

# Excess Mortality and Covid-19 Related Deaths in Northern Ireland

## March to December 2020

### Key Points

- There were 1,958 excess deaths from 1<sup>st</sup> March to 31<sup>st</sup> December 2020, 15.4% above expected levels (average deaths for the same period over the last five years (2015-2019)). In the same period, there were 1,903 Covid-19 related deaths.
- The number of excess deaths for males (1,045) is higher than that for females (913).
- The vast majority of excess deaths (74.9%) and Covid-19 related deaths (77.8%) are accounted for by those aged 75 and over.
- The number of deaths in hospitals was slightly higher (+1.8%) than expected levels, as a combined effect of 1,156 Covid-19 related deaths occurring in hospitals but 1,046 fewer non Covid-19 deaths in hospital. In contrast, there were more non-Covid-19 deaths occurring at home: combined with the 119 Covid-19 related deaths at home, this resulted in the majority of excess deaths (1,395 or 71.3%) occurring at home.
- Belfast LGD has the largest number of excess deaths (310), accounting for 15.8% of the total number of excess deaths. However, Antrim & Newtownabbey LGD had the highest excess deaths as a proportion above expected levels (28.1%), while Derry City & Strabane LGD had the lowest (7.4%).
- In the first three months of the pandemic (March to May 2020), Covid-19 was found to be the underlying cause for 706 deaths, accounting for 79.0% of the 894 excess deaths in that period.

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## 1. Introduction

The Northern Ireland Statistics & Research Agency (NISRA) publishes official statistics on the number of deaths registered in Northern Ireland<sup>1</sup>. Due to the coronavirus (Covid-19) pandemic, the NISRA weekly deaths release<sup>2</sup> 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 recently, which provides a further breakdown of Covid-19 related mortality rates by age, sex and geographical areas<sup>3</sup>.

This bulletin reports on excess mortality based on deaths occurring during the first 10 months (March to December 2020) of the pandemic 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 countries<sup>4</sup>.

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<sup>5</sup>.

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 content of this bulletin will be kept under review and more detail may be presented in future.

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<sup>1</sup> <https://www.nisra.gov.uk/statistics/births-deaths-and-marriages/deaths>

<sup>2</sup> <https://www.nisra.gov.uk/publications/weekly-deaths>

<sup>3</sup> Covid-19 Deaths Bulletin 1 March - 31 January 2021, available at <https://www.nisra.gov.uk/publications/Covid-19-related-deaths-northern-ireland>

<sup>4</sup> For example, see <https://www.health.org.uk/news-and-comment/charts-and-infographics/understanding-excess-mortality-the-fairest-way-to-make-international-comparisons>

<sup>5</sup> <https://www.statisticsauthority.gov.uk/code-of-practice/>

## 2. Covid-19 in Northern Ireland

It is widely reported that the Covid-19 pandemic started in late 2019 in the Wuhan province of China. From there, it spilled over into other countries in South-East Asia and reached Europe by the end of January 2020. The first UK cases were confirmed in England on 31<sup>st</sup> January<sup>6</sup>, and the first case in the Republic of Ireland was reported on 29<sup>th</sup> February<sup>7</sup>.

In Northern Ireland, the first confirmed case was reported on 28<sup>th</sup> February<sup>8</sup>. Cases continued to rise in early March and the first Covid-19 related death occurred on 18<sup>th</sup> March 2020. Based on deaths registered up to 17<sup>th</sup> February 2021, there have been 1,903 Covid-19 related deaths in Northern Ireland up to 31<sup>th</sup> December 2020.

### **Covid-19 related deaths**

Deaths due to Covid-19 included in this bulletin reflect where Covid-19 or 'suspected' or 'probable' Covid-19 was mentioned anywhere on the death certificate, including in combination with other health conditions. An earlier report<sup>9</sup> showed that Covid-19 was the underlying cause of death for 807 deaths (89.5% of 902 Covid-19 related deaths registered in Northern Ireland up to 30<sup>th</sup> September 2020).

## 3. Excess mortality

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 people's mental health. Some of these effects may take months or years to be fully understood.

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 (2015-2019). The absolute number 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).

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<sup>6</sup> <https://www.gov.uk/government/news/cmo-confirms-cases-of-coronavirus-in-england>

<sup>7</sup> Health Protection Surveillance Centre:

<https://www.hpsc.ie/a-z/respiratory/coronavirus/novelcoronavirus/casesinireland/>

<sup>8</sup> Public Health Agency Covid-19 surveillance reports, see

<https://www.publichealth.hscni.net/publications/Covid-19-surveillance-reports>

<sup>9</sup> NISRA, Covid-19 related deaths and pre-existing conditions:

<https://www.nisra.gov.uk/publications/covid-19-related-deaths-and-pre-existing-conditions>

### **Excess Deaths**

Excess mortality is the difference between actual deaths from all causes in a period minus the expected number of deaths or 'normal 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 number of excess deaths which occurred in Belfast, we look at the number of deaths which occurred in Belfast for the period of interest (March to December 2020) and subtract from this the 5 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.

### **Excess Winter Mortality**

Excess Winter Mortality (EWM)<sup>10</sup> 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 2019/2020.

A period with excess mortality can be followed by another period where the number of deaths are below expected levels. A period of high mortality rate could have reduced 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<sup>st</sup> March to 31<sup>st</sup> December 2020, comparing the number of deaths to the average of equivalent months from 2015 to 2019. To allow for delays in the death registration process, the report takes account of registrations up to 17<sup>th</sup> February 2021 and also builds this period into the 2015-2019 average to enable a more valid comparison. Further information on the methodology is presented in Annex A.

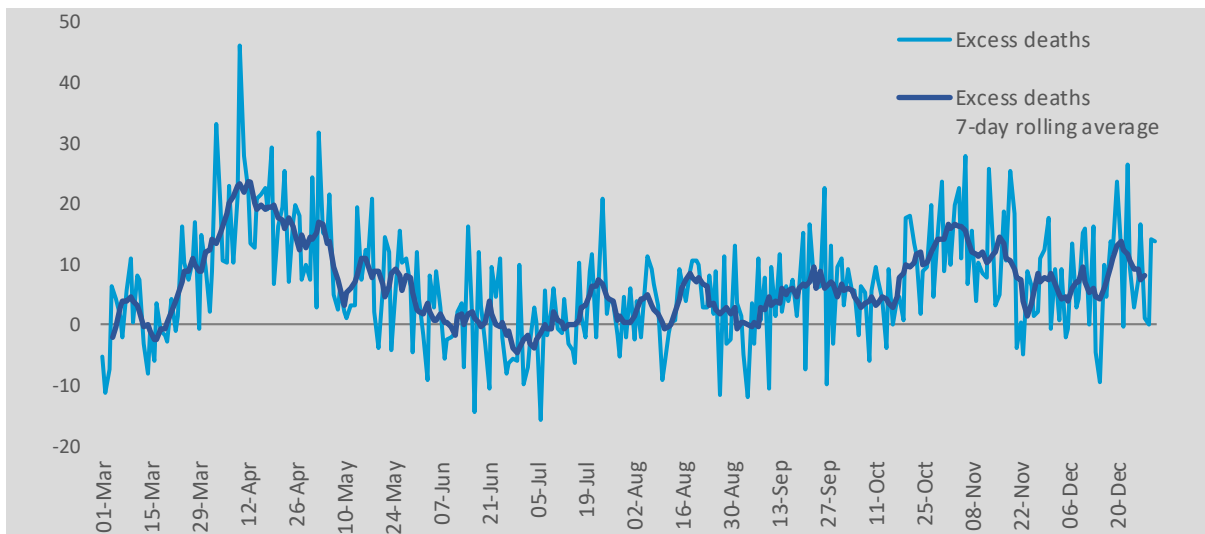
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<sup>10</sup> <https://www.nisra.gov.uk/statistics/cause-death/excess-winter-mortality>

## 4. Excess deaths – March to December 2020

Excess deaths have been reported on a registration date basis in the weekly death reports<sup>11</sup>, and can be derived from monthly death registrations<sup>12</sup>. From March to December 2020 inclusive, 14,663 deaths were registered, which was 2,015 more (+15.9%) than the average over the previous five years of 12,648 deaths in corresponding months. By considering deaths which occurred in this 10 month period, including those registered up to the 17<sup>th</sup> February 2021, 14,294 deaths occurred during this time. This figure is slightly lower than the number of registrations (14,663) in that period due to a level of registration delay. After accounting for this registration lag period (see Annex A), excess deaths are estimated to be 1,958 deaths or 15.4% higher than in previous years. The daily excess deaths occurring are quite variable in Northern Ireland (see Figure 1).

