas.

Excess deaths by cause of death

All deaths will be coded in accordance with the International Statistical Classification of Diseases, Injuries and Causes of Death, (ICD) (Tenth Revision). Classification of the underlying cause of death is done by reference to the death certificate and additional information from the certifying doctor. Excess deaths can be calculated for specific causes of deaths. This will help understand the reasons for the difference between excess deaths and Covid-19 related deaths, when broken down by age groups or geographical areas.

¹¹ Review of the Statistical Classification and Delineation of Settlements

¹² See the Health inequalities annual report 2021, published by the NI Department of Health

At the time of writing (October 2022), the coding of all deaths *registered* up to 30 June 2022 has been completed. This analysis looks at the first two years, covering a 22-month period (March 2020 to December 2021). The underlying cause of death was currently not available for a small number (9 of the 32,171 deaths) that occurred in this period. These may be coroner's cases where it takes a longer period to establish the circumstances surrounding the death.

Table 2 below shows excess deaths by cause of death for March 2020 to December 2021, which had 3,447 excess deaths, 11.9% above average deaths during the same period over the previous five years.

Table 2: Excess deaths as a proportion of average deaths in the previous five years, by cause of death, March 2020 to December 2021 (22 months)

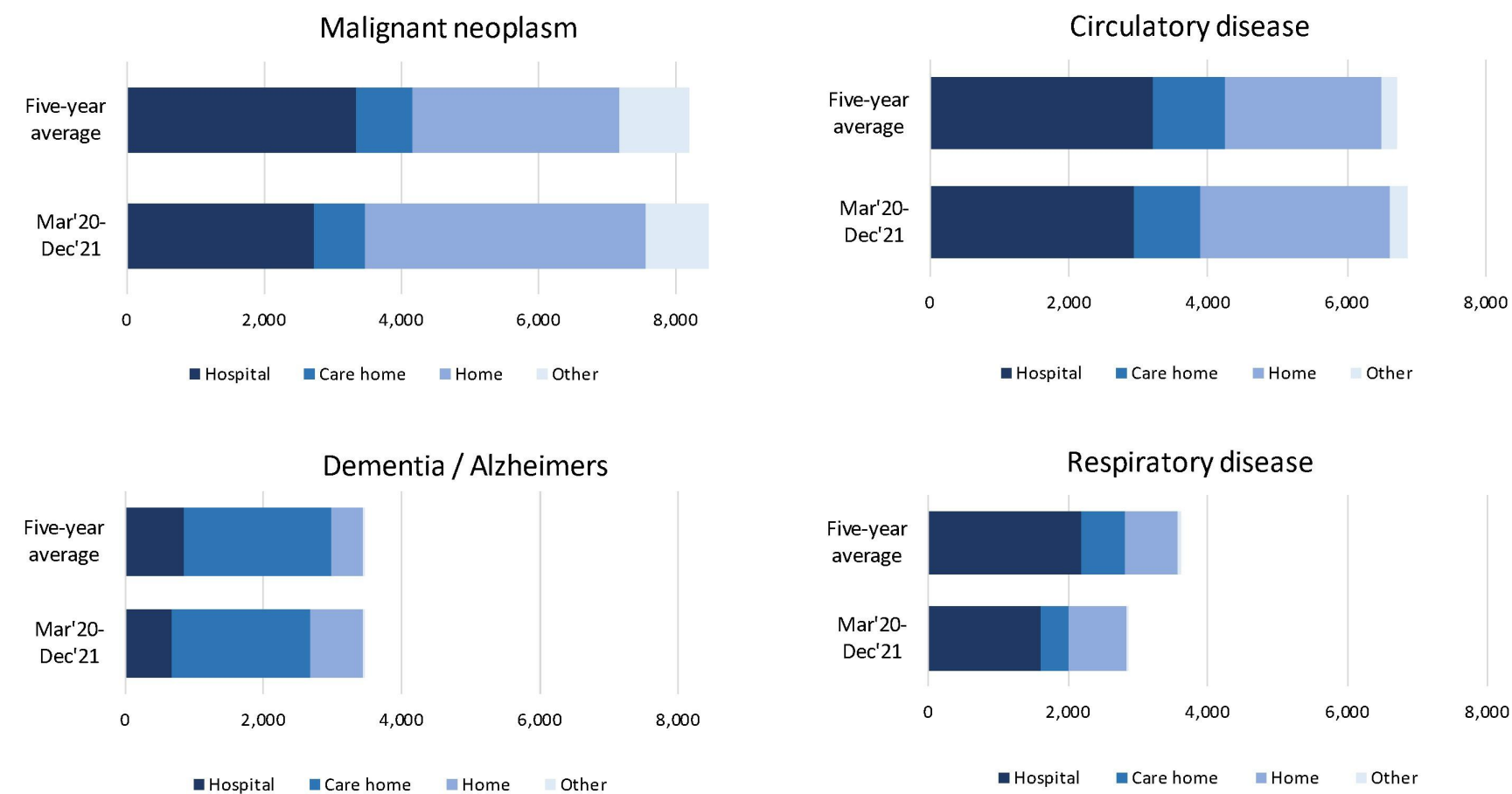
Underlying cause of death	Excess deaths	Excess as proportion of five-year average deaths
Covid-19	3,162 ¹³	-
Malignant neoplasm	276	3.4%
Dementia and Alzheimer's disease	2	0.1%
Diseases of circulatory system	164	2.4%
Diseases of respiratory system	-743	-20.6%
Diseases of digestive system	224	14.9%
External causes	40	1.9%
Other causes	314	10.4%
Uncoded cause of death	9	-
Total	3,447	11.9%

