

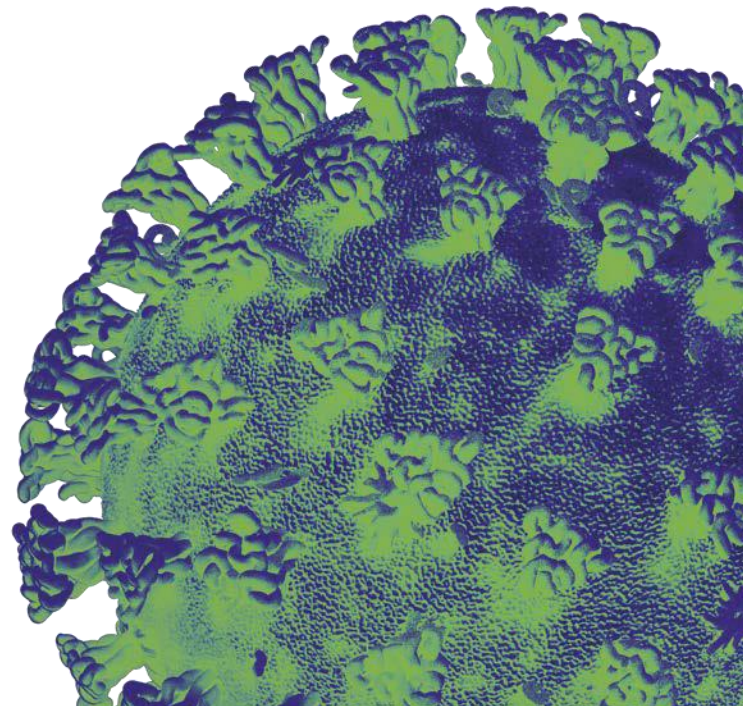
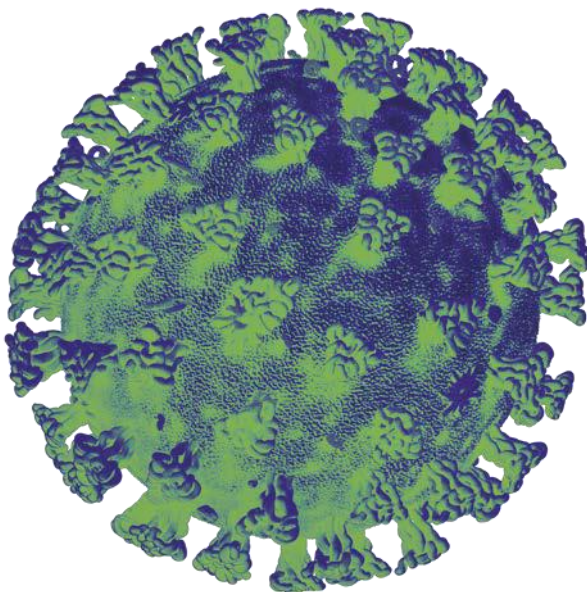
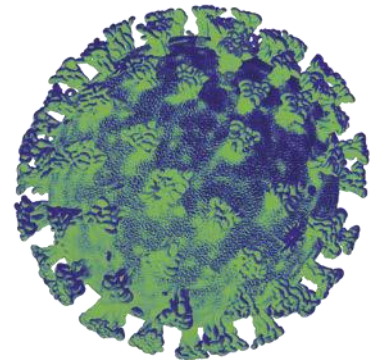


Llywodraeth Cymru
Welsh Government

Technical Advisory Group

Examining Deaths in Wales Associated with COVID-19

30 March 2022



Examining Deaths in Wales associated with COVID-19

Introduction

The first deaths involving COVID-19 in Wales were registered in March 2020. Previously, as the first period of the COVID-19 pandemic subsided in July 2020, we looked back at the data for us to learn from the loss of life that the virus had brought¹. As the second period of the pandemic drew to a close in March 2021, we looked at comparisons between the first and second periods². A third period of the pandemic hit in autumn 2021 and is still in progress; however, vaccines, boosters and lower intrinsic severity of Omicron have meant a lower case fatality ratio from COVID-19 over time³. This report looks at deaths in Wales from the start of the pandemic to the end of 2021, compares the three main periods, and includes some UK comparisons.