**Figure 1: Daily excess deaths and 7-day rolling average, March to December 2020**



In the first three weeks of March 2020, the number of deaths occurring was broadly similar to previous years. From then on, daily excess deaths remained above zero until the middle of May. 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 year, and whilst daily excess deaths remained below the peaks of April, there continued to be more deaths than expected based on the previous five years.

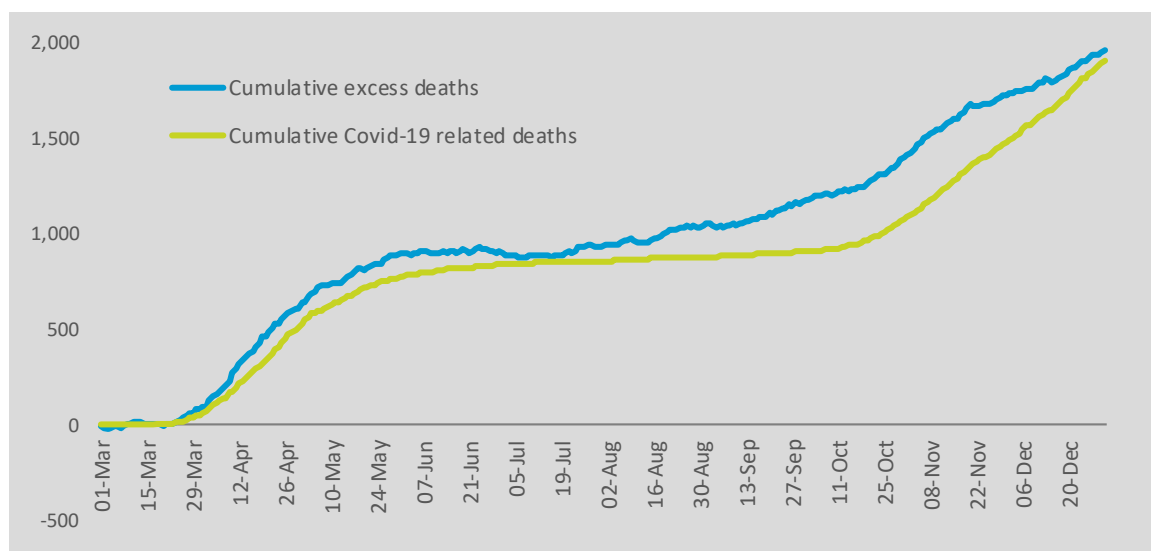
An alternative presentation of excess deaths is as cumulative totals. Starting from the excess deaths on 1<sup>st</sup> March 2020, excess deaths of subsequent days are added. Figure 2 shows the cumulative excess deaths occurring from 1<sup>st</sup> March to 31<sup>th</sup> December 2020, based on registrations up to 17<sup>th</sup> February 2021.

<sup>11</sup> Weekly deaths - <https://www.nisra.gov.uk/publications/weekly-deaths>

<sup>12</sup> Monthly deaths registrations - <https://www.nisra.gov.uk/publications/monthly-deaths>

Figure 2 also presents the cumulative number of Covid-19 related deaths up to 31<sup>st</sup> December 2020. Both series follow a similar pattern: flat in the first three weeks of March and increasing towards the end of March, then a steep increase throughout April, followed by a more gradual increase during May. In June, cumulative Covid-19 related deaths increased more slowly, whilst excess deaths remained at roughly the same level. Excess deaths increased again steadily from July to the end of the year, with a period of accelerated growth from October to November. Meanwhile, cumulative Covid-19 related deaths remained flat throughout July to September, and grew at a constant rate during the last three months of the year.

**Figure 2: Cumulative number of excess deaths and Covid-19 related deaths, 1<sup>st</sup> March to 31<sup>st</sup> December 2020**



The cumulative number of excess deaths has continued to exceed the cumulative number of Covid-19 related deaths since the end of March. The gap between the two series rapidly increased in the first two weeks of April, but narrowed by early July. The series widened again shortly thereafter up to early November, before narrowing again towards the end of the year.

Over the period March to December 2020, there were 1,958 excess deaths. By 31<sup>st</sup> December, 1,903 deaths included a mention of Covid-19 on the death certificate. The difference between those two figures is 55 deaths or 2.8% of excess deaths. Note that this gap will be wider when considering deaths where Covid-19 is the underlying cause of death, roughly 90% of Covid-19 related deaths<sup>13</sup>. There could be multiple reasons<sup>14</sup> for this gap, and further research will be needed to fully understand the direct and indirect effects of the pandemic.

<sup>13</sup> Covid-19 was the underlying cause of death for 870 deaths out of the 902 Covid-19 related deaths (89.5%), see <https://www.nisra.gov.uk/publications/covid-19-related-deaths-and-pre-existing-conditions>

<sup>14</sup> The Office for National Statistics provides further background on reasons for non-Covid-19 excess deaths in <https://www.ons.gov.uk/peoplepopulationandcommunity/birthsdeathsandmarriages/deaths/articles/analysisofdeathregistrationsnotinvolvingcoronavirusCovid19englandandwales28december2019to1may2020/technicalannex#possible-explanations-for-non-Covid-19-excess-deaths>

## 5. Excess deaths by age and sex

Excess deaths can be calculated for sub-populations, such as particular age groups. 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, 1<sup>st</sup> March to 31<sup>st</sup> December 2020**