The number of deaths where Covid-19 was found to be the underlying cause (3,500) is broadly similar to excess mortality in this period (3,447). Noteworthy excess deaths were found for malignant neoplasm (276 or 3.4% above historical levels) and diseases of the digestive system (224 or 14.9% above historical levels). There were 743 fewer deaths from diseases of the respiratory system from March 2020 to December 2021 compared to the same period in the previous five years (negative excess deaths).

Figure 13 shows the number of deaths from March 2020 to December 2021, and in equivalent periods of the previous five years, for the four most common causes of death and broken down by place of death. In each of these cases, number of deaths in hospitals and care homes are lower during the pandemic (negative excess deaths), and are higher for deaths at home. For example, where historically hospitals were the most common place for death due to malignant neoplasms (40.7% compared to 36.7% at home), in the period March 2020 to December 2021, 32.2% of deaths due to malignant neoplasms occurred in hospital and 48.4% occurred at home.

¹³ There were 1,692 Covid-19 deaths in March to December 2020, that were registered before 12 October 2021 (adjustment for registration delay). This number became part of the five-year average to calculate excess deaths in 2021. As such, a fifth of these deaths (338) were included in the expected Covid-19 deaths and thus excess Covid-19 deaths was calculated as all Covid-19 deaths minus expected Covid-19 deaths (3,500 – 338 = 3,162).

Figure 13: Deaths from March 2020 to December 2021, by place of death and selected causes of death, compared to five-year average



Strengths and limitations

Death statistics form a high-quality data source, given the legal requirement of timely registration of all deaths that occurred in Northern Ireland, which is administered by a District Registrar, electronically recorded and managed by the General Register Office and quality assured by statisticians in NISRA¹⁴.

The excess deaths calculation does not require population estimates; the underlying assumption is that the population is stable in both size and age distribution. Neither does it require information on the cause of death. An earlier paper¹⁵ that reported age-standardized mortality rates of all causes and Covid-19 related deaths used detailed population estimates in its analysis. It is recommended that these papers are read together to gain greater understanding of the impact of the Covid-19 pandemic in Northern Ireland.

The Northern Ireland population was not the same as in the previous five years, with annual increases of around 0.5% and an aging population¹⁶. The excess deaths methodology captures this effect by looking at annual increases in the number of deaths, which reflects both the age and size of the population. The average annual increase in the number of deaths from March to December was 180 deaths between 2011 and 2019. Compared to the 3,662 excess deaths in the 30 months from March 2020 to August 2022, the underlying trend in deaths due to population change would have had a relatively small impact.

There was also a variation in the number of deaths between years due to, for example, seasonal weather. In the years 2015 to 2019, for which the five-year average of 12,762 deaths was used as a baseline, the number of deaths ranged from 12,398 to 13,081 (see accompanying tables). Again, the 1,931 excess deaths in 2020 was much greater than the magnitude of such annual variation.

