COVID-19 Weekly Excess Deaths
Health Inequalities Briefing
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Introduction

An expected rise in deaths has been observed in Scotland since the beginning of the COVID-19 pandemic. However, about a quarter of the excess deaths between the beginning of the pandemic and the week beginning 1 June 2020 have not been directly due to COVID-19. There are a number of possible reasons for this excess in non-COVID-19 deaths:

1. **Artefact**: deaths directly due to COVID-19 that have not been certified as such.

2. **Unintended consequences (social determinants)**: deaths are due to unintended consequences of the non-clinical responses to COVID-19.

3. **Service supply/access**: deaths due to problems with health and social care service access.

4. **Service demand**: deaths of individuals not presenting to health and social care services as they would at other times.

5. **Other**: other causes that have not yet been identified.

Aims

The aims of this report are to measure inequalities in all-cause, COVID-19 and non-COVID-19 mortality in 2020 by week; and to compare the inequality gaps for all-cause and non-COVID-19 deaths to the equivalent weekly average for the previous five years (2015-19).

Methods

We used death register data and small area population estimates provided by National Records for Scotland (NRS) to calculate directly age-sex standardised all-cause, COVID-19 and non-COVID-19 mortality rates by Scottish Index of Multiple Deprivation (SIMD2020) for weeks 1 to 23 of 2020 (30 December 2019 to 7 June 2020) against a pooled average for the previous five years (2015-19). Standardising rates in this way allows us to make comparisons that are not biased by differences in the age distribution of the Scottish population. Deaths in our analysis are classified as COVID-19 only where the underlying cause of death was certified as COVID-19 (ICD-10 code U07). It does not include deaths where COVID-19 is listed as a contributory factor. This is in line with the excess deaths analysis already undertaken by NRS as it prevents double counting if other specific causes of deaths are to be included in future analysis. In 94% of deaths where COVID is mentioned, it is the underlying cause.

We then used these rates to calculate the absolute and relative gap between the most and least deprived SIMD2020 quintile per week. The absolute gap was calculated by subtracting...
the least deprived quintile’s rate from that of the most deprived quintile. The relative gap was calculated by dividing the absolute gap by the rate for the least deprived quintile, and then converting into a percentage difference.
Main Points
This report compares age-sex standardised all-cause, COVID-19 and non-COVID-19 mortality rates by Scottish Index of Multiple Deprivation (SIMD2020) for weeks 1 to 23 of 2020 (30 December 2019 to 7 June 2020) against a pooled average for the same period in the previous five years (2015-19).

Overall mortality trends
• The first COVID-19 deaths in Scotland were recorded in the week commencing 16 March 2020. Two weeks later (week commencing 30 March 2020) the mortality rate was markedly higher than in the preceding five years, and it peaked the following week (week commencing 6 April 2020) at about double the average historic rate.
• Both COVID-19 and non-COVID-19 deaths contributed to this excess mortality.
• The subsequent decline in all-cause mortality has been slower than the initial rise, with all-cause mortality rates only returning to within the historic range in the most recent week included in this analysis (week commencing 1 June 2020).

Absolute inequalities
• All-cause mortality rates for each deprivation category followed the overall mortality rate trend over the study period.
• This led to a doubling of the absolute gap between most and least deprived categories in early-April followed by a slower narrowing, with the absolute gap returning to within the historic range since the week commencing 18 May 2020.
• While inequalities have narrowed to within the historical range since the early-April peak, this should be seen within the context of Scotland historically having some of the widest health inequalities in Europe6.

Relative inequalities
• Relative inequalities in weekly all-cause mortality rates did not show such a clear trend over time. This is at least in part due to the relative gap being sensitive to changes in the overall rate.
• However, over the whole period since the first certified COVID-19 death in Scotland, larger relative inequalities have been observed for COVID-19 deaths than for non-COVID-19 deaths.
• An excess of both COVID-19 and non-COVID-19 deaths have contributed to increased absolute inequality in weekly all-cause mortality in Scotland between April and May 2020.
• The relative gap between the least and most deprived areas was greater for COVID-19 deaths than for non-COVID-19.

6 https://www.scotpho.org.uk/comparative-health/health-inequalities/data/international-comparisons/
Implications for research

This analysis could be extended to include other specific causes of death and other dimensions of inequality (for example, urban/rural dimensions). It is also suggested that further analysis would be helpful to establish the extent to which migration into care homes\(^7\) could account for inequalities in mortality. In addition, further research would be beneficial to:

1. **Clarify underlying causes** of the excess non-COVID-19 deaths.
2. **Quantify the unintended population health impacts** of the non-clinical responses to COVID-19 (utilising both ad-hoc modelling and post-hoc evaluation).