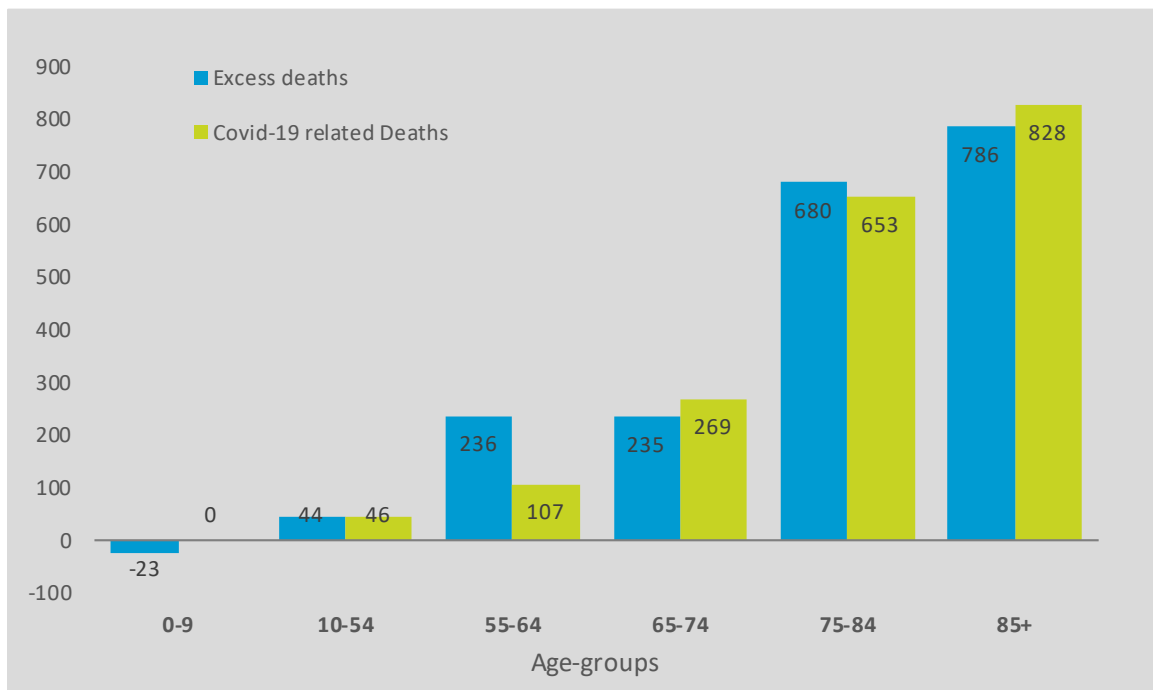


Figure 3 shows that both excess deaths and Covid-19 related deaths increase by age. The vast majority of excess deaths (74.9%; 1,466 out of 1,958) and Covid-19 related deaths (77.8%; 1,481 out of 1,903) are accounted for by those aged 75 and over. The number of excess deaths for the age group 55-64 years (236) was more than double that of Covid-19 related deaths (107), suggesting that direct effects of the pandemic could account for less than half of the impact on excess mortality in this age group.

There were 23 negative excess deaths for those aged under 10 years, indicating that the number of deaths in this group in the ten months from March to December 2020 was 22.0% lower than the five-year average of previous years. However, the expected number of deaths in this age group is low and are predominately infant deaths<sup>15</sup>, which could have a longer registration delay. Deaths of those aged 10 to 44 could also be affected by the registration delay, as this group can have a high proportion of accidental, unexpected or suspicious

<sup>15</sup> Table 5.2a of the Registrar General Annual Report 2019 shows 87.5% (112 out of 128) of deaths aged 0 to 9 years were under 1 year old: <https://www.nisra.gov.uk/publications/registrar-general-annual-report-2019-deaths>

deaths<sup>16</sup> (for example, suicide, drug related deaths), which are commonly referred to coroners.

The number of excess deaths for females (913) is lower than that for males (1,045), and the number of Covid-19 related deaths is only slightly higher (955 compared to 948). The female total excess deaths figure is lower than the number of female Covid-19 related deaths (Figure 5). This difference is relatively small and within the annual variation in the number of deaths.

**Figure 5: Excess deaths and Covid-19 related deaths, by sex, 1<sup>st</sup> March to 31<sup>st</sup> December 2020**

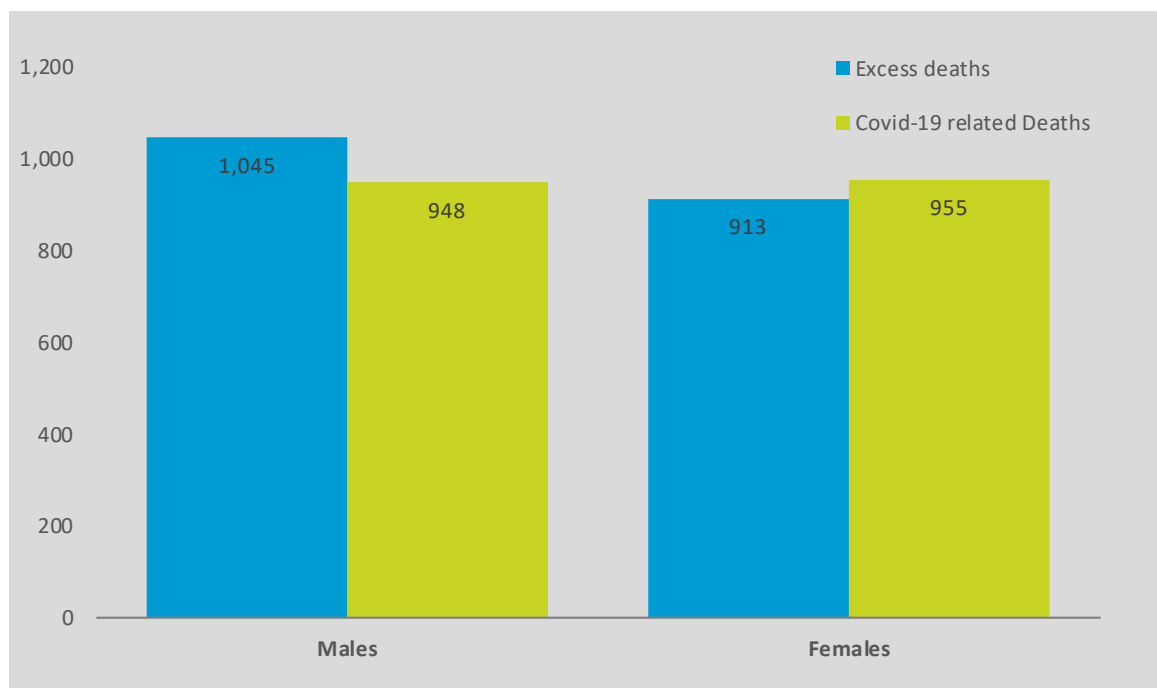
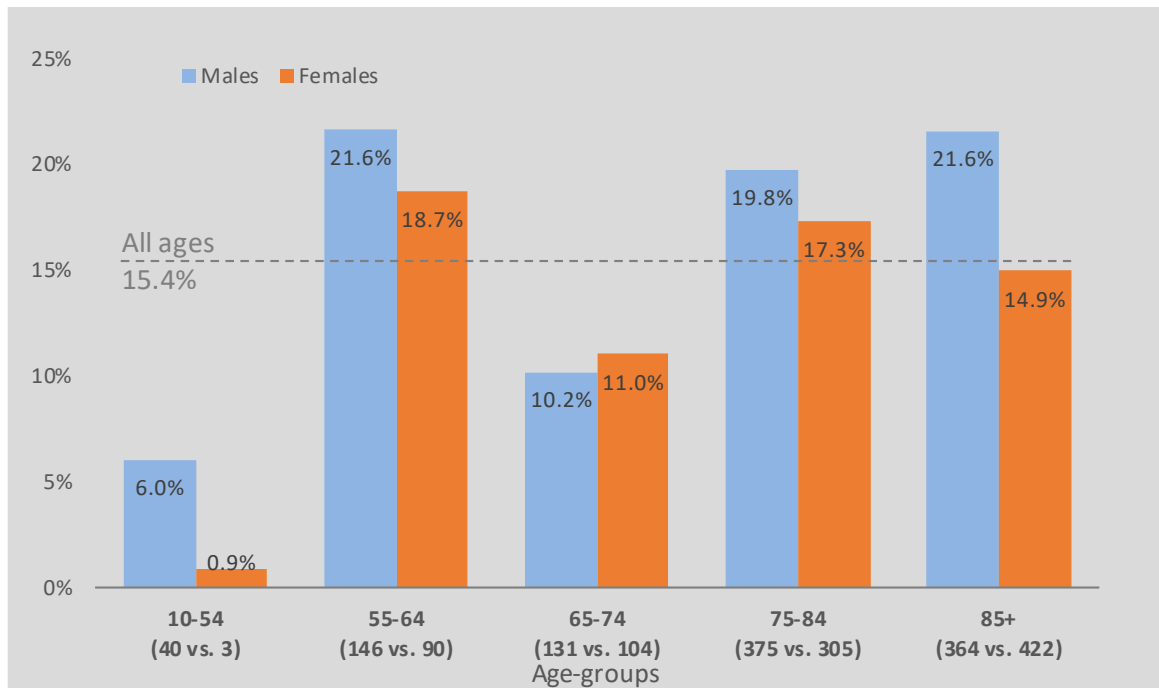


Figure 6 below shows excess deaths by sex and age group as a proportion of the average number of deaths in the previous five years.

