Impact of death certification reform – week 45 of 2024

Background

The CMI mortality monitor uses provisional weekly deaths data published by the Office for National Statistics (ONS). The ONS publishes data on both an "occurrences basis", which assigns deaths to weeks based on when deaths occurred, and a "registrations basis", which assigns deaths to weeks based on when deaths were registered.

The CMI mortality monitor uses weekly deaths data on a registrations basis, in order to provide timely analysis of emerging mortality data.

Death certification reforms were implemented with effect from 9 September 2024. This note:

- considers the extent to which reforms may have affected delays between deaths occurring and being registered; and
- provides an approximate initial estimate of the potential impact of the reforms on results from the mortality monitor.

Data analysis

Charts A and B are based on ONS data for deaths in England & Wales in weeks 1 to 45 of 2024:

- Chart A shows the number of deaths that were registered in the week of occurrence. e.g. the first bar shows that 2,765 deaths that occurred in week 1 were also registered in week 1.
- Chart B shows the number of deaths that were registered in the week of occurrence or the following week. e.g. the first bar shows that 8,981 deaths that occurred in week 1 were registered in week 1 or week 2.

Chart A: Weekly deaths registered in the week of occurrence

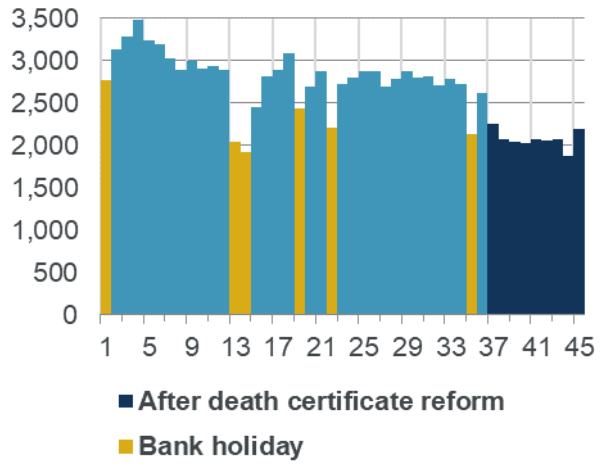

Chart B: Weekly deaths registered in the week of occurrence or the following week

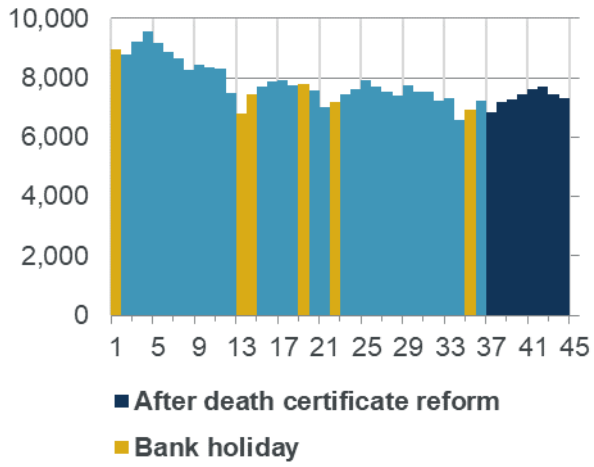

Chart A shows clear signs of increased registration delays following death certification reform. Numbers of deaths registered in the week of occurrence are noticeably lower for all of weeks 37-45 than all earlier weeks in 2024 except where there is a bank holiday. In the absence of reforms, we might have expected deaths in the latest weeks shown to have been higher than in the summer rather than lower.

Chart B suggests, albeit with limited evidence to date, that death certification reform has not had such a noticeable impact on the number of deaths registered within the first two possible weeks.

Potential impact

To assess the potential impact of a change in registration delays, we have constructed a simple model which is described in the appendix.

The model estimates the weekly patterns of delays in death registrations before and after death certificate reform and uses these patterns to estimate the impact on registered deaths.

We note that our analysis should be treated as provisional:

- We do not have data to assess the longer-term impact of death registration reforms on registration patterns and it is not clear whether registration delays have settled into a new steady state.
- We have assumed that longer-term registration delays, of six weeks or more, are unaffected by the reforms. However, while this seems a plausible assumption, small differences in longer-term delays could have a material impact on results.
- We have assumed that the longer delays between the occurrence and registration of deaths will be a permanent feature following the death certification reforms resulting in a “new normal” rather than a temporary strain caused by the change in process.
- We note that changes in registration delays may have varied by age, but we have not allowed for this in our simple model at this stage.

