NISRA
Northern Ireland Statistics and Research Agency
Gníomhaireacht Thuaisceart Éireann um Staitisticí agus Taighde

Excess Deaths Methodology: Why the change?

Information Paper

January 2025

Executive Summary

The Covid-19 pandemic heightened interest in 'excess' deaths, which is typically defined as the difference between the *actual* number of deaths in a particular period and the *estimated* number of deaths that would normally be expected in that period. As estimates of expected deaths can be constructed in a range of different ways, estimates of excess deaths published by different organisations have until recently been produced on different bases, even within the UK.

This information paper sets out the background and context which have driven changes in the excess deaths methodology used by the NI Statistics & Research Agency (NISRA), the Office for National Statistics (ONS) and National Records of Scotland (NRS). Specifically, these changes relate to the method used to estimate 'expected deaths' in the calculation of excess deaths. This paper presents a retrospective comparison showing how closely the old and new method-based estimates of expected deaths align with registered (actual) deaths for the same period. The paper concludes that the new approach represents a significant improvement in estimates of excess deaths, particularly in older age groups which have the most bearing on this statistic.

1. Background

‘Excess deaths’ is the term used to describe how the number of deaths observed (registered) during a time period differs from the number of deaths that might be expected in the same period (also known as the baseline). The method of obtaining excess deaths can be expressed simply as:

Excess deaths = Observed deaths - Expected deaths

Although named ‘excess’, the difference can be positive or negative: that is, there could be more observed deaths than are expected in a given period (in which case excess deaths is positive), or there could be fewer deaths registered than expected in any given period (in which case excess deaths is negative).

‘Excess deaths’ is a concept that can only be considered in aggregate: because it is just the difference between the total number of actual and expected deaths, no individual, registered death can be identified as an ‘excess death’.

Estimates of excess deaths for specific groups or causes of death are defined similarly: for example, estimates of excess deaths for a specific age group are the difference between the actual and the expected number of deaths registered for that age group.

Although the concept of excess deaths is quite simple, the method for estimating ‘expected deaths’ can vary across organisations and jurisdictions, which is problematic for users as it leads to varying estimates of excess deaths. In early 2023, a blog published by ONS set out some of the complexities of creating an estimate of expected deaths and the need for a review of the existing approach (prior to February 2024) used by the National Statistics Institutes including the ONS, NRS and NISRA – as recommended by the UK Statistics Authority.

The work undertaken and the outcome of the review were detailed in a blog published by the ONS in February 2024. This set out the improved method for estimating expected deaths being adopted by the UK National Statistics Institutes. On the same day, NISRA published a short paper giving a high-level overview of the changes and comparing counts of excess deaths based on the previous and new methodologies.

1.1 Why did the old approach need to change?

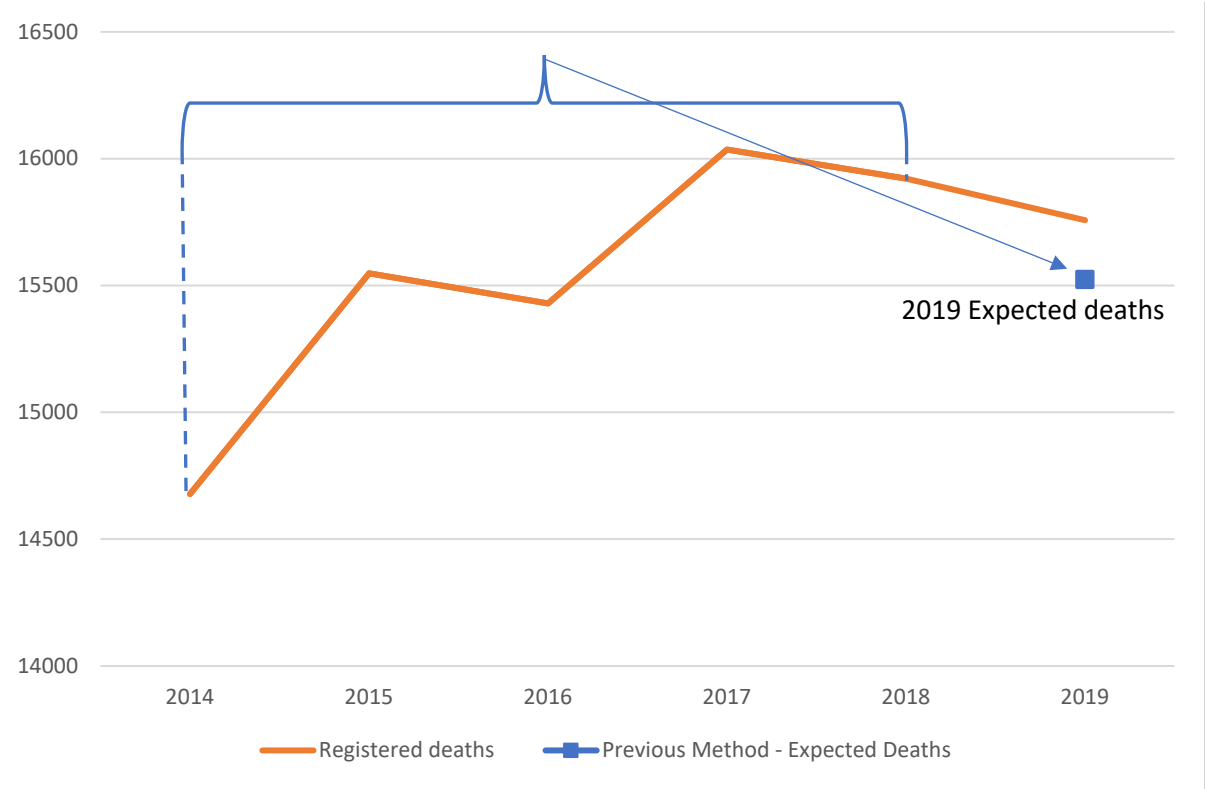
Prior to February 2024, the method used by the ONS, NRS and NISRA to ‘predict’ expected deaths estimates for a current period was to take a simple, five-year average of the number of deaths registered in the same period for each of the previous five years. While the data published may not have specifically labelled the 5-year average as ‘expected deaths’, this is the purpose it served, and it was used in the calculation of excess deaths by subtracting from deaths registered for the corresponding period. The main advantage of this method was that it was very transparent, easily replicated, and widely understood.

Chart 1 illustrates how, in the five-year average method, observed deaths were used in a basic calculation to produce an expected number of deaths. It provides an example of how the expected number of deaths for calendar year 2019 (15,523) was calculated based on the average of the number of deaths registered in each of the years from 2014 to 2018:

15,523 = (14,678 + 15,548 + 15,430 + 16,036 + 15,922) / 5

Over this pre-pandemic period, there was a general upwards trend in deaths registered, with the number of deaths per year increasing by over 1,000 between the first (14,678) and last year (15,922). Using the old methodology, the predicted, expected number of deaths for 2019 lies between the low- and high-points of this series at 15,523 deaths – lower than in both of the two previous years and at about the same level as actual deaths four years earlier. From this presentation, it is clear that the expected number of deaths in 2019 is brought lower by the relatively low number of deaths in 2014 in particular.