<sup>16</sup> Table 6.2 of the Registrar General Annual Report 2019 shows 49.4% (307 out of 621) of deaths aged 10 to 44 died of external causes: <https://www.nisra.gov.uk/publications/registrar-general-annual-report-2019-cause-death>



**Figure 6: Excess deaths as proportion of average deaths 2015-19, by sex and age group, March to December 2020**

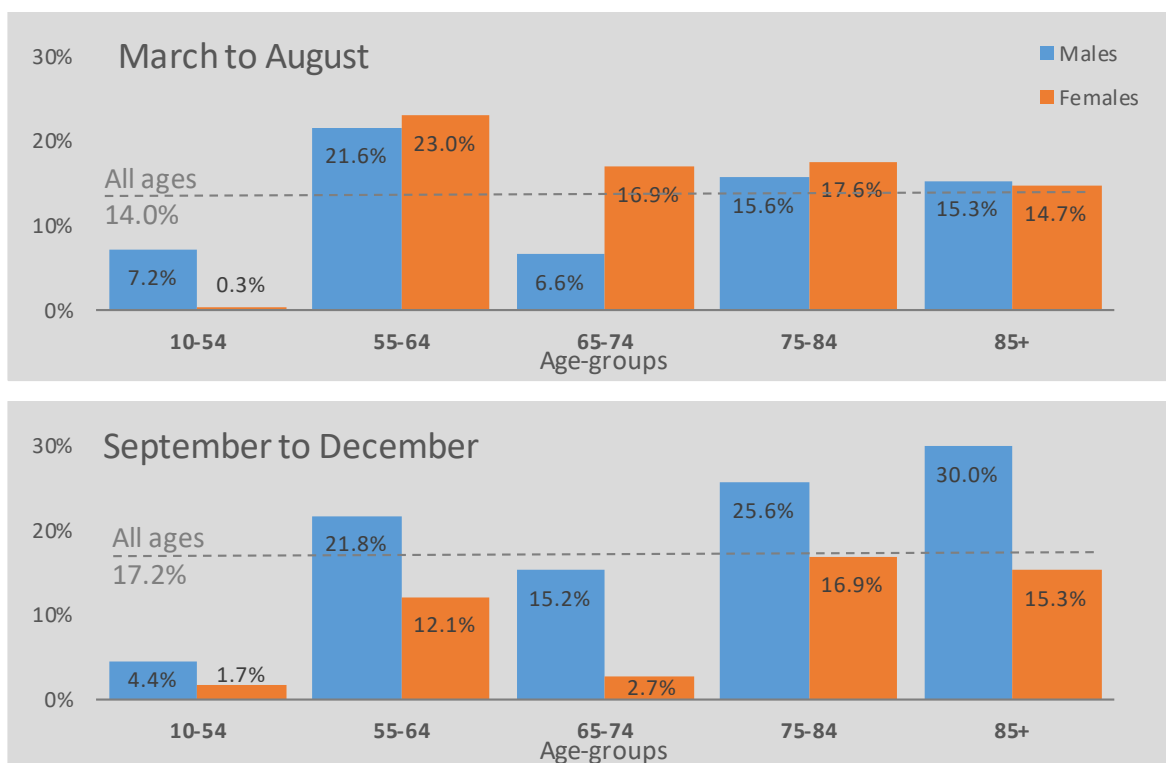


Over all ages, excess deaths were 15.4% above expected levels during the 10 month period. Figure 6 shows that the proportions of deaths over the five-year average for both males and females aged 55 to 64 (older working age), are higher than the equivalent *proportions* in older age groups. For those aged 75 and over, excess deaths as a proportion over the 5-year average is higher for males than females.

Figure 7 shows equivalent figures for two time periods:

- March to August 2020, a six-month period covering the initial rise and fall of Covid-19 related deaths; and
- September to December 2020, a four-month period when Covid-19 related deaths started to rise again and continued to do so throughout this period.

**Figure 7: Excess deaths as proportion of average deaths 2015-19, by sex and age group, March to August 2020, and September to December 2020**



In both periods and for both males and females, excess deaths as a proportion of five-year average deaths were higher for the older working age (55-64) compared to the young pensionable age (65-74). For March to August 2020, this proportion was the highest of all age groups. In the second period September to December 2020, excess deaths as a proportion of the five-year average deaths is higher for males than females in all age groups. Also, this proportion is highest for the 75-84 and 85+ age groups for both males and females.

## 6. Excess deaths by place of death

Three fifths (60.7%) of the 1,903 Covid-19 related deaths from March to December 2020 occurred in hospital, compared to 32.1% in care homes and 6.3% at home. The other remaining settings are 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 8 shows (a) the average number of deaths from March to December in the years 2015 to 2019, broken down by place of death, and (b) deaths from March to December 2020, broken down by place of death and split into Covid-19 related deaths and non Covid-19 deaths.