Implications for policy

Although this further research would be beneficial to fully understand the excess mortality observed in Scotland during the COVID-19 pandemic period and its implications for health inequalities, there are policy actions that should be prioritised based on the evidence currently available:

1. Messages from government and the NHS should **continue to make clear that the NHS remains open** and should be used to meet health care needs.
2. Health boards should **ensure that health care services remain in place and accessible for all** those who may need them in the face of additional demands on services.
3. **Social mitigation efforts to reduce the unintended consequences of the social distancing measures should continue and be intensified.** In particular, actions to reduce income insecurity should be prioritised as a means of addressing the fundamental causes of health inequality.

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\(^7\) This would be to investigate potential limitations of using area-based deprivation measures based post code of residence at time of death.
Results and Commentary

All-cause deaths

Age-sex standardised rate

The first COVID-19 deaths in Scotland were recorded in the week commencing 16 March 2020. Two weeks later (week commencing 30 March 2020) the mortality rate was markedly higher than in the preceding five years. The highest recorded rate was 40.0 per 100,000 population in week 15 (week commencing 6 April 2020) (Figure 1). The all-cause mortality rate in week 23 of 2020 (week commencing 1 June 2020) was 21.8 per 100,000 population, compared with an average of 21.3 per 100,000 population in the equivalent week for 2015-19. The shaded ribbon on Figure 1 represents the historic minimum and maximum weekly rates between 2015 and 2019.

Age-sex standardised rate by area deprivation quintile

Figure 2 presents all-cause mortality rates for 2020 by week and Scottish Index of Multiple Deprivation (SIMD2020) quintile. The shaded ribbon on Figure 2 represents the range in weekly rates by quintile observed between 2015 and 2019. All-cause mortality rates for each deprivation quintile followed the overall mortality rate trend over the study period.

Absolute gap between most and least deprived areas

The highest recorded absolute gap was 30.7 per 100,000 population in week 15 (Figure 3). The absolute gap between the most and least deprived SIMD2020 quintiles in week 23 was 11.9 per 100,000 population, compared with an average of 14.6 per 100,000 population in the equivalent week for 2015-19. The shaded ribbon on Figure 3 represents the historic absolute minimum and maximum weekly deprivation gap between 2015 and 2019.

Percentage difference between most and least deprived areas

The percentage difference between the most and least deprived SIMD2020 quintiles in week 23 was 72%, compared with an average of 95% in the equivalent week for 2015-19 (Figure 4). The shaded ribbon on Figure 4 represents the historic minimum and maximum weekly percentage differences between 2015 and 2019.

Key points

Despite reductions to the all-cause mortality rate from its peak in week 15, the overall rate remained substantially higher than the historic maximum for 2015-19 and only returned to within the historic range in week 23. Absolute inequalities in all-cause mortality remained wider than would be expected based on data from the previous five years, and only returned to within the historic range in week 21. Relative inequalities in weekly all-cause mortality rates have largely remained within the expected historical range.
Figure 1: All-cause mortality rate, 2020 vs. 2015-19 pooled average 1,2,3

Source: National Records of Scotland.
Weekly age-sex standardised rate.
Shading shows range of 2015-19 rates.

Figure 2: All-cause mortality rate by deprivation, 2020 4,5,6

Source: National Records of Scotland.
Age-sex standardised rate per 100,000 population by week and SIMD 2020 quintile.
Shading shows range of quintile rates between 2015 and 2019.
Figure 3: Absolute gap in all-cause mortality rate between most and least deprived areas, 2020 vs. 2015-19 pooled average.\textsuperscript{7,8,9,10}

Figure 4: Percentage difference in all-cause mortality rate between most and least deprived areas, 2020 vs. 2015-19 pooled average.\textsuperscript{11,12,13,14}

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7. Source: National Records of Scotland.
8. Percentage difference is absolute gap multiplied by 100 divided by rate in least deprived areas.
9. Age-sex standardised rates per 100,000 population by week.
10. Age-sex standardised rates per 100,000 population by week.
13. Percentage difference is absolute gap multiplied by 100 divided by rate in least deprived areas.
14. Age-sex standardised rates per 100,000 population by week.