There are still a number of unknowns in the analysis of excess mortality during the pandemic. Firstly, the pandemic has not finished: there is a booster vaccination programme in the Autumn of 2022, continued pressure on the health service, unknown health outcomes for those who have recovered from Covid-19, and the possibility of new variants. Secondly, there will have been a number of deaths that occurred up to August 2022, but which have not yet been registered or where coding of cause of death has not been completed. An update of this report covering the period up to December 2022 is planned for publication in early 2023.

Background Notes

The information used to produce statistics on deaths occurring in Northern Ireland is based on registrations recorded on the Northern Ireland General Register Office's Registration System (NIROS). Daily extracts of registration records from NIROS are processed by the NISRA Vital Statistics Unit.

¹⁴ See [Quality and Methodology Information \(QMI\) for Northern Ireland death statistics](#)

¹⁵ [Covid-19 related deaths in Northern Ireland](#), March 2020 to October 2021

¹⁶ NISRA produces official [population statistics for Northern Ireland](#)

Deaths involving Covid-19 are defined as those where Covid-19 was mentioned on the death certificate, either as the underlying cause of death or as a contributory cause. Cause of death is coded according to the International Statistical Classification of Diseases and Related Health Conditions 10th Revision (ICD-10). The relevant codes included in this publication are U07.1 (Covid-19, virus identified) and U07.2 (Covid-19, virus not identified).

Super Output Areas (SOA)

Northern Ireland is split into 890 spatial areas known as [Super Output Areas \(SOAs\)](#), with an average population of around 2,100 people. The number of SOAs in each of the 11 Local Government Districts (LGDs) varies, ranging from 49 in Fermanagh & Omagh LGD to 174 in Belfast LGD.

Multiple Deprivation Measure (NIMDM, 2017)

The [Northern Ireland Multiple Deprivation Measure 2017 \(NIMDM 2017\)](#) is a measure of multiple deprivation at the Super Output Area (SOA) level. It is comprised of seven distinct domains of deprivation which can be recognised and measured separately. The overall MDM is conceptualised as a weighted area level aggregation of these specific domains of deprivation.

Urban-Rural Classification

The [Review of the Statistical Classification and Delineation of Settlements](#) (March 2015) defined the boundaries of towns and villages. It also provided a default definition for urban areas (settlements with a population of 5,000 and over) and rural areas (smaller settlements and open countryside, as well as banded drive-times. Further detail can be found from the NISRA website.

Administrative Data Research Northern Ireland (ADR NI)

Administrative Data Research Northern Ireland (ADR NI) is funded by the Economic & Social Research Council (ESRC) and is a partnership between the Administrative Data Research Centre Northern Ireland (ADRC NI, comprising Queen's University Belfast and Ulster University), and the Northern Ireland Statistics and Research Agency (NISRA). Together they support the acquisition, linking and analysis of administrative data sets, developing cutting-edge research to improve knowledge, policymaking and public service delivery.

Links to Relevant Publications

A range of data and analysis on Covid-19 in Northern Ireland and its effect on the economy and society can be accessed from the [NISRA website](#).

Other relevant publications include:

- [Weekly death registrations in Northern Ireland](#)
- [Covid-19 related deaths and pre-existing conditions in Northern Ireland](#): March 2020 to November 2021
- [Covid-19 related deaths in Northern Ireland](#): March 2020 to October 2021
- [Covid-19 deaths and equality – Wave One](#): March to September 2020
- [Covid-19 statistics](#) (Department of Health)
- [Coronavirus \(Covid-19\) cases and risk in the UK](#)
- [Covid-19 health surveillance monitor](#) (Ireland)

- [Deaths registered weekly in England & Wales](#)
- [Excess deaths in England and Wales: March 2020 to June 2022](#)
- [Weekly data on deaths registered in Scotland](#)
- [COVID-19 deaths and cases statistics](#) (Central Statistics Office, Ireland)
- [Vital statistics](#) (Central Statistics Office, Ireland)

List of Tables

Data accompanying this bulletin are available from the NISRA website in [Excel format](#). The spreadsheet includes the following tables.