**Figure 8: Deaths from March to December by place of death and Covid-19, 2020 compared to average of 2015-19**

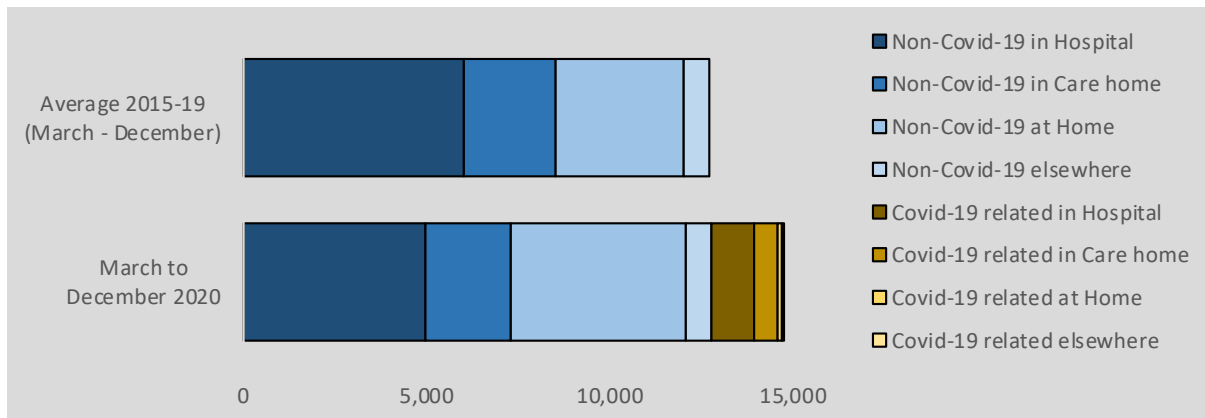
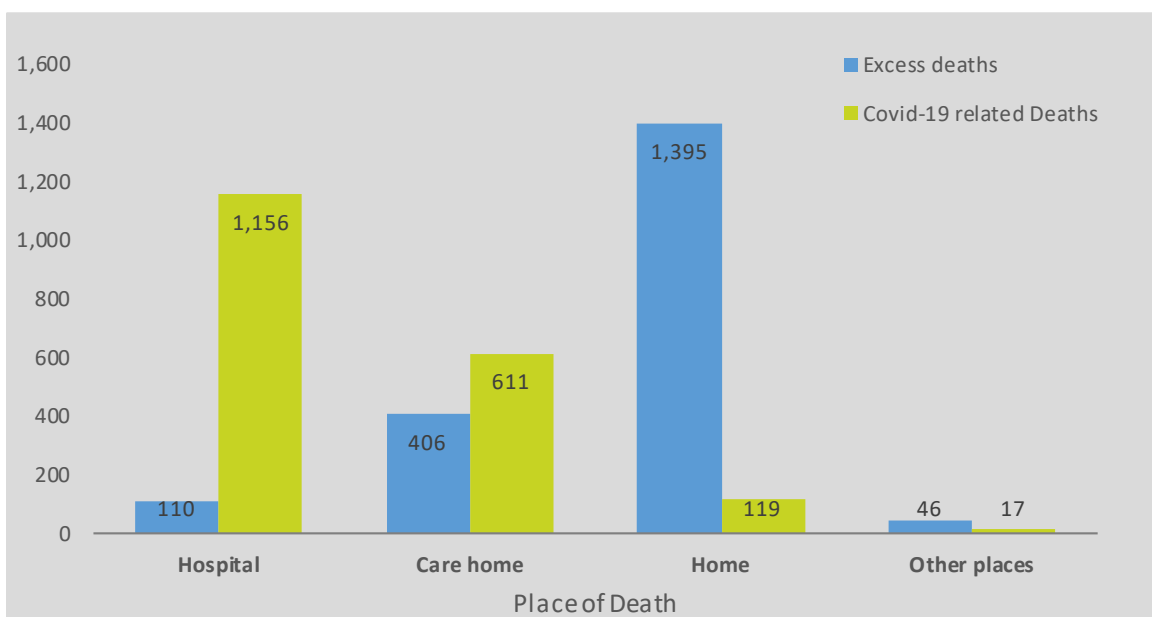


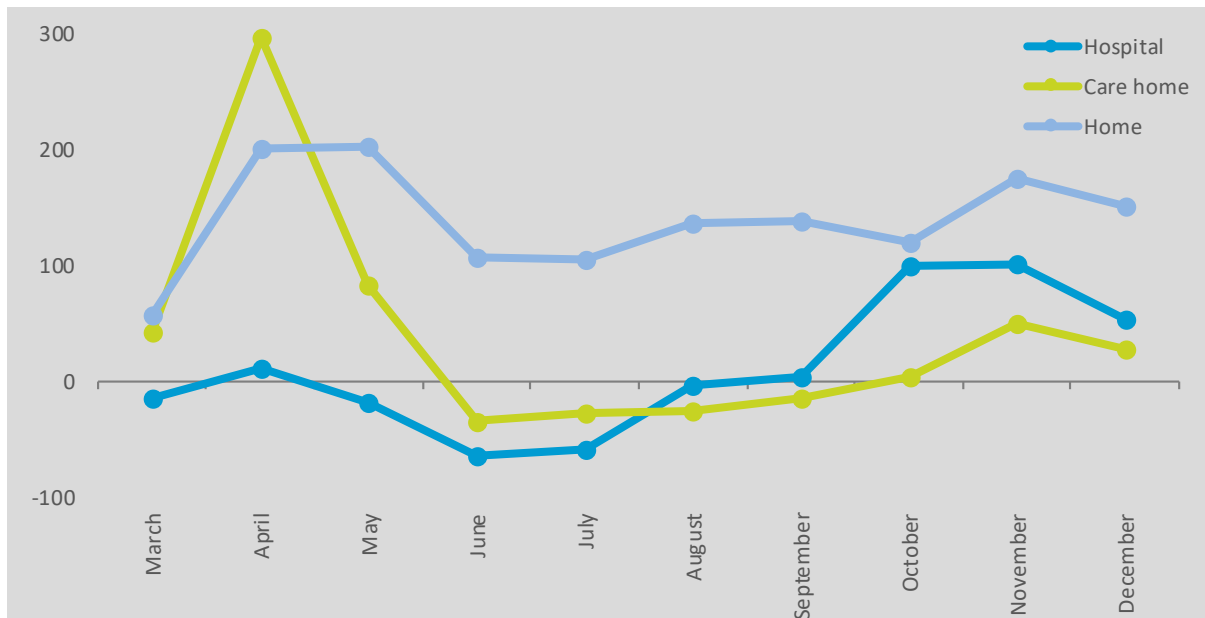
Figure 8 shows that the difference between deaths in March to December 2020 compared to the five-year average of 2015 to 2019 (1,958 excess deaths) is of a similar size as the Covid-19 related deaths (1,903) in this period. It also shows that for deaths that were not Covid-19 related, a shift occurred 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 far 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 9.

**Figure 9: Excess deaths and Covid-19 related deaths, by place of death, 1<sup>st</sup> March to 31<sup>st</sup> December 2020**



Excess deaths in hospitals (110) are much lower than the Covid-19 related deaths (1,156). Care homes had also smaller levels of excess deaths (406) compared to Covid-19 related deaths (611). In contrast, the number of excess deaths at home (1,395) is nearly twelve times the number of Covid-19 related deaths at home (119) and accounts for 71.3% of excess deaths over the period. Figure 10 shows excess deaths for each month March to December in hospitals, care homes, and at home.

**Figure 10: Excess deaths, by month and place of death, March to December 2020**



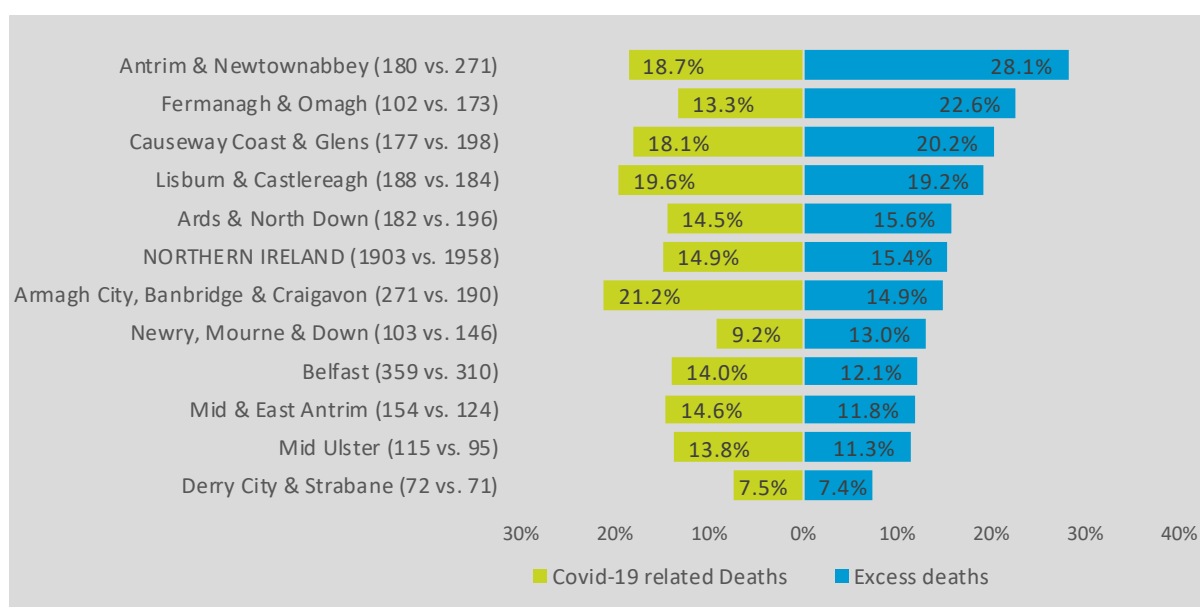
Excess deaths in hospitals were around zero or negative from March to September: there were fewer deaths in hospital compared to the average number of deaths in hospital in the previous five years. Only in the last three months of 2020 were excess deaths in hospital positive. Excess deaths at home have remained at substantial positive levels from April onwards, given that in the previous five years, on average around 350 people died at home each month.