The analysis suggests that:

- While weekly registered deaths were affected in the weeks immediately after death certification reform, the impact on weekly registered deaths should be very small for the latest weeks.
- Cumulative mortality, based on registered deaths, could be around 0.25% lower in 2024 than if the reforms had not been implemented.
- In the absence of further changes to the pattern of registration delays, cumulative mortality, based on registered deaths, in 2025 and later years is likely to be unaffected by the reforms.
- This implies that the mortality improvement based on registered deaths could be around 0.25% higher in 2024 and 0.25% lower in 2025 than if the reforms had not been implemented.

Appendix: Modelling

To assess the potential impact of a change in registration delays, we have constructed a simple model in which:

- death occurrences are constant – with 10,000 in each week; and
- delays in death registrations change following death certificate reform.

Table 1 has three scenarios and shows the proportion of deaths registered by each week.

- For example, for the "previous" scenario, of deaths occurring in week w, 27% of those are registered in week w and 75% are registered in either week w or week $w+1$.
- "Previous" is an estimate broadly based on weeks 3-12 and 24-33 of 2024 – two ten-week periods unaffected by bank holidays.
- "New normal" is our estimate of the position after death certificate reform, based on data for weeks 38 to 45. This is somewhat speculative at this stage and could be refined as more data emerges.
- "Stress" is an illustrative scenario with a longer delay than "new normal".

Table 2 shows the weekly death registrations implied by the same three scenarios.

Table 1: Scenarios for death registrations – cumulative

Description	Week 0	Week 1	Week 2	Week 3	Week 4	Week 5
Previous	27%	75%	87%	90%	91%	92%
New normal	20%	70%	87%	90%	91%	92%
Stress	20%	65%	83%	88%	90%	92%

Table 2: Scenarios for death registrations – weekly

Description	Week 0	Week 1	Week 2	Week 3	Week 4	Week 5	Later
Previous	27%	48%	12%	3%	1%	1%	8%
New normal	20%	50%	17%	3%	1%	1%	8%
Stress	20%	45%	18%	5%	2%	2%	8%

Table 3 shows the results of either the "previous" scenario persisting or transitions from "previous" to one of the other scenarios in "week 1".

The results show that:

- Differences in weekly registered deaths are noticeable in week 1, with both the previous and stress scenarios having 7% fewer deaths in that week.
- Registered deaths return to the usual level (of 10,000 in our simple model) over time:
  - For the "new normal" scenario, registered deaths vary from "previous" for two weeks, as the cumulative deaths are the same for week 2 onwards in the "new normal" and "previous" scenarios.
  - For the "stress" scenario, registered deaths vary from "previous" for five weeks, as the cumulative deaths are the same for week 5 onwards in the "new normal" and "stress" scenarios.
- The impact on annual mortality is relatively small. Under the "new normal" scenario we see 1,200 fewer deaths out of 520,000 – a difference of 0.23%. For the "stress" scenario the difference is 0.46%

Table 3: Hypothetical registered deaths for different scenarios under the simple model

Week	Previous throughout	Previous to new normal	Previous to Stress
-1	10,000	10,000	10,000
0	10,000	10,000	10,000
1	10,000	**9,300**	**9,300**
2	10,000	**9,500**	**9,000**
3	10,000	10,000	**9,600**
4	10,000	10,000	**9,800**
5	10,000	10,000	**9,900**
6	10,000	10,000	10,000
7	10,000	10,000	10,000
8	10,000	10,000	10,000
Total	**100,000**	**98,800**	**97,600**
Change	**-**	**-1,200**	**-2,400**

We can show that for our simple example where occurrences are the same each week, the total difference in deaths from a change in registration pattern can be calculated as the weighted sum of differences in the registration patterns as shown in Table 4:

- "Difference" is the difference between the original and new patterns
- "Weight" is the number of weeks after occurrence
- "Weighted difference" is the product of difference and weight
- The total weighted difference for the "new normal" scenario is -12%, so the total difference in registrations is 12% of one week's occurrences i.e. -12% x 10,000 = -1,200, and the annual difference is -12% ÷ 52 = -0.23%.