Chart 1: Worked example of the 5-year average based method of calculating expected deaths for calendar year 2019



The actual number of deaths registered in 2019 was 15,758: a reduction on the number of deaths in 2018, and a reversal of some of the upwards trend observed over this period. In both these senses, 2019 was a 'better' year than 2018. However, the measure of excess deaths was positive (15,758 – 15,523), indicating more deaths occurred than were expected. It is easy to see how the contradictory messages of these two approaches could cause confusion: was 2019 a 'better' year, or not?

Chart 1 and this discussion illustrate how important the method of estimating expected deaths is for the usefulness of measures of excess deaths. On the old measure, NI had a considerable number of excess deaths in 2019, indicating higher mortality than expected. But by changing the method to a four- rather than five-year average, for example, the estimate of expected deaths would have been within 0.2% of the actual number of deaths registered: suggesting that mortality levels in 2019 were broadly as expected. Alternatively, an analyst might justifiably have compared the 2019 total to the two previous years (2017 and 2018) and concluded that NI's mortality levels were lower than 'usual'.

All three interpretations of the data are strictly correct – but demonstrate that measures of excess deaths are only as strong as the estimate of expected deaths on which they are based. The limitations of the simple five-year average approach – particularly that it was based on numbers of registered deaths only and could not take account of the changing size and age structure of the population – made it a very crude yardstick on which to base estimates of excess deaths. Similar arguments could be made about longer or shorter moving average measures.

The Covid-19 pandemic years, particularly 2020 and 2021, presented further challenges for the five-year average, with peaks in registered deaths above the levels that one would predict in 'normal' times. Basing a five-year average of expected deaths on these exceptional death counts would inflate expected deaths, and so suppress excess deaths estimates.

In this context, the Office for Statistics Regulation (OSR) conducted a review of excess deaths reporting by the ONS and produced a number of recommendations. The main recommendation was that 'ONS must review its methods and approach to ensure its statistics are fit for purpose.' OSR welcomed the establishment of a cross-UK technical working group with the aim of investigating whether 'a more sophisticated, longer term modelling approach would improve its estimation'.

2. The New Method

The new method implemented in February 2024 uses a statistical model to predict the number of deaths expected in a given period. This new method introduces several improvements to obtain as accurate an estimate of expected mortality as possible, which accounts for everything we know about the population:

i) **Population growth**: the new model recognises that the UK and NI populations are growing. Everything else equal, we would expect more deaths in a larger population than a smaller one. Relying on death counts in earlier years (when the population is smaller) will under-estimate the number of deaths which should be expected in later years (when it is larger);

ii) **Population ageing**: The new model recognises and accounts for the fact that, similar to other western countries, the UK and NI populations are

ageing. Everything else equal, more deaths would be expected in an older population than a younger one. Basing our estimate of expected deaths on counts from earlier periods (when a smaller fraction of the population was older) will also result in an under-estimate of expected deaths now (when a larger fraction of the population is older). Therefore, the model includes both population and deaths broken down by age and sex;

iii) **Mortality trends**: over the longer term, mortality rates (when adjusted for age) have shown an overall improvement, driven by falling death rates for older age groups. Expected deaths based on a five-year average count of deaths will likely miss these trends and inflate (understate) the number expected (excess) deaths over a period. The new model therefore accounts for recent trends in mortality rates over a five-year window.

In addition, the model adjusts for seasonal effects and removes defined outlier periods over the pandemic (specifically April and May 2020, and November 2020 to February 2021 for monthly calculations; Weeks 14 to 22 of 2020, and Week 45 of 2020 to Week 8 of 2021 for weekly data) rather than all of 2020, to achieve an estimate that reflects more ‘normal’ circumstances. The additional inputs used in the new model are based on well established data series and further detail of the quality of these are provided in Annex 2.

The output of the new method is a set of estimates of expected deaths for sex by age sub-groups in the population which vary seasonally and reflect the size and age structure of the population. Deaths for these sub-groups can be summed to get an overall estimate of the total expected deaths count. These estimates adjust for all the factors that we know to impact mortality and that we can quantify, including:

- annual population estimates and projections,
- recent trends in mortality from death registration data,
- seasonality within the year; and
- periods of high levels of mortality and the proportion of those which were Covid-related to identify outliers.

Adjusting for these factors improves the quality of the estimate of expected deaths. The biggest of these influencing factors – and which explains a large proportion of

the difference between the new and old estimates of excess deaths – are the size and structure of the population which are explained further below.

3. Population size and structure and mortality

There are several important contextual factors to consider when seeking to predict mortality levels in a population:

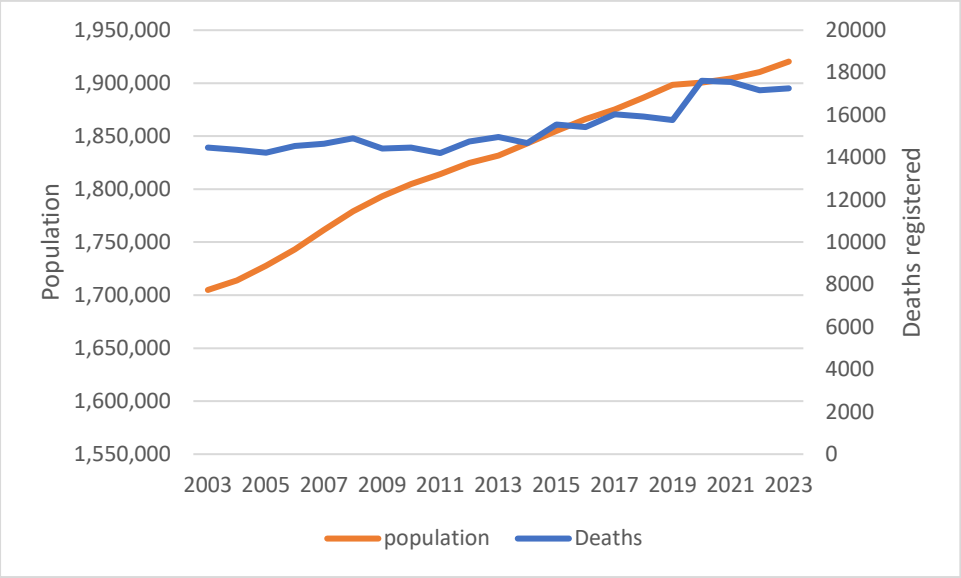
- The changing size of the population
- The changing age structure of the population, and
- Trends in mortality in the population

3.1 Size of the population

Two of the most important factors which determine the number of deaths in a society are the total size of the population and the age structure of the population. Chart 2 shows the first of these two factors: it indicates that the population in Northern Ireland grew by 12.9% between 2003 and 2023, or by around 0.6%, on average, per year. Everything else being equal, this larger population means that we should expect there to be more deaths in later years than in earlier years: if there are more people living in Northern Ireland, it follows that there are likely to be more deaths than previously.

The population and deaths data for Northern Ireland (Chart 2) are consistent with this logic but indicate a role for other factors too. Over the 2003 to 2023 period, the total number of registered deaths increased by 19% - greater than the increase in the size of the population. During the pre-pandemic period (from 2003 to 2018 only), registered deaths increased by 10%, compared to population change of 11%.