Excess deaths in care homes peaked in April with 297 deaths, which was 119.9% higher than the average number of deaths in the previous five years (248). From June to September, excess deaths in care homes were negative, which could be connected to previous high levels of excess deaths.

## 7. 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 residence<sup>17</sup>. 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 11 presents both figures as a proportion of the average number of deaths in the previous five years.

**Figure 11: Excess deaths and Covid-19 related deaths as proportion of average deaths 2015-19, by Local Government District, 1<sup>st</sup> March to 31<sup>st</sup> December 2020**



Belfast LGD has the largest number of excess deaths (310), accounting for 15.8% of excess deaths in Northern Ireland (1,958). However, Antrim & Newtownabbey LGD had the highest excess deaths as a proportion of average deaths in 2015-19 (28.1%), followed by Fermanagh & Omagh LGD (22.6%) and Causeway Coast & Glens LGD (20.2%). Derry City & Strabane LGD had the smallest excess deaths number as a proportion of historic deaths (7.4%).

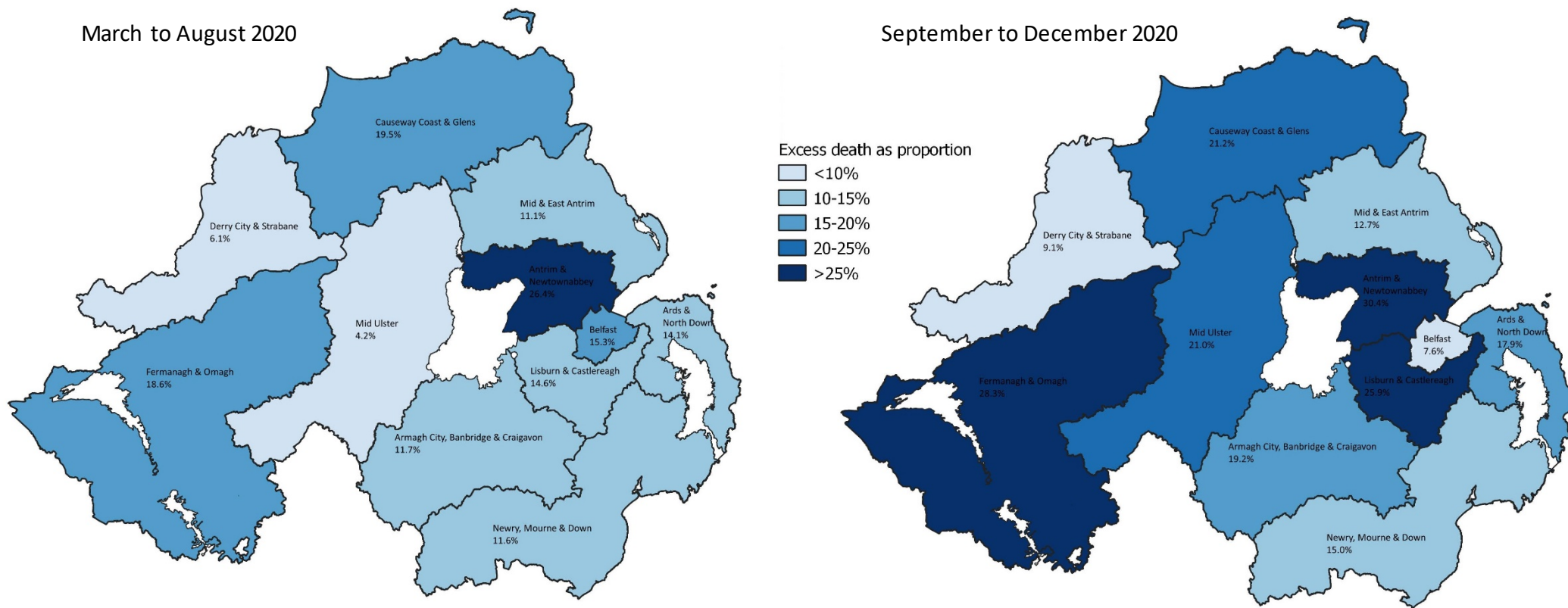
There are six LGDs where the number (and therefore, proportions compared to the 5-year average) of Covid-19 related deaths is greater than excess deaths. In particular, Armagh City, Banbridge & Craigavon LGD had 271 Covid-19 related deaths compared to 190 excess deaths.

Figure 12 shows a map of excess deaths relative to average deaths in 2015-19 by Local Government Districts. Further information is available in the accompanying Excel file.

<sup>17</sup> 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.



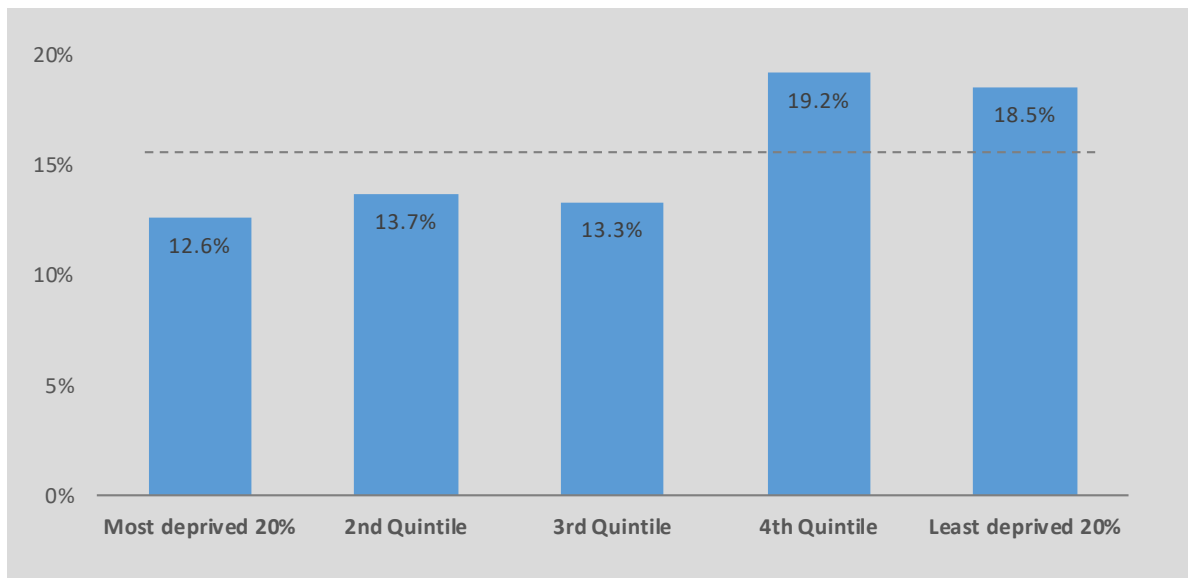
**Figure 12: Excess deaths as proportion of average deaths 2015-19, by Local Government District**



## 8. 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 13 shows the excess deaths during this period in 2020 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 13: Excess deaths as a proportion of average deaths 2015-19, by Deprivation Quintiles, 1<sup>st</sup> March to 31<sup>st</sup> December 2020**



Excess deaths are highest in the two least deprived quintiles, with just under a 20% increase in deaths compared to the average of previous years. Excess deaths are lowest in the most deprived quintile, with similar rates in the 2<sup>nd</sup> and 3<sup>rd</sup> quintiles. Age standardised mortality rates (ASMRs) show the opposite pattern: on an age standardised basis, the most deprived area has the highest ASMR. 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)<sup>18</sup> 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.