**COVID-19 deaths**

**Age-sex standardised rate**

The highest COVID-19 death rate recorded in Scotland since the start of the pandemic was 13.4 per 100,000 population (week 16; commencing 13 April 2020) (Figure 5). The COVID-19 mortality rate in week 23 of 2020 (week commencing 1 June 2020) was 1.5 per 100,000 population, compared with 2.3 per 100,000 population in week 22.

**Age-sex standardised rate by area deprivation quintile**

Figure 6 presents COVID-19 mortality rates for 2020 by week and SIMD2020 quintile.

**Absolute gap between most and least deprived areas**

The largest absolute gap in COVID-19 death rates between the most and least deprived SIMD2020 quintiles so far in 2020 was 12.6 per 100,000 population in week 15 (commencing 6 April 2020) (Figure 7). The absolute gap between the most and least deprived SIMD2020 quintiles in week 23 was 1.4 per 100,000 population, compared with 0.8 per 100,000 population in week 22.

**Percentage difference between most and least deprived areas**

The largest percentage difference in COVID-19 deaths between the most and least deprived SIMD2020 quintiles was 192% in week 15. In other words, in week 15 COVID-19 mortality rates were 2.9 times higher in the most deprived areas than in the least deprived areas (Figure 8). The percentage difference between the most and least deprived SIMD2020 quintiles in week 23 was 181%, compared with 32% in week 22.

**Key points**

The highest recorded age-sex standardised rate for COVID-19 mortality at the time of writing was in week 16 of 2020, with a subsequent reduction each week. Absolute and relative inequalities in COVID-19 mortality have also narrowed since week 16, but there is evidence that they are starting to widen again.
Figure 5: COVID-19 mortality rate, 2020\textsuperscript{15,16}

![COVID-19 mortality rate graph](image)


Figure 6: COVID-19 mortality rate by deprivation, 2020\textsuperscript{17,18}

![COVID-19 mortality rate by deprivation graph](image)

19. Age-sex standardised rate per 100,000 population by week and SIMD 2020 quintile.
Figure 7: Absolute gap in COVID-19 mortality rate between most and least deprived areas, 2020\textsuperscript{19,20,21}

21. Absolute gap is rate in most deprived areas minus rate in least deprived areas.
22. Age-sex standardised rates per 100,000 population by week; 2020.

Figure 8: Percentage difference in COVID-19 mortality rate between most and least deprived areas, 2020\textsuperscript{22,23,24}

24. Percentage difference is absolute gap multiplied by 100 divided by rate in least deprived areas.
25. Age-sex standardised rates per 100,000 population by week; 2020.
Non-COVID-19 deaths

**Age-sex standardised rate**

The highest recorded weekly non-COVID-19 mortality rate so far in 2020 was 31.1 per 100,000 population in week 2 (commencing 6 January 2020), which was within the historical range for that week (Figure 9). The highest non-COVID-19 mortality rate since the first registered COVID-19 death in Scotland was 29.7 per 100,000 population in week 14 (commencing 30 March 2020). The non-COVID-19 mortality rate in week 23 of 2020 (week commencing 1 June 2020) was 20.3 per 100,000 population, compared with an average of 21.3 per 100,000 population in the equivalent week for 2015-19. The shaded ribbon on Figure 9 represents the historic minimum and maximum weekly rates between 2015 and 2019.

**Age-sex standardised rate by area deprivation quintile**

Figure 10 presents non-COVID-19 mortality rates for 2020 by week and SIMD2020 quintile. The shaded ribbon on Figure 10 represents the historic minimum and maximum weekly rates by quintile between 2015 and 2019.

**Absolute gap between most and least deprived**

The largest absolute gap so far in 2020 was 22.2 per 100,000 population in week 2 (Figure 11). The absolute gap between the most and least deprived SIMD2020 quintiles in week 23 was 10.5 per 100,000 population, compared with an average of 14.6 per 100,000 population in the equivalent week for 2015-19. The shaded ribbon on Figure 11 represents the minimum and maximum weekly absolute gap between 2015 and 2019.

**Percentage difference between most and least deprived**

The largest percentage difference so far in 2020 was 120% in week 18 (Figure 12). The percentage difference between the most and least deprived SIMD2020 quintiles in week 23 was 67%, compared with an average of 95% in the equivalent week for 2015-19.