Chart 2: Northern Ireland population estimates and deaths registered, 2003 to 2023 (non-zero Y-axis for population)

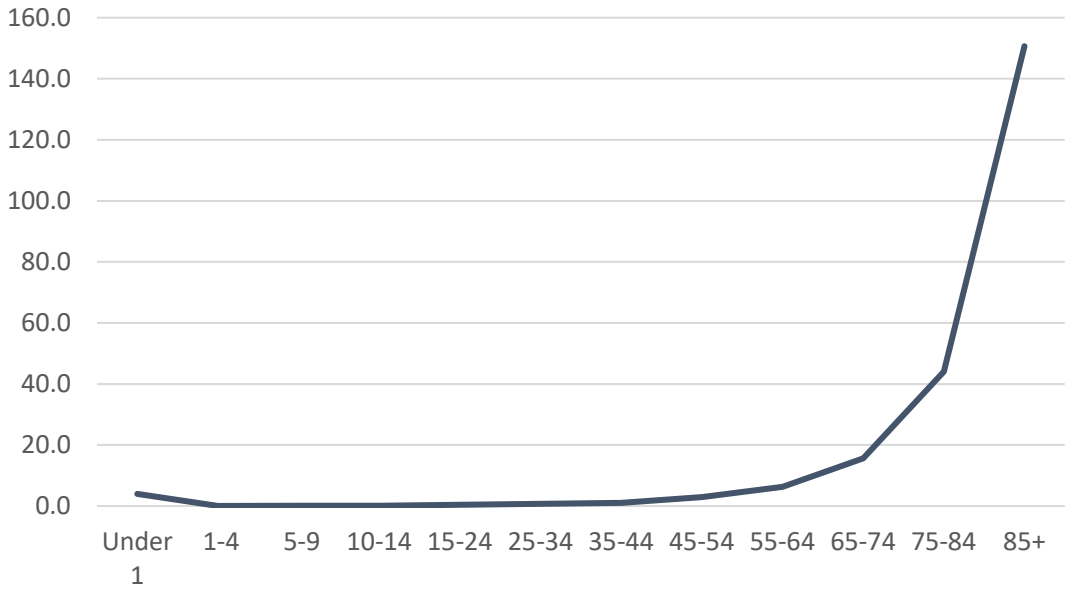


3.2 Age structure of the population

Alongside the size of the population, the age structure of the people living in a society also has an important bearing on the number of deaths. Everything else equal, the more (fewer) older people in a population, the greater (smaller) the number of deaths that would be expected.

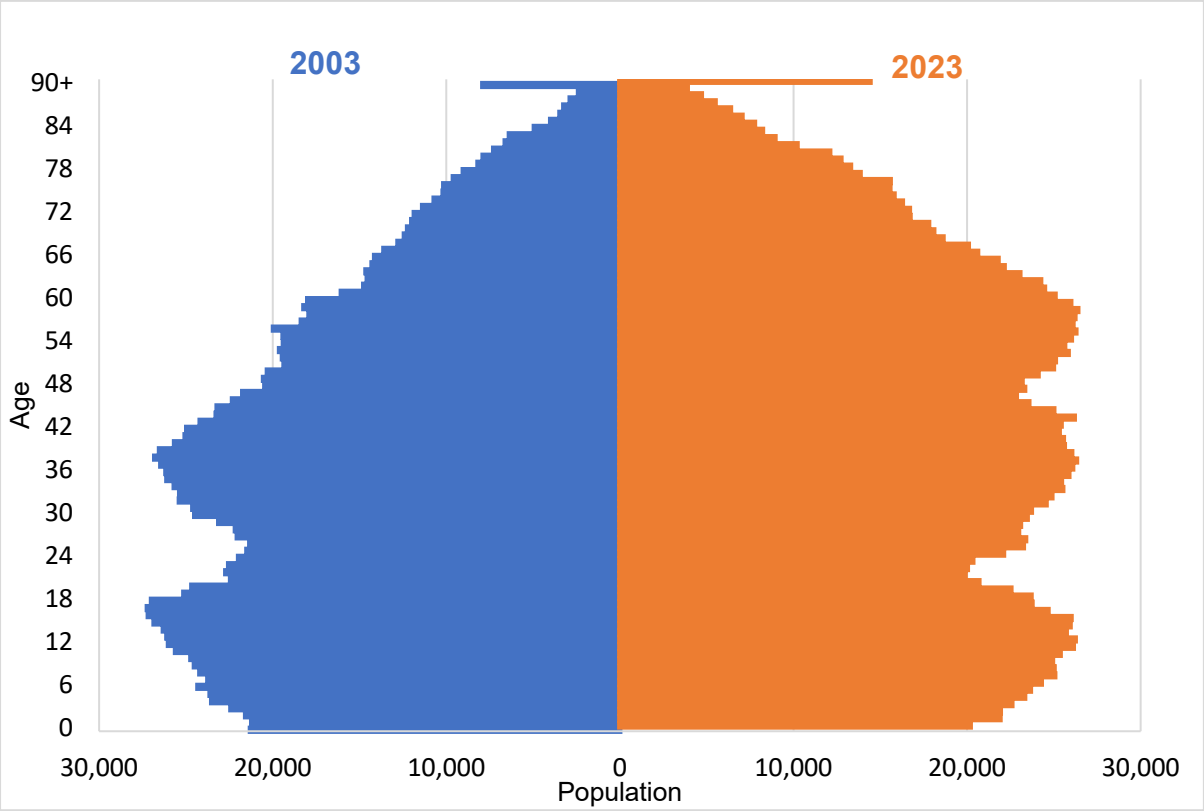
This arises because mortality rates increase with age. Chart 3 demonstrates this for Northern Ireland, by showing the death rates for individual age groups for 2023 registered deaths. In 2023, the age specific death rates per 1,000 population in Northern Ireland ranged from 0.02 for persons aged 1-14 to 150.7 for persons aged 85 and over. It follows that if a population has more people in these older age groups, a higher number of deaths would be expected.

Chart 3: Age specific death rates per 1,000 population, 2023



As well as growing relatively strongly (Chart 2), the population of Northern Ireland has been ageing, with the proportion of people in older age groups increasing at a more rapid rate than the numbers in younger age groups. The Northern Ireland population pyramid, (Chart 4), shows the number of people by year of age in 2003 (left side) and 2023 (right side). It is clear that comparatively, 2003 shows a higher concentration of people in the mid and younger age groups, giving a more pyramid shape; but the 2023 population shows how that concentration is migrating up the age groups. This is indicative of an ageing population, and of more people in being at greater mortality risk (Chart 3).

Chart 4: Population pyramid chart for Northern Ireland by single year of age, 2003 and 2023



Although the population pyramid provides a visual sense of developments, it can be difficult to assess overall changes through this presentation. Inspecting these data in detail shows that while the NI population grew by 12.9% between 2003 and 2023, the growth rates for different age groups have varied, giving rise to changes in the fraction of the population at each age group. Over this period, the proportion of the population accounted for by people aged less than 20 fell by around 3.7 percentage points, from 28.9% to 25.1%. The share aged 20 to 69 increased slightly by 0.6 percentage points (from 61.6% to 62.2%) over the same period. However, the proportion of the population in the highest age group, 70 and above increased by 3.2 percentage points, from 9.5% to 12.7% of the population. This is a demonstration of an ageing population, and indicates a larger group is at greater mortality risk in 2023 than in 2003.