Table number	Table title
Table 1	Deaths by month for 2015-2022, and calculation of excess deaths in 2020-2022
Table 2	Excess deaths and Covid-19 related deaths, March 2020 to August 2022
Table 3	Excess deaths and Covid-19 related deaths, by sex and 5-year age band
Table 4	Excess deaths and Covid-19 related deaths, by sex and age group
Table 5	Excess deaths and Covid-19 related deaths, by place of death
Table 6	Excess deaths and Covid-19 related deaths, by month and place of death
Table 7	Excess deaths and Covid-19 related deaths, by Local Government District
Table 8	Excess deaths and Covid-19 related deaths, by Assembly Area
Table 9	Excess deaths and Covid-19 related deaths, by deprivation quintile
Table 10	Excess deaths and Covid-19 related deaths, by month, in urban, mixed urban/rural and rural areas, March 2020 to August 2022
Table 11	Excess deaths and Covid-19 related deaths for rural, urban and mixed urban/rural areas, March 2020 to August 2022
Table 12	Excess deaths and Covid-19 related deaths, by drive time to Belfast
Table 13	Excess deaths and Covid-19 related deaths, by Travel To Work Area
Table 14	Excess deaths and Covid-19 related deaths, by District Electoral Area
Table 15	Excess deaths and Covid-19 related deaths, by underlying cause of death
Table 16	Excess deaths and Covid-19 related deaths by place of death and cause of death

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<https://www.nisra.gov.uk/statistics>



Annex A – Excess deaths methodology

‘Excess deaths’ is the difference between the observed number of deaths and the expected number of deaths.

WHO definition of Excess Death/Mortality:

“Mortality above what would be expected based on the non-crisis mortality rate in the population of interest. Excess mortality is thus mortality that is attributable to the crisis conditions. It can be expressed as a rate (the difference between observed and non-crisis mortality rates), or as a total number of excess deaths.”

(ODI/HPN paper 52, 2005, Checchi and Roberts)

The first key question for determining excess deaths is to define the expected number of deaths. There are broadly three different methods:

1. Number of deaths based on historic population estimates and projected mortality rates (see Table A.1). The 2018-based population projection is the best comparator, as the 2020-based interim projections had already incorporated deaths data from the early part of the pandemic.
2. Advanced modelling methods can be used to account for seasonality in deaths and corrects for delays in the collection and processing of death data. A well-known example is the [EuroMOMO project](#), which provides weekly excess deaths for a number of European countries, including Northern Ireland. Modelling is also used by the US [National Centre for Health Statistics](#), and [Our World in Data](#).
3. The number of deaths during a similar period in previous years. NISRA’s weekly deaths statistics report uses the average number of deaths in the previous 5 years. This approach does not require population estimates, although it implicitly assumes that the population has been relatively stable and no other events in that period, such as extreme weather or major disease outbreaks, had a measured impact on the number of deaths.

Table A1.: Observed deaths compared to projected deaths according to 2018-based and 2020-based population projections, mid-2019 to mid-2022

Time period	Observed deaths	Projected deaths (2018-based)	Projected deaths (2020-based)
Mid-2019 to mid-2020	16,708	16,184	-
Mid-2020 to mid-2021	17,033	16,374	16,791
Mid-2021 to mid-2022	17,253	16,584	17,550
Mid-2019 to mid-2022	50,994	49,142	-

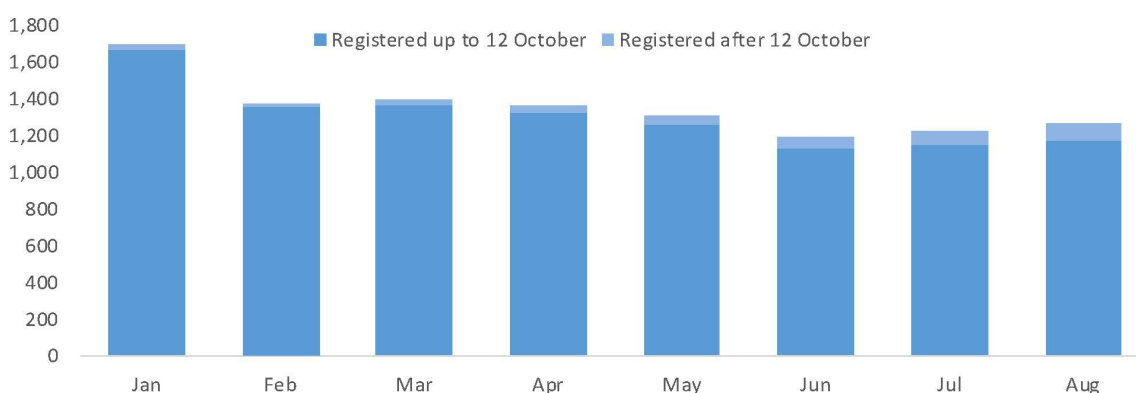
Most NISRA publications on deaths are based on the date of registration. All statistics remain provisional until the publication of the Registrar General Annual report. The advantage of this is that death statistics can be finalised and are not affected by late registrations. Weekly death statistics are also reported on a registration basis. The majority of deaths are registered within five days, but it could be considerably longer if a case is referred to the coroner.