Table 4: Calculation of difference in deaths

Description	Week 0	Week 1	Week 2	Week 3	Week 4	Week 5	Later
Previous	27%	48%	12%	3%	1%	1%	8%
New normal	20%	50%	17%	3%	1%	1%	8%
Difference	+7%	-2%	-5%	0%	0%	0%	0%
Weight	0	1	2	3	4	5	6
Weighted difference	0%	-2%	-10%	0%	0%	0%	0%

As an aside, we note that a change in registration pattern has the same impact on total deaths over the period whether it happens instantly or gradually over a number of weeks.

Separately we note that the median time from death to registration, as reported in the provisional weekly deaths data published by the ONS, is 8 days in weeks 38-45 after the death certificate reforms compared to 7 days in weeks 23-37 immediately before the reform. We note that this increase in registration delay of 1 day is equivalent to 0.27% of a year, a similar figure to the 0.23% figure calculated above.

Notes on methods and data

Full details of the methods used for the mortality monitor are included in Working Paper 111. Our analysis is based on Standardised Mortality Rates (SMRs). These adjust the provisional weekly deaths data published by the ONS to control for changes in the size, age and gender distribution of the population over time. We note that mortality rates and mortality improvements vary by age, and the results shown are sensitive to the age distribution of the chosen standard population (the 2013 European Standard Population).

This note shows how our calculations, which rely on data for registered deaths, may be affected by death certificate reform. We are also conscious that during the pandemic deaths may have been registered earlier or later than in previous years. Consequently, comparisons of mortality between years during the pandemic and earlier years may not be on a like-for-like basis. Also, results for individual weeks may not be consistent between years due to the timing of public holidays.

Use of this document

The CMI disclaims any liability from use of or reliance on these calculations, including in relation to financial transactions such as longevity swaps; and the CMI does not guarantee that it will continue to publish updates. Please also see the reliances and limitations, disclaimer, and copyright notice on the final page of this document.

TAS compliance

This paper is intended to illustrate the impact of death certificate reforms on results from the CMI mortality monitor. The paper is intended for use by actuaries and other parties interested in detailed mortality statistics and is for information only.

The paper complies with the principles in the Financial Reporting Council's Technical Actuarial Standard "TAS 100: General Actuarial Standards". Any person using this paper should exercise judgement over its suitability and relevance for their purpose.

Reliances and limitations

The purpose of the weekly mortality monitor is to provide regular updates on standardised mortality in England & Wales during the coronavirus pandemic, adjusting ONS data to allowing for changes in the size and age of the population.

The mortality monitor reports on all-cause, COVID-19, and influenza and pneumonia mortality. It does not offer any view on other causes of death or reasons for changes in mortality rates.

The CMI aims to produce high-quality outputs and takes considerable care to ensure that the mortality monitor and the accompanying spreadsheet of results are accurate. However:

- We cannot guarantee their accuracy (see the Disclaimer).
- There is a reliance on the data published by the ONS which is described as "provisional". We are unable to quantify the impact on the results of the monitor of any future revisions to provisional data.
- We have also applied judgement and assumptions in deciding on the calculation methods and the presentation of results.
- Anyone using the results of the mortality monitor should ensure that it is appropriate for their particular use and note that care is needed when estimating full year experience from partial year experience. This is particularly true during the coronavirus pandemic.
- Population estimates for the latest years reflect our own estimates and are less certain than published ONS figures for earlier years.

Continuous Mortality Investigation Limited ("CMI") is registered in England & Wales
Company number: 8373631
Registered Office: 1-3 Staple Inn Hall, High Holborn, London, WC1V 7QJ

Correspondence address: Two London Wall Place, 123 London Wall, London, EC2Y 5AU
Email: info@cmilimited.co.uk
Tel: 020 7776 3820

Website: www.cmilimited.co.uk (redirects to www.actuaries.org.uk)

Continuous Mortality Investigation Limited is wholly owned by the Institute and Faculty of Actuaries.