Age standardised mortality rates (ASMR) are commonly used when making comparisons across different populations as they adjust for differences in the age structure of populations by weighting against a ‘standard’ population. While NI crude

mortality rates (which do not take account of different age profiles) have generally increased from 2003 to 2023 from 8.2 to 9.0 per 1,000 population, the ASMRs[1] have shown a different pattern, with a decrease from 1,252.0 to 992.6 per 100,000 population over the same time. This indicates that after accounting for the age of the population, the death rate in Northern Ireland is lower than two decades earlier.

To further demonstrate the impact of the ageing population, we can conduct a thought experiment, by taking historical age-specific mortality rates from a past year and apply them to a projected population for corresponding age groups in a recent year. This approach asks how many deaths should be expected if we hold death rates (like those in Chart 3 above) constant but allow the population to age.

Taking 2018 as a more typical, pre-pandemic year, there were 15,922 deaths registered. As in Chart 3, death rates were higher among older age groups and lower among younger age groups. Applying these age-specific mortality rates from 2018 to the population size and age structure for the 2023 mid-year population estimate[2] gives us the number of deaths we would expect if mortality rates remained stable. The total which we get for 2023 – 17,622 deaths – is 11% higher than in 2018, even though the overall population increase was just 1.8% between 2018 and 2023. This experiment shows how the combination of a growing and ageing population bears on the number of deaths.

3.3 Trends in mortality

Alongside changes in the size and composition of the population, recent trends in mortality also impact on the number of deaths to expect in a population. For example, improvements in mortality in general in a population have arisen from advances in medical care leading to increased life expectancy. Conversely, certain events such as epidemics, pandemics and wars will negatively impact mortality trends that too should be considered.

As stated above, death rates increase with age, and this remains true even with improving life expectancy. However, mortality rates among older age groups in particular, have changed over the last two decades.

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1 Both standardised to the 2013 European Standard Population

2 https://www.nisra.gov.uk/publicatins/2023-mid-year-population-estimates-northern-ireland

Chart 5: Age-specific death rates per 1,000 population, 2003 and 2023

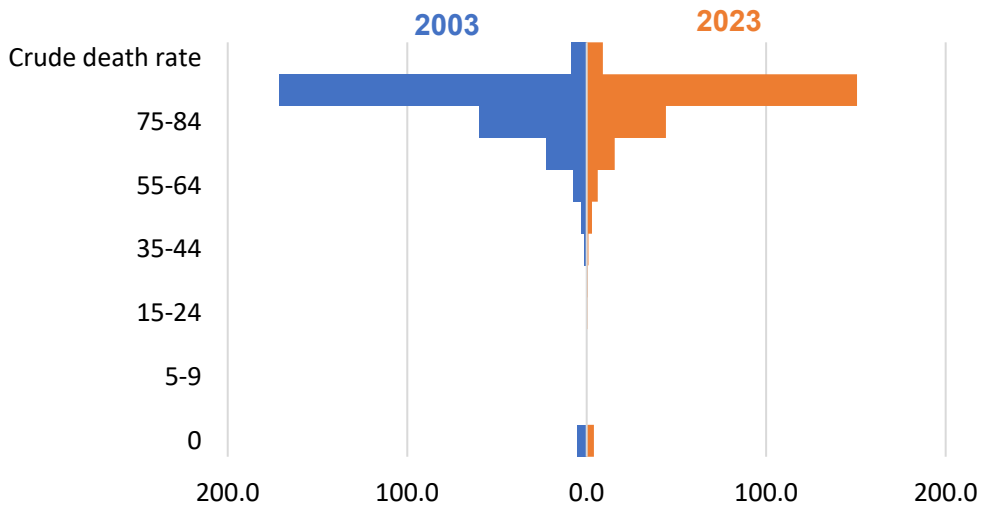


Chart 5 compares the age specific death rates for Northern Ireland in 2003 (left hand panel) and 2023 (right hand panel). The pattern of lower (higher) death rates among younger (older) people is apparent in both years. However, it also shows reductions in age-specific death rates in most age groups over this period, particularly among the older age groups. For example, for those 85 and over, the age specific death rate was 171.3 per 1,000 population in 2003, dropping to 150.7 in 2023.

Taken together, the evidence shows the population of Northern Ireland is growing and ageing – both of which will push up on the number of deaths we should expect. Conversely, there is also evidence that mortality rates – particularly for older age groups – have improved over the last two decades, which will tend to hold down the number of deaths we observe. Accounting for these trends – and not simply averaging past deaths – results in an increase in accuracy of calculated expected deaths, as demonstrated in the next section.

4. Is the new approach more accurate?

Expected deaths measures can be used for a range of purposes. For example, the method used by EuroMOMO (European monitoring of excess mortality for public health action) is designed to deliver coordinated, timely mortality monitoring and

analyses in as many European countries as possible, using a standardised approach to ensure that signals are comparable between countries.

The new method agreed between ONS and the other National Statistics Institutes of the UK is intended to be a general measure for detecting short-term variations from ‘normal’ circumstances, i.e. in the absence of any significant mortality events such as epidemics or pandemics.

As such, the new method takes into account as many different mortality influencing factors as possible to generate the best possible quality estimates of expected deaths. Table 1 compares the old and new methods in terms of the presence of features which are designed to make an estimate of expected deaths more accurate. From this presentation it is clear that the new method – while certainly more complex than the previous methods – can account, more completely, for important mortality influencing factors. In principle, these features should mean that the new measure of expected deaths is more accurate than the previous method.