**Key points**

The highest rate for non-COVID-19 mortality since the first COVID-19 death was certified in Scotland was recorded in week 14 and the rate has since reduced to similar levels to the previous five years. The absolute gap in non-COVID-19 deaths has also narrowed and was lower than the historic range by week 21. Relative inequalities in all-cause mortality are within the expected historical range.
Figure 9: Non-COVID-19 mortality rate, 2020 vs. 2015-19 pooled average

Figure 9: Non-COVID-19 mortality rate, 2020 vs. 2015-19 pooled average

25,26,27

Figure 10: Non-COVID-19 mortality rate by deprivation, 2020

28,29,30

27. Weekly age-sex standardised rate.

Figure 10: Non-COVID-19 mortality rate by deprivation, 2020

30. Age-sex standardised rate per 100,000 population by week and SIMD 2020 quintile.
Figure 1: Absolute gap in non-COVID-19 mortality rate between most and least deprived areas, 2020 vs. 2015-19 pooled average\textsuperscript{31,32,33}

\begin{figure}
\centering
\includegraphics[width=\textwidth]{figure1}
\caption{Figure 1: Absolute gap in non-COVID-19 mortality rate between most and least deprived areas, 2020 vs. 2015-19 pooled average.}
\end{figure}

\textsuperscript{32.} Source: National Records of Scotland.
\textsuperscript{33.} Absolute gap is rate in most deprived areas minus rate in least deprived areas.
\textsuperscript{34.} Age-sex standardised rates per 100,000 population by week.

Figure 12: Percentage difference in non-COVID-19 mortality rate between most and least deprived areas, 2020 vs. 2015-19 pooled average\textsuperscript{34,35,36,37}

\begin{figure}
\centering
\includegraphics[width=\textwidth]{figure12}
\caption{Figure 12: Percentage difference in non-COVID-19 mortality rate between most and least deprived areas, 2020 vs. 2015-19 pooled average.}
\end{figure}

\textsuperscript{35.} Source: National Records of Scotland.
\textsuperscript{36.} Percentage difference is absolute gap multiplied by 100 divided by rate in least deprived areas.
\textsuperscript{37.} Age-sex standardised rates per 100,000 population by week.
\textsuperscript{38.} Shading shows range of percentage differences between 2015 and 2019.
Comparison of percentage difference from the least deprived quintile (weeks 12-23, 2020)

Relative health inequalities are sensitive to changes in the overall mortality rate, which may explain the lack of a clear trend in the relative gaps derived from weekly rates. To provide further insight into relative health inequality since the first certified COVID-19 death in Scotland we combined weeks 12 to 23 (16 March 2020 to 7 June 2020) to produce age-standardised rates for COVID-19 and non-COVID-19 mortality by SIMD2020. Figure 13 presents the percentage difference for quintiles 1-4 compared to quintile 5 (the least deprived) for both COVID-19 and non-COVID-19 deaths. For all quintiles apart from Quintile 3 the percentage difference from the least deprived quintile is higher for COVID-19 mortality than for non-COVID-19 mortality. The difference by cause of death was greatest for the two most deprived quintiles. In the most deprived quintile the COVID-19 mortality rate in this period was 110% higher (that is, 2.1 times higher) than that in the least deprived areas, compared with 87% (1.9 times higher) for non-COVID-19 deaths.

Figure 13: Mortality rates as a percentage difference from the least deprived areas, by cause of death

![Mortality rates as a percentage difference from the least deprived areas, by cause of death](image)

40. Percentage difference is the difference in mortality rate multiplied by 100 and divided by rate in least deprived areas.
41. Age-sex standardised rates per 100,000 population, for deaths occurring between 16 Mar 2020 and 7 June 2020.
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Further information and data for this publication are available from the publication page on our website.

Open data

Data from this publication is available to download from the Scottish Health and Social Care Open Data Portal.

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Appendices

Appendix 1 – Early access details

Pre-Release Access

Under terms of the "Pre-Release Access to Official Statistics (Scotland) Order 2008", PHS is obliged to publish information on those receiving Pre-Release Access ("Pre-Release Access" refers to statistics in their final form prior to publication). The standard maximum Pre-Release Access is five working days. Shown below are details of those receiving standard Pre-Release Access.

Standard Pre-Release Access:
Scottish Government Health Department
NHS Board Chief Executives
NHS Board Communication leads
Appendix 2 – PHS and Official Statistics

About Public Health Scotland (PHS)

PHS is a knowledge-based and intelligence driven organisation with a critical reliance on data and information to enable it to be an independent voice for the public’s health, leading collaboratively and effectively across the Scottish public health system, accountable at local and national levels, and providing leadership and focus for achieving better health and wellbeing outcomes for the population. Our statistics comply with the Code of Practice for Statistics in terms of trustworthiness, high quality and public value. This also means that we keep data secure at all stages, through collection, processing, analysis and output production, and adhere to the ‘five safes’.