<sup>18</sup> <https://www.nisra.gov.uk/statistics/deprivation/northern-ireland-multiple-deprivation-measure-2017-nimdm2017>



## 9. Excess deaths – 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.

At the time of writing (March 2021), the coding of deaths registered up to 30<sup>th</sup> September 2020 has been completed. The first wave (March to August) had 8,338 deaths, of which 249 (3%) were registered past 30 September and hence the underlying cause of death is currently not available.

Table 1 below shows excess deaths by cause of death for March to May 2020, which represents peak mortality during the first wave with 894 excess deaths or 23.0% above average deaths during the same period over the previous five years.

**Table 1: Excess deaths as a proportion of average deaths 2015-19, by cause of death, 1<sup>st</sup> March to 31<sup>st</sup> May 2020**

<b>Underlying cause of death</b>	<b>Excess deaths</b>	<b>Excess as proportion of average deaths in 2015-19 (March to May)</b>
Covid-19	706	-
Malignant neoplasm	75	6.8%
Dementia and Alzheimer's disease	62	13.1%
Diseases of circulatory system	16	1.7%
Diseases of respiratory system	-74	-14.3%
Other causes	40	4.6%
Uncoded cause of death	69	-
<b>Total</b>	<b>894</b>	<b>23.0%</b>

Covid-19 was found to be the underlying cause for 706 deaths, accounting for 79.0% of excess deaths in this three-month period at the start of the pandemic. Noteworthy excess deaths were found for malignant neoplasm (75 deaths) and dementia/Alzheimer's disease (62), with the latter being 13.1% above historical levels. There were 74 fewer deaths from diseases of the respiratory system from March to May 2020 compared to the same period in the previous five years (negative excess deaths).

There were 69 deaths that occurred from March to May 2020 for which the underlying cause of death had not been established yet: they were registered after September – a delay of more than four months. These are generally coroner’s cases where it would take a longer period to establish the circumstances surrounding the death. Historically, a large proportion of these deaths would have been due to external causes of death, however, such information is currently not available and as such, caution should be taken when interpreting these figures. In addition, there may have been deaths that occurred in this period, which haven’t been registered yet.

In this three-month period, there were 769 Covid-19 related deaths. For each of these deaths, the underlying cause of death was established. This means that for 706 out of 769 (91.8%) of Covid-19 related deaths in this three-month period, Covid-19 was found to be the underlying cause of death. The analysis of excess deaths by cause of death covers only a short period at the start of the pandemic. It will take some time for the full picture to emerge due to delays in both the registration of deaths and the coding of causes of deaths.

## 10. 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 NISRA<sup>19</sup>.

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 paper<sup>20</sup> 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 in 2020 is not the same as in the previous five years, with annual increases of around 0.5% and an aging population<sup>21</sup>. 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 1,958 excess deaths in these ten months in 2020, the underlying trend in deaths due to population change would have had a relatively small impact.

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<sup>19</sup> See Quality and Methodology Information (QMI) for Northern Ireland death statistics, available at: <https://www.nisra.gov.uk/publications/vital-statistics-documentation>

<sup>20</sup> Covid-19 Deaths Bulletin 1 March 2020- 31 January 2021, available at <https://www.nisra.gov.uk/publications/covid-19-related-deaths-northern-ireland>

<sup>21</sup> NISRA produces official population statistics for Northern Ireland, see <https://www.nisra.gov.uk/statistics/population>

There is 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 12,737 deaths was used as a baseline, the number of deaths ranged from 12,374 to 13,005 (see accompanying tables). Again, the 1,958 excess deaths in 2020 is much greater than the magnitude of such annual variation.

The biggest unknown in this analysis is the number of deaths which occurred from March to December, but which have not yet been registered. In the previous five years, deaths registered up to 17<sup>th</sup> February of the following year and occurring between March and December, were around 400 lower than eventually registered. As discussed in the previous section, given the typical causes of death for late registrations, this number may be greater in 2020.

## 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.

Deaths involving Covid-19 are defined as those where Covid-19 is 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 and U07.2.

## 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. Further detail can be found from the NISRA website:

<https://www.nisra.gov.uk/support/geography/northern-ireland-super-output-areas>

## 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. Further detail can be found from the NISRA website:

<https://www.nisra.gov.uk/statistics/deprivation/northern-ireland-multiple-deprivation-measure-2017-nimdm2017>

## 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:

<https://www.nisra.gov.uk/support/geography/urban-rural-classification>

## **Administrative Data Research Northern Ireland (ADR NI)**

Administrative Data Research Northern Ireland (ADR NI) 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 at:

<https://www.nisra.gov.uk/statistics/ni-summary-statistics/coronavirus-covid-19-statistics>

Weekly death registrations in Northern Ireland, 2021

<https://www.nisra.gov.uk/publications/weekly-deaths>

Additional analysis on Covid-19 related deaths

<https://www.nisra.gov.uk/statistics/cause-death/covid-19-related-deaths>

Weekly Data on Deaths Registered in Scotland

<https://www.nrscotland.gov.uk/Covid19stats>

Analysis of death registrations not involving coronavirus (COVID-19), England and Wales: 28 December 2019 to 10 July 2020

<https://www.ons.gov.uk/peoplepopulationandcommunity/birthsdeathsandmarriages/deaths/articles/analysisofdeathregistrationsnotinvolvingcoronaviruscovid19englandandwales28december2019to1may2020/28december2019to10july2020>

Vital statistics (Central Statistics Office, Ireland)

<https://www.cso.ie/en/statistics/birthsdeathsandmarriages/>

## List of Tables

Data accompanying this bulletin are available from the NISRA website in Excel format. The spreadsheet includes the following tables.

Table 1	Deaths by month and year of death, 2015-2020 and excess deaths in 2020, March to December
Table 2	Excess deaths and Covid-19 related deaths, 1 March to 31 December 2020
Table 3	Excess deaths and Covid-19 related deaths, by sex and 5-year ageband, 1 March 2020 to 31 December 2020
Table 4	Excess deaths and Covid-19 related deaths, by sex and age group, 1 March to 31 December 2020
Table 5	Excess deaths and Covid-19 related deaths, by month and place of death, 1 March to 31 December 2020
Table 6	Excess deaths and Covid-19 related deaths, by Local Government District, 1 March to 31 December 2020
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Table 8	Excess deaths and Covid-19 related deaths, by deprivation quintile, 1 March to 31 December 2020
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Table 12	Excess deaths and Covid-19 related deaths, by drivetime to Belfast, 1 March to 31 December 2020
Table 13	Excess deaths and Covid-19 related deaths, by Travel To Work Area, 1 March to 31 December 2020

## Contact Details

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## Annex A – Excess deaths methodology

‘Excess deaths’ is the difference between the observed number of deaths and the expected number of deaths. 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 population estimates and projected mortality rates. For example, the 2018-based population projections for Northern Ireland<sup>22</sup> projected 16,184 deaths between mid-2019 and mid-2020, and 16,374 between mid-2020 and mid-2021. As these projections are created on an annual basis, roughly a third of 2019-20 deaths plus half of 2020-21 deaths could be expected to occur in March-December 2020;
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<sup>23</sup>, which provides weekly excess deaths for a number of European countries, including Northern Ireland.
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.