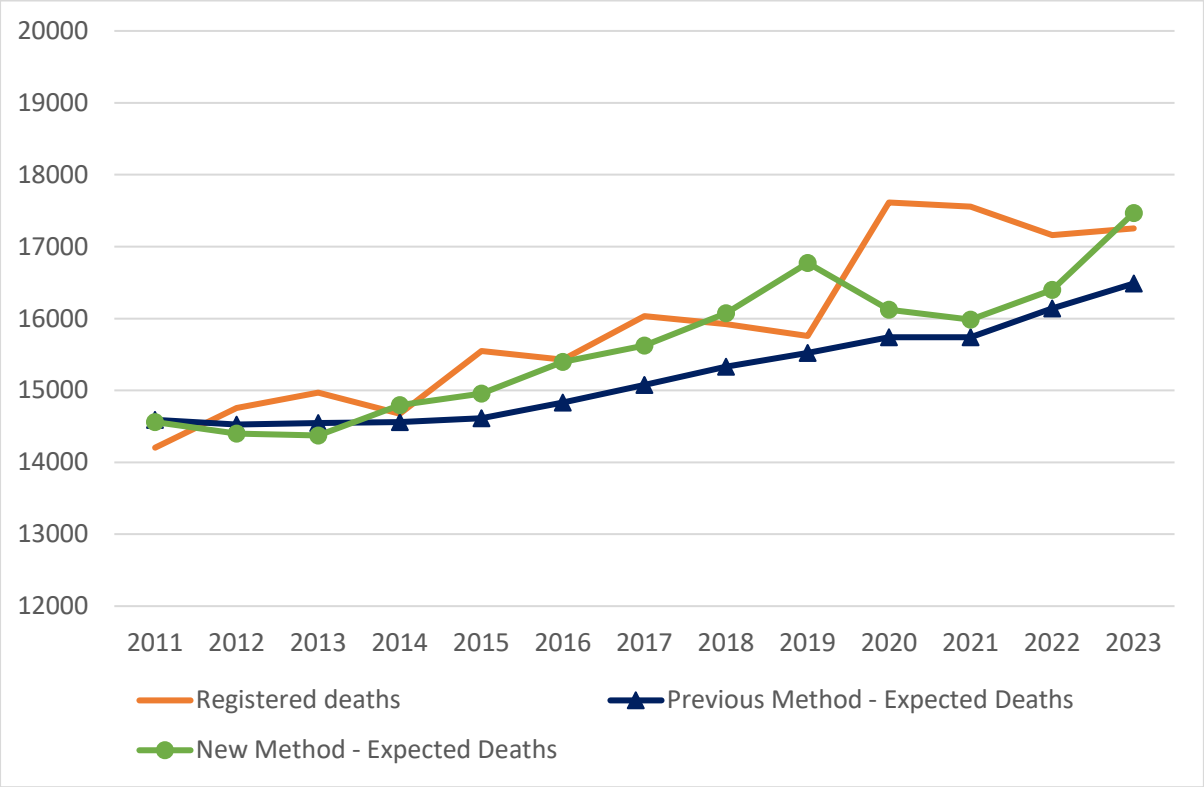
Table 1: Comparison of methods for estimating expected deaths

Component	**Previous five-year average method for estimating expected deaths**	**New method for estimating expected deaths**
Underlying dating information for deaths	Date of death registration	Date of death registration
Counts used in the approach	Total count of death registrations	Count of death registrations by age and sex
Years used for expected baseline	Five years with a one-year lag period	Five years with a one-year lag period
Accounts for trends in mortality	No	Yes
Accounts for population growth	No	Yes
Accounts for seasonal trends in mortality	Yes	Yes
Adjustment for periods of unusual mortality	Yes	Yes
Measure of accuracy related to the estimate	No	Yes
Comparable across the UK	Yes	Yes
Monthly adjustment to account for GRO working days in the month (excluding public holiday variations at present)	No	Yes

There are a wide range of ways to assess the strength of a forecast of this nature relative to an outturn. Chart 6 plots the first of these: comparing the estimates of annual expected deaths using both the five-year average method and the new method with the number of deaths actually registered over the period from 2011 to

2023. It clearly shows that the count of actual deaths increased over the period leading up to the pandemic. In 2020 and 2021 there was a marked increase in the number of deaths, following which the number of deaths has levelled off at a higher level than during the pre-pandemic period.

Chart 6: Registered and expected deaths, 2011 to 2023



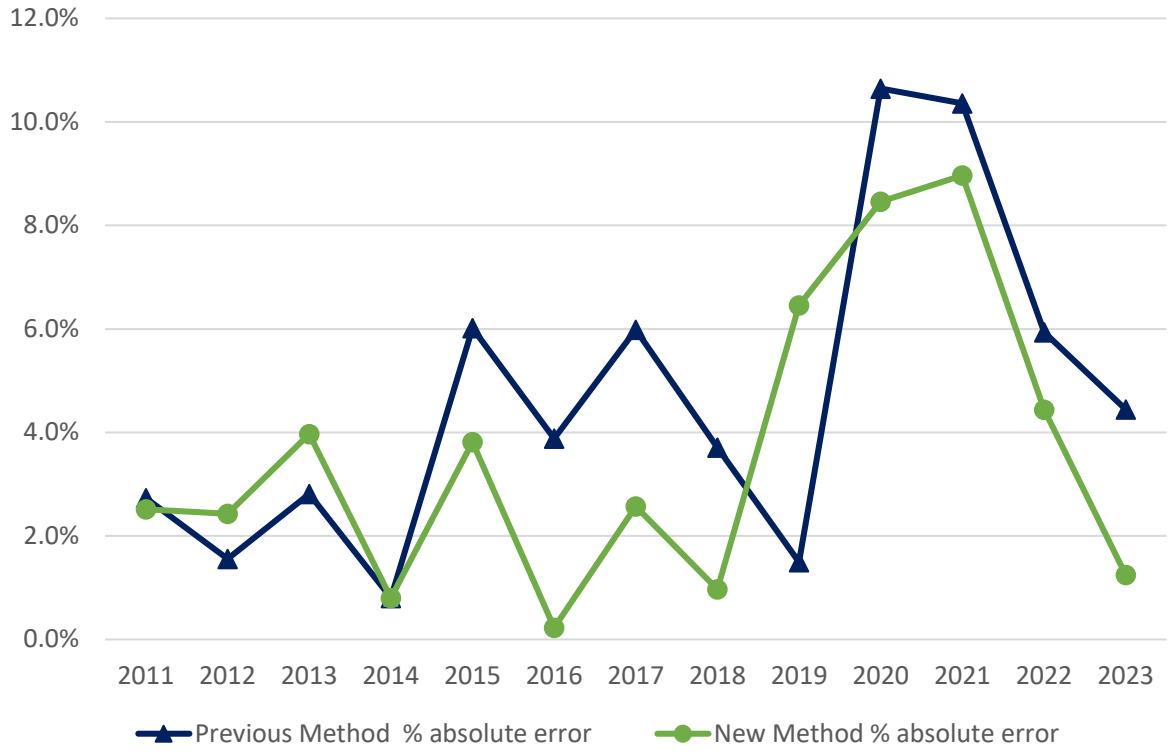
The two different methods for forecasting actual deaths differ in their performance, as measured by the difference between the actual and the forecast series. Chart 6 shows that the previous 5-year average method had a considerable degree of 'error' from the observed number of deaths for much of the period between 2014 and 2023. It also illustrates that the direction of this error was almost always negative: that is in eight of the nine years between 2011 and 2019, this measure underestimated the registered number of deaths. As a consequence, this measure produced estimates of excess deaths that were systematically higher than they should be for almost a decade.

Although the new method does not predict the level of actual deaths exactly over this period, the estimates it produced are closer to the actual number of deaths registered in nine of the thirteen years presented. Chart 6 also demonstrates that this method was not systematically biased in either direction: in four of the pre-pandemic

years it over-estimated deaths, and in five it underestimated them. Both methods showed less accuracy during the pandemic as neither were designed for predicting mortality in such a unique situation.

Estimates of the accuracy of the relative measures can be difficult to assess visually from this presentation, so Chart 7 illustrates the 'absolute error' associated with each series. This measures the percentage difference between the expected deaths series and the actual deaths each year from 2011 to 2023, regardless of whether deaths were over or underestimated.