During the Covid-19 pandemic, a number of changes have been made to the usual process of certifying and registering a death which have been enabled by the Coronavirus Act 2020, which came into effect on 25 March 2020. This could lead to fewer cases being referred to coroners, and informants registering deaths by phone rather than in person. There is some evidence that these changes are leading to a shorter lag between the date of death and the date of registration.

The analysis in this report is based on deaths that occurred from 1 March 2020 to 31 August 2022, comparing deaths in this period to the average of the previous 5 years. It is recognised that there could be deaths that occurred in this period, but that have not yet been registered. This is most likely in the more recent months.

This analysis includes deaths registered up to 12 October 2022, therefore allowing for 29 working days after the end of August to register deaths. Deaths that occurred in the same period of the previous years have had more time to be registered and the analysis adjusts for this. Figure A has broken down the average number of deaths in 2017-21 into those that were registered within 27 working days of the following year, and those that have been registered since. It shows that this effect of registration delay was largest for the most recent months.

Figure A: Average deaths in 2017-21, by month and registration cut-of date



Based on these figures, there are three possible approaches in deriving excess deaths in these four months:

1. Deaths which occurred in March 2020 to August 2022 and registered by 12 October 2022 (42,812), compared to the average number of deaths occurring over the same months of the previous five years and which have been registered to date (thus including late registrations) (39,749). This results in 3,063 excess deaths, or 7.7% above the five-year average;
2. Deaths which occurred in March 2020 to August 2022 and registered by 12 October 2022 (42,812), compared to the average number of deaths occurring over the same months in the previous five years, including death registrations up to 29 working days of the following year (39,150). This results in 3,662 excess deaths, or 9.4% above that five-year average; or
3. Adjusting the number of deaths occurring between March 2020 and August 2022 to account for late registrations, and compare to the average number of deaths in the previous five years which has been registered to date.

The first approach is most likely to result in an underestimate of excess deaths, as the number of deaths during the pandemic that have yet to be registered will be greater than late registrations in the same period of the previous five years. The second approach could provide an overestimate if the changes¹⁷ in the certification and registration of deaths have reduced the lag between occurrence and registration.

Finally, the third approach would rely on assumptions being made on the method of adjustment. This adjustment could be done by applying the observed difference from the five-year average, either in levels (599 deaths) or as a proportion (1.7%). This would still not capture a possible reduction in the registration lag, and may require different adjustments for different populations. For example, drug-related deaths or suicides will commonly go through the coroner and could have a long registration lag: such deaths are typically seen in young males and urban deprived areas¹⁸.

To put the possible measures of excess death into context, excess deaths based on deaths registered from March 2020 to August 2022 was 3,753¹⁹, and the number of Covid-19 related deaths that registered in this period was 4,836. These figures align more with the second approach, suggesting that the impact of late registration was sizable. It was decided to use the second approach to estimate the estimate of excess deaths, but to present this excess as a proportion of historical deaths registered to date, i.e. the 3,662 excess deaths are 9.2% higher than the five-year average of 39,749 deaths. This methodology is demonstrated in Tables A.2 through A.4 on the next two pages.

¹⁷ These changes include registration by telephone rather than in person, and fewer cases referred to the coroner (when the deceased has not been seen by their GP in the last 28 days, and died of natural causes). Further detail on these changes are in the background notes (page 2) of the [weekly deaths report](#).

¹⁸ See [Drug-related Deaths in Northern Ireland: Socio-Demographic Analyses](#)

¹⁹ This figure is taken from the [monthly death statistics](#).