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). <https://www.who.int/hac/about/definitions/en/>*

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.

<sup>22</sup> See <https://www.nisra.gov.uk/publications/2018-based-population-projections-northern-ireland>

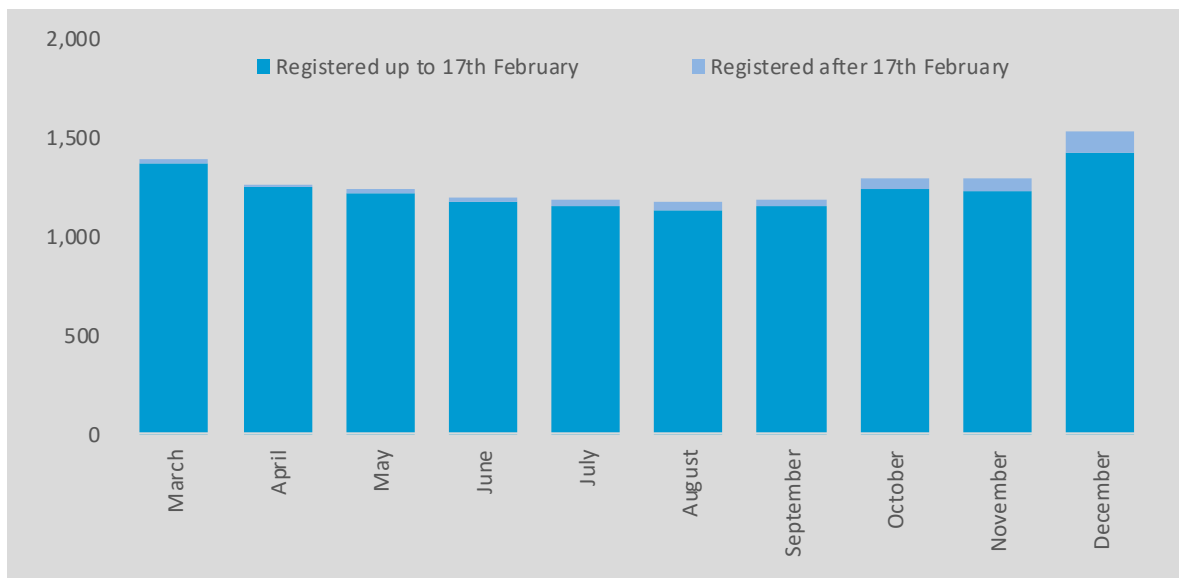
<sup>23</sup> See [https://webgate.ec.europa.eu/chafea\\_pdb/assets/files/pdb/2007201/2007201\\_d04\\_en\\_ps.pdf](https://webgate.ec.europa.eu/chafea_pdb/assets/files/pdb/2007201/2007201_d04_en_ps.pdf)

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<sup>th</sup> March. 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<sup>st</sup> March to 31<sup>st</sup> December, comparing deaths in 2020 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 17<sup>th</sup> February 2021, therefore allowing for 33 working days after the end of June 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 2015-19 into those that were registered by the 33<sup>rd</sup> working day of the following year, and those that have been registered since. It shows that this effect of registration delay is largest for the most recent months.

**Figure A: Average deaths in 2015-19, by month and registration cut-off date, 1<sup>st</sup> March to 31<sup>st</sup> December 2020**





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

1. Deaths which occurred in March to December 2020 and registered by 17<sup>th</sup> February 2021 (14,294), compared to the average number of deaths occurring over the same months of 2015-19 and which have been registered to date (thus including late registrations) (12,737). This results in 1,557 excess deaths, or 12.2% above the 5-year average;
2. Deaths which occurred in March to December 2020 and registered by 17<sup>th</sup> February 2021 (14,294), compared to the average number of deaths occurring over the same months of 2015-19, including death registrations up to 33 working days of the following year (12,336). This results in 1,958 excess deaths, or 15.9% above that 5-year average; or
3. Adjusting the number of deaths occurring between March and December 2020 to account for late registrations, and compare to the average number of deaths in 2015-19 which have been registered to date.

The first approach is most likely to result in an underestimate of excess deaths, as the number of deaths in March to December 2020 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 changes<sup>24</sup> 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 (401 deaths) or as a proportion (3.2%). 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 areas<sup>25</sup>.

To put the possible measures of excess death into context, excess deaths based on deaths registered from March to December was 1,771<sup>26</sup>, and the number of Covid-19 related deaths that occurred in this period was 1,831. These figures align more with the second approach, suggesting that the impact of late registration is sizable. It was decided to use the second approach to estimate the number of excess deaths, but to present this excess as a proportion of historical deaths registered to date, i.e. the 1,958 excess deaths are 15.4% higher than the five-year average of 12,737 deaths. This methodology is demonstrated in Table A on the next page.

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<sup>24</sup> 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, available at <https://www.nisra.gov.uk/publications/weekly-deaths>

<sup>25</sup> <https://www.nisra.gov.uk/publications/drug-related-deaths-northern-ireland-socio-demographic-analyses>

<sup>26</sup> This figure is taken from the monthly death statistics as published on <https://www.nisra.gov.uk/publications/monthly-deaths>

**Table A: Deaths by month and year of death, 2015-2020, 1 March to 31 December<sup>1</sup>**

Month	2015	2016	2017	2018	2019	Average 2015-19 (A)	Average 2015-19 at cut-off <sup>2</sup> (B)	2020 <sup>3</sup> (C)	Excess Deaths (C - B)	Excess deaths as proportion of average 2015-19 (C - B) / A
March	1,395	1,338	1,370	1,490	1,352	1,389.0	1,371.6	1,457	85.4	6.1%
April	1,274	1,227	1,205	1,250	1,355	1,262.2	1,244.0	1,769	525.0	41.6%
May	1,233	1,234	1,280	1,168	1,288	1,240.6	1,220.8	1,504	283.2	22.8%
June	1,241	1,207	1,165	1,150	1,201	1,192.8	1,170.2	1,182	11.8	1.0%
July	1,127	1,236	1,209	1,152	1,186	1,182.0	1,157.0	1,184	27.0	2.3%
August	1,099	1,204	1,175	1,190	1,179	1,169.4	1,130.2	1,242	111.8	9.6%
September	1,209	1,171	1,212	1,178	1,176	1,189.2	1,152.4	1,273	120.6	10.1%
October	1,289	1,296	1,349	1,229	1,295	1,291.6	1,236.4	1,466	229.6	17.8%
November	1,224	1,337	1,350	1,169	1,389	1,293.8	1,229.2	1,559	329.8	25.5%
December	1,453	1,545	1,651	1,398	1,584	1,526.2	1,424.2	1,658	233.8	15.3%
<b>March-Dec</b>	<b>12,544</b>	<b>12,795</b>	<b>12,966</b>	<b>12,374</b>	<b>13,005</b>	<b>12,736.8</b>	<b>12,336.0</b>	<b>14,294</b>	<b>1,958.0</b>	<b>15.4%</b>

Source: NISRA

**Notes:**

<sup>1</sup> Based on the date a death 'occurred' rather than when a death was registered.

<sup>2</sup> Based on death registrations up to and including 17 February of the following year.

<sup>3</sup> Based on death registrations up to and including 17 February 2021.