Chart 7: % Absolute error between expected deaths and registered deaths, previous and new method, 2011 to 2023



This presentation shows that the new method performs more strongly over the 2011 to 2023 period than the five-year average. The absolute error of the new method is lower than the previous method in nine of the thirteen years considered. Taking the period as a whole, the old method produced an average absolute error of 4.6% compared with the new method's average absolute error of 3.6%.

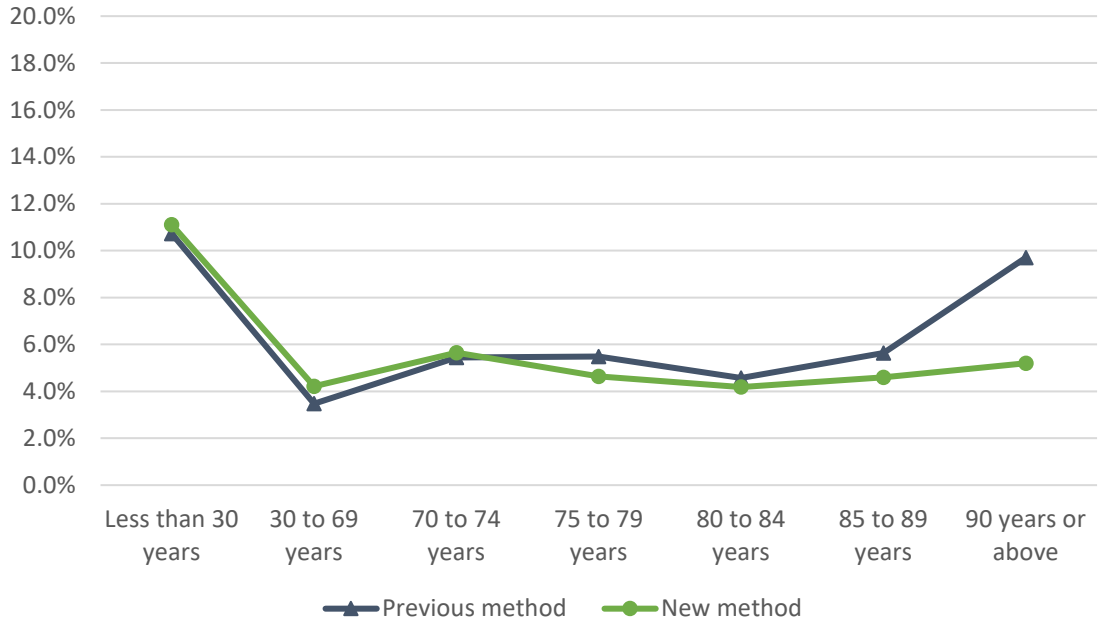
It is important to understand that absolute error does not account for direction of difference. So, while the average absolute error for the model-based approach was 3.6% over the period 2011 to 2023, the error in individual years was either positive or

negative. However, with the 5-year average approach, not only was the absolute error greater in nine of the thirteen years, it was systematically biased downwards. Looking at the most recent full year of registration data (2023) the absolute error using the 5-year average method is 4.4%. i.e. the estimated number of expected deaths is 4.4% different from the actual number of deaths registered; in comparison, the model-based method gives a lesser error of 1.2%.

Taken together, these charts show that at the aggregate level, the new measure of expected deaths is a closer fit to actual deaths than the five-year average approach, and that it corrects a significant downwards bias in the earlier estimates. Both are clear indications of an improved methodology, producing higher quality estimates.

The evidence also indicates that the new method performs as well or better for important sub-groups of the population. Much of the improvement between the old and new methods arises from better predictions of mortality for older groups in particular and it is of course, these groups where prediction is most important given the already demonstrated increase in mortality rates with age. Chart 8 shows the absolute percentage errors for each method broken down for age groups between 2011 and 2023. As before, this presentation simply shows how close a forecast approach came to exactly predicting mortality for each group, irrespective of whether the measure over- or under-stated mortality. In this presentation, the smaller the absolute error, the more accurate the estimated expected deaths were for a specific group.

Chart 8: Comparison of absolute error from registered deaths by age for previous and new methods for estimating expected deaths, 2011-2023 average



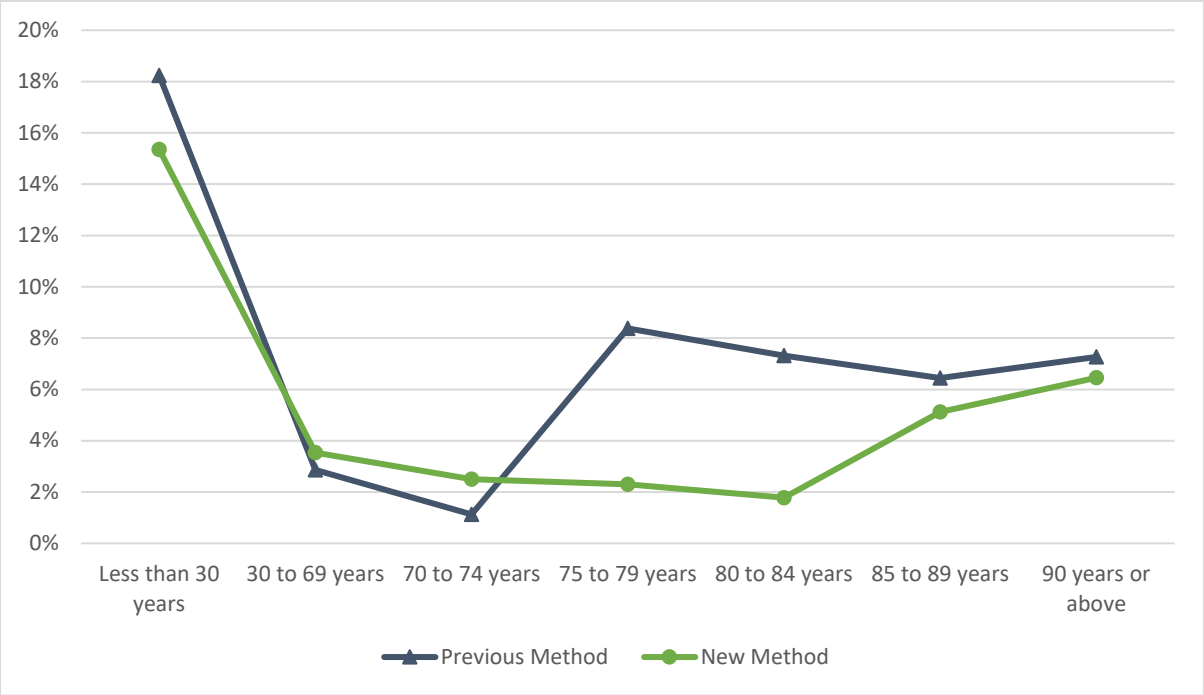
While the two measures produce very similar absolute error rates for most age groups, the new measure produces lower errors rates for those aged 75 and above over this period – with a notable forecast improvement for those aged 85 and above. Accounting for trends in the structure of the population and changing mortality plays an important role in achieving this improvement.