Table A.2: Deaths by month and year of death, 2015-2020 (March to December)

Month	2015	2016	2017	2018	2019	Average 2015-19 (A)	Average 2015-19 at cut-off (B)	2020 (C)	Excess Deaths (C - B)	As proportion of average 2015-19 (C - B) / A
March	1,395	1,338	1,371	1,493	1,359	1,391.2	1,387.4	1,472	84.6	6.1%
April	1,275	1,229	1,208	1,254	1,367	1,266.6	1,262.2	1,780	517.8	40.9%
May	1,234	1,235	1,281	1,170	1,294	1,242.8	1,239.2	1,515	275.8	22.2%
June	1,241	1,208	1,165	1,153	1,209	1,195.2	1,191.2	1,202	10.8	0.9%
July	1,127	1,237	1,209	1,158	1,196	1,185.4	1,182.0	1,211	29.0	2.4%
August	1,100	1,204	1,178	1,191	1,189	1,172.4	1,166.6	1,267	100.4	8.6%
September	1,210	1,173	1,218	1,185	1,192	1,195.6	1,189.4	1,313	123.6	10.3%
October	1,289	1,297	1,351	1,235	1,302	1,294.8	1,289.2	1,501	211.8	16.4%
November	1,224	1,338	1,355	1,173	1,401	1,298.2	1,292.4	1,633	340.6	26.2%
December	1,454	1,548	1,652	1,404	1,598	1,531.2	1,522.8	1,743	220.2	14.4%
March-Dec	12,549	12,807	12,988	12,416	13,107	12,773.4	12,722.4	14,637	1,914.6	15.0%

Table A.3: Deaths by month and year of death, 2016-2021

Month	2016	2017	2018	2019	2020	Average 2016-20 (A)	Average 2016-20 at cut-off (B)	2021 (C)	Excess deaths (C - B)	As proportion of average 2016-20 (C - B) / A
January	1,482	1,651	1,939	1,413	1,524	1,601.8	1,595.2	1,948	352.8	22.0%
February	1,312	1,391	1,446	1,307	1,337	1,358.6	1,352.0	1,405	53.0	3.9%
March	1,338	1,371	1,493	1,359	1,472	1,406.6	1,399.0	1,311	-88.0	-6.3%
April	1,229	1,208	1,254	1,367	1,780	1,367.6	1,356.8	1,209	-147.8	-10.8%
May	1,235	1,281	1,170	1,294	1,515	1,299.0	1,290.2	1,285	-5.2	-0.4%
June	1,208	1,165	1,153	1,209	1,202	1,187.4	1,177.6	1,207	29.4	2.5%
July	1,237	1,209	1,158	1,196	1,211	1,202.2	1,190.8	1,341	150.2	12.5%
August	1,204	1,178	1,191	1,189	1,267	1,205.8	1,188.6	1,514	325.4	27.0%
September	1,173	1,218	1,185	1,192	1,313	1,216.2	1,200.2	1,534	333.8	27.4%
October	1,297	1,351	1,235	1,302	1,501	1,337.2	1,322.4	1,514	191.6	14.3%
November	1,338	1,355	1,173	1,401	1,633	1,380.0	1,361.6	1,621	259.4	18.8%
December	1,548	1,652	1,404	1,598	1,743	1,589.0	1,566.8	1,645	78.2	4.9%
Jan-Dec	15,601	16,030	15,801	15,827	17,498	16,151.4	16,001.2	17,534	1,532.8	9.5%

Source: NISRA

Table A.4: Deaths by month and year of death, 2017-2022 (January to August)

Month	2017	2018	2019	2020	2021	Average 2017-21 (A)	Average 2017-21 at cut-off (B)	2022 (C)	Excess deaths (C - B)	As proportion of average 2017-21 (C - B) / A
January	1,651	1,939	1,413	1,524	1,948	1,695.0	1,670.0	1,544	-126.0	-7.4%
February	1,391	1,446	1,307	1,337	1,405	1,377.2	1,355.0	1,290	-65.0	-4.7%
March	1,371	1,493	1,359	1,472	1,311	1,401.2	1,367.8	1,440	72.2	5.2%
April	1,208	1,254	1,367	1,780	1,209	1,363.6	1,326.2	1,361	34.8	2.6%
May	1,281	1,170	1,294	1,515	1,285	1,309.0	1,261.8	1,242	-19.8	-1.5%
June	1,165	1,153	1,209	1,202	1,207	1,187.2	1,125.4	1,207	81.6	6.9%
July	1,209	1,158	1,196	1,211	1,341	1,223.0	1,145.0	1,339	194.0	15.9%
August	1,178	1,191	1,189	1,267	1,514	1,267.8	1,175.0	1,218	43.0	3.4%
Jan-Aug	10,454	10,804	10,334	11,308	11,220	10,824.0	10,426.2	10,641	214.8	2.0%

Source: NISRA