In more recent periods, the superiority of the new method is evident for a larger range of age groups. Chart 9 presents the absolute average error rates from both methods for different age groups over the 2022-23 period. It shows that the new and old methods produce similar absolute average error rates for the youngest and the oldest age groups, but that the new method performs better for the 75 to 84-year-old group from which many deaths occur. For these groups, the average absolute error of the old method is between 3.5 and four times larger than that of the new method.

In part, this improvement reflects the different treatment of the pandemic period between the old and the new methodologies. Under the new method, estimates of expected deaths for the years following 2020 have been adjusted to account for peaks associated with the pandemic which can be considered to be outside the norm for expected mortality levels. Using the previous method, 5-year averages for expected deaths were calculated excluding the full year 2020. For example, expected deaths for 2022 were based on totals from 2016-2019 and 2021. As

outlined in section two, the new method allows for a more specific and refined adjustment to account for the impact of the pandemic whereby specific months (or weeks) were excluded from the calculations where at least 15% of deaths were accounted for by Covid-19 deaths. The errors plotted in Chart 9 therefore, were calculated using expected deaths including these 'outlier' adjustments.

Chart 9: Comparison of absolute error from registered deaths by age for previous and new methods for estimating expected deaths, 2022-2023 average

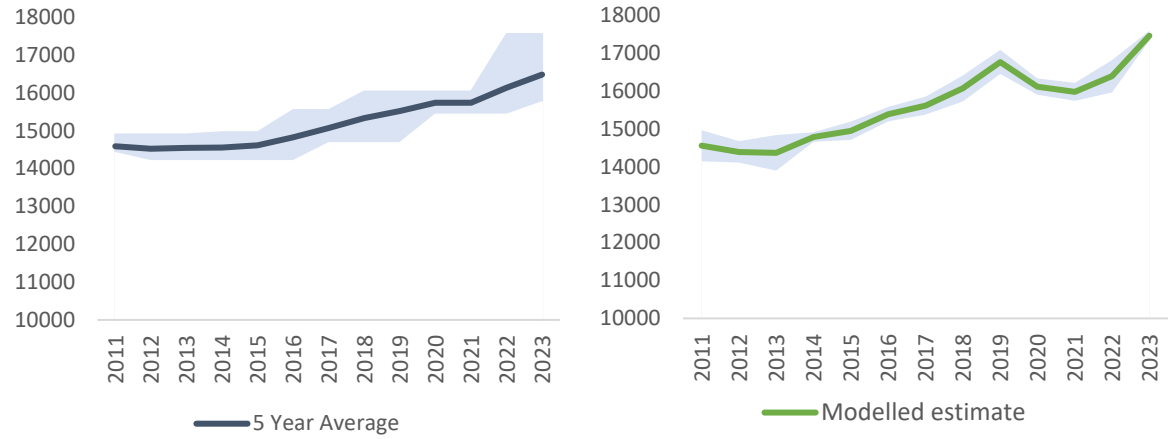


Certainty around estimates of expected deaths

As with any method for making an estimate or prediction, analysts recognise that there is a level of uncertainty associated with the estimate. The previous method for estimating expected deaths used the method of taking a 5-year average of previous observed number of death registrations completed. It follows that the uncertainty around this estimate is the range between the minimum and maximum numbers of deaths observed in each of the five years which contribute to its calculation. Chart 10 shows the 5-year average plotted for the years 2011 to 2023, with a shaded area around the line showing the estimate. This area shows the range between the minimum and maximum number of deaths in each of the previous five years.

The introduction of the model-based approach for estimating the number of expected deaths for a period gives the capacity for quantifying uncertainty around the value using statistical processes, by producing a 'confidence interval'. A confidence interval demonstrates how good an estimate is. It provides a guide as to what boundaries the actual value lies within. There are different levels of confidence intervals. In this case confidence intervals have been calculated to 95%, which means that there is 95% certainty that the true value should lie in the given range. It should be noted that as deaths data is not normally distributed, the current method for calculating confidence intervals is a guide but can be improved with further developments. Chart 11, shown alongside Chart 10, gives a visual representation of the scale of error around the estimate for expected deaths using the model-based approach.

Charts 10 and 11: Estimated expected deaths based on the 5-year average with maximum and minimum values; and expected deaths using the model-based approach with confidence intervals.



The charts clearly show a tighter band on uncertainty using the model-based approach, pointing to increased accuracy in calculating an estimated number of deaths that way.

5. Conclusion

We have stepped through the rationale for moving away from the former, simple average approach, based on observations from the previous five years of death registrations to a wider view which incorporates key contextual information on what

we know about NI population change and mortality trends, as well as accounting for periods of unusual mortality levels in a more refined way.

This explainer demonstrates that while the five-year average approach was easily understood and a useful tool for National Statistics Institutes to quickly provide UK wide estimates of excess deaths during the pandemic, it left much room for improvement, systematically producing underestimates of the number of deaths one might expect for the current period, based only on the number of deaths registered in corresponding periods in previous years.

The analysis has demonstrated that the new model provides a step forward in terms of a more statistically accurate way of estimating expected deaths in a population in normal circumstances. The biggest factors influencing mortality are size and age structure of the population with the highest death rates attributable to the oldest age groups. A population that is not only growing but ageing should logically expect to see increases in the number of deaths, even if rates remain the same.

The comparison of observed deaths with expected deaths using each of the methods has demonstrated less error associated with the new method particularly in terms of reflecting size and age structure of the population. This increase in accuracy, particularly in the upper age groups is important to understanding why this new method is a useful step forward.

While the new model-based method may be less transparent to general users than the previous approach due to the multiplicity of factors and interactions it accounts for, this can be justified by the greater accuracy it offers in terms of estimating expected deaths in a given time period under 'usual' circumstances (i.e. absence of a pandemic or other major health situations) and in turn, the accuracy of the estimates of excess deaths.

Feedback

It is important to remember that these remain 'official statistics in development' and they will undergo further refinement.

In coming months, in conjunction with the other UK National Statistics Institutes, the Office for National Statistics will issue a document detailing some proposed methodological adjustments. NISRA will also highlight this document to users via the NISRA website, in the weekly death registrations tables, and on social media.

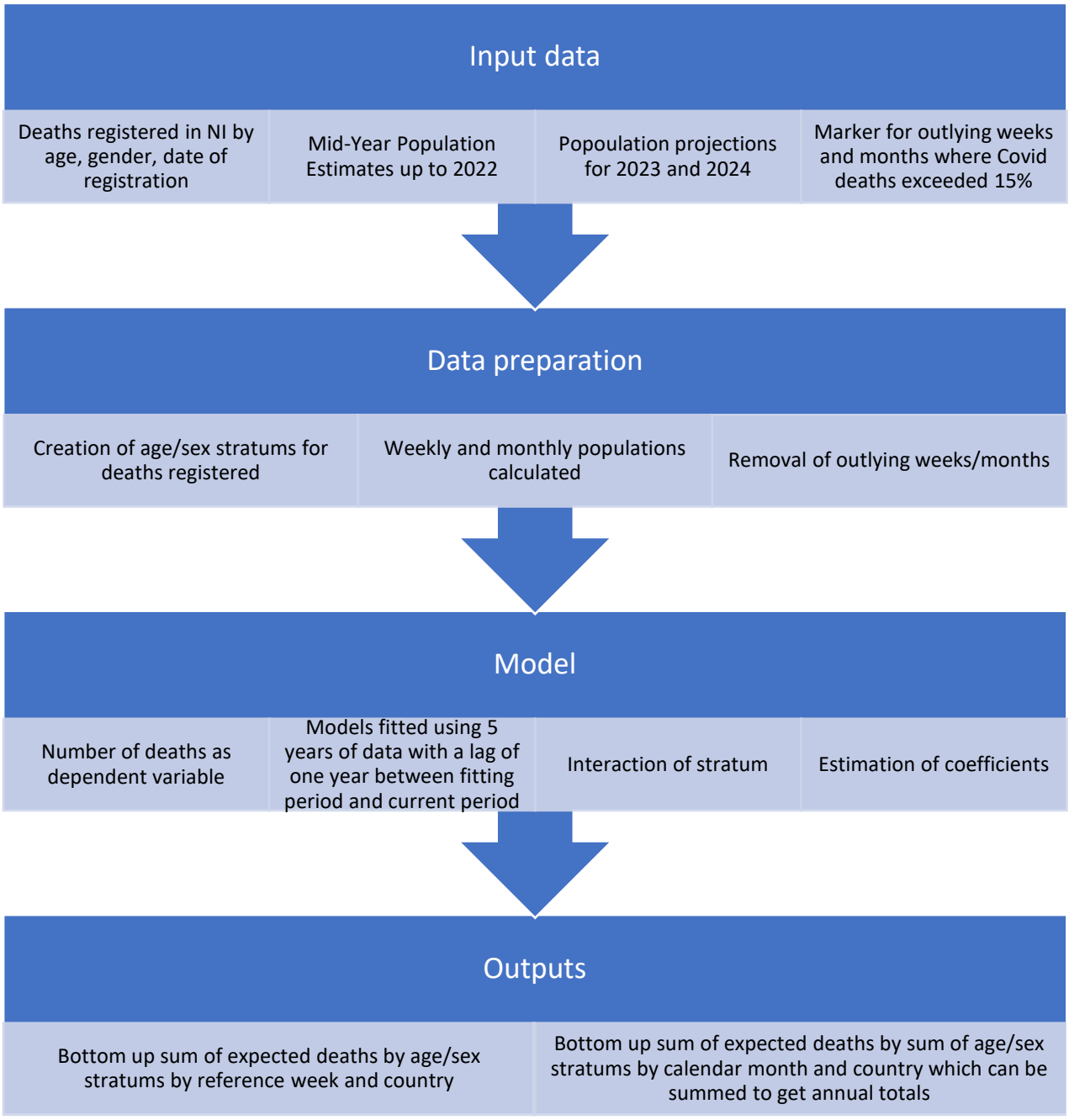
NISRA invite feedback from interested users at any time but will especially welcome any insights following the publication of the methodological proposals document.

Feedback can be submitted directly by email to:

demography@nisra.gov.uk

Annex 1

Flowchart of model for calculating expected deaths



Annex 2

Quality of inputs to Model for Estimating Expected Deaths

The model relies on granular level data inputs which are interacted in the model to produce the resulting estimated deaths. Details on the technical workings of the model and how the inputs are grouped and interacted are available in section 2 of the paper published by ONS in February 2024 (Estimating excess deaths in the UK, methodology changes - Office for National Statistics). These inputs consist of:

- Death registrations (including registration date, age and sex)
- % of deaths attributed to Covid-19 by week/month
- Population estimates (including age, sex and year)
- Population projections (including age, sex and year)
- Week number lookup file (for assigning week number to dates)

Deaths

Information on deaths in Northern Ireland comes from the official death registrations made with the General Register Office for Northern Ireland and mortality data is produced and published by the Northern Ireland Statistics and Research Agency. The data is thoroughly quality assured through a series of ongoing checks throughout the year until it is finalised through the publication of the Annual Report of the Registrar General.

Checks may include, but are not limited to, ensuring all records are unique, individual and valid, and that information is as complete as possible, for example, age, address, country of birth, place of death etc. The data is then processed, which means that various derived variables are created from, and in additional to, the original information. Some examples include age groups, place of death category (hospital, home, hospice etc.), registration year, cause of death categories, attaching various geographies to address information.

There are several documents available on the NISRA website that describe the processes involved from data collection to publication, with a focus on quality assurance. It identifies where there are potential areas of risk in the quality and

accuracy of deaths data; it also details the checks carried out on the data to mitigate those risks.

- Quality Assurance of Administrative Data (QAAD) for Deaths Data in Northern Ireland | Northern Ireland Statistics and Research Agency – the QAAD report aims to apply the requirements of the UK Statistic Authority's Quality Assurance toolkit to the administrative data used by NISRA to produce deaths statistics in Northern Ireland. The aim being to provide reassurance and transparency regarding the quality of the data underpinning these statistics and to give users a better understanding of their reliability and accuracy.
- Northern Ireland Deaths Background Quality Report | Northern Ireland Statistics and Research Agency – the Background Quality Report for deaths data in Northern Ireland provides a range of information that describes the quality of the data and details any points that should be noted when using the outputs.

Covid-19 Deaths

An adjustment is made in the model for estimating expected deaths to exclude the influence of outlying weeks or months from calculations. Currently the rule for exclusion is where 15% or more of deaths were accounted for by a Covid-19 related cause. A Covid-19 related death is a death where the certifying doctor mentioned Covid-19 as either the underlying cause or a contributory cause of death on the death certificate. Cause of death text is converted to code using the WHO ICD-10 framework. Covid-19 related deaths are identified as all deaths where any of the following the ICD-10 codes appear among the list of causes:

- U07.1 - COVID-19, virus identified
- U07.2 - COVID-19, virus not identified
- U09.9 - Post COVID-19 condition, unspecified
- U10.9 - Multisystem inflammatory syndrome associated with COVID-19, unspecified

The Northern Ireland Deaths Background Quality Report (Northern Ireland Deaths Background Quality Report | Northern Ireland Statistics and Research Agency) gives

more information on how cause of death text is converted to ICD10 codes and the quality assurances involved.

Population

Population estimates for Northern Ireland are produced and published by part of the Census team in NISRA. Estimates are based on the count from the preceding Census and take into account a range of data from administrative sources (such as births, deaths and migration) to 'roll forward' the census total at the mid-point for each year. Population estimates are based on a well-established methodology and are widely used as a key metric to plan for service development and delivery among other things.

The following documents detail the quality of the data, and the processes involved:

- Population Estimates and Projections Data Quality Document | Northern Ireland Statistics and Research Agency
- Population Estimates and Projections Data Flow Diagram | Northern Ireland Statistics and Research Agency

For years, where a mid-year estimate of the Northern Ireland population is not available, population projections are used instead. National population projections (NPPs) by sex and single year of age are produced for the UK and each of the UK constituent countries by the Office for National Statistics (ONS), and again are based on well-established methods. National projections provide an estimate of the future size and age structure of the population of Northern Ireland. The following link is to the report on Quality and Methodology Information (QMI) for population projections.

- National population projections QMI - Office for National Statistics