Key findings

- The number of deaths in 2020, and to a lesser extent 2021, was well above average.
- There have been some differences in the pattern of deaths seen in the three peak periods of the pandemic. The first period saw the sharpest increase, and included the week with the highest number of excess deaths. The second period saw a more gradual increase, but lasted for a longer period, and included the week with the most deaths involving COVID-19. The third period has to date seen a sustained increase but at a lower level and without the sharp peaks of both the first and second periods.
- Over the course of the pandemic so far, Wales has experienced lower levels of excess deaths than some parts of the UK. However this is largely due to lower levels in Wales during period 1, with less difference seen subsequently.

Data

There are two main sources of COVID-19 mortality statistics:

- rapid mortality surveillance data produced by Public Health Wales (PHW). This is available very quickly and gives an early indication of the overall trend of COVID-19 deaths, predominantly from hospitals.
- data produced by the Office for National Statistics (ONS), based on information collected on the death certificate. This takes longer to prepare but is more comprehensive as it includes all deaths where COVID-19 was mentioned on the death certificate, and deaths in all settings.

Further information on the differences between both sources are explained in the Chief Statistician's [blog](#).

¹ [Technical Advisory Group: examining deaths in Wales associated with COVID-19 | GOV.WALES](#)

² [Technical Advisory Group: examining deaths in Wales associated with COVID-19 24 March 2021 | GOV.WALES](#)

³ [Mortality Risk of COVID-19 - Our World in Data](#)

Understanding the data

There are a number of ways to measure and explain the impact from COVID-19 in terms of mortality. We can use total numbers of deaths involving COVID-19, but this is a crude measure that does not offer much granularity of information. Instead, we can select a proportional measure of comparison, like deaths per 100,000 people. This does not take into account the vulnerability of a population to COVID-19 infection. We still need to consider the differences in demographics to understand the true effect of this coronavirus. We can also use “age-standardised mortality rates”. These are a better comparative measure of mortality between areas than the number of deaths, as they account for the population size and age structure. However they do not capture or account for the range of other potential demographic factors and indirect impacts of the pandemic.

This paper will generally focus on excess deaths, which is a key measure of quantifying the number of deaths in a given year.

Definitions

Throughout this paper we refer to specific terminology to explain mortality and COVID-19 related mortality. The section below explains how these are defined. The report primarily uses ONS data about death registrations, based on the date the death was registered.

Excess deaths

This refers to the difference between the number of deaths registered over a set time, compared with the average number of deaths for the same time period over the previous five years⁴. A positive value means that we are seeing more deaths than the historical average, with a negative value showing fewer deaths (i.e. no excess).

Excess deaths help understand the total picture of mortality during the pandemic, as they also take into account indirect impacts of the coronavirus pandemic (these could potentially include things such as fewer deaths from road accidents, or more deaths due to delayed access to healthcare).

However, in making comparisons with a historic average, excess deaths do not take account of population change, and with our growing and ageing population we might expect to see some gradual increase in deaths even if rates remained constant.

Deaths involving/not involving COVID-19

Deaths involving refer to where COVID-19 was mentioned anywhere on the death certificate as a contributory cause of death. Deaths not involving refer to where COVID-19 was not mentioned anywhere on the death certificate as a contributory cause of death.

Deaths due to COVID-19

These refer to where COVID-19 was identified as the underlying (main) cause of death on the death certificate. Up to the end of December 2021, 87% of registered

⁴ For 2021, the 5-year average for 2015-19 was again used to give a comparison period not affected by the pandemic.

deaths involving COVID in Wales were due to COVID-19⁵. Many deaths due to COVID-19 also had other pre-existing conditions reported on their death certificate – up to the end of December 2021 this applied to 83% of such deaths⁶. A similar occurrence is also seen for many other causes of death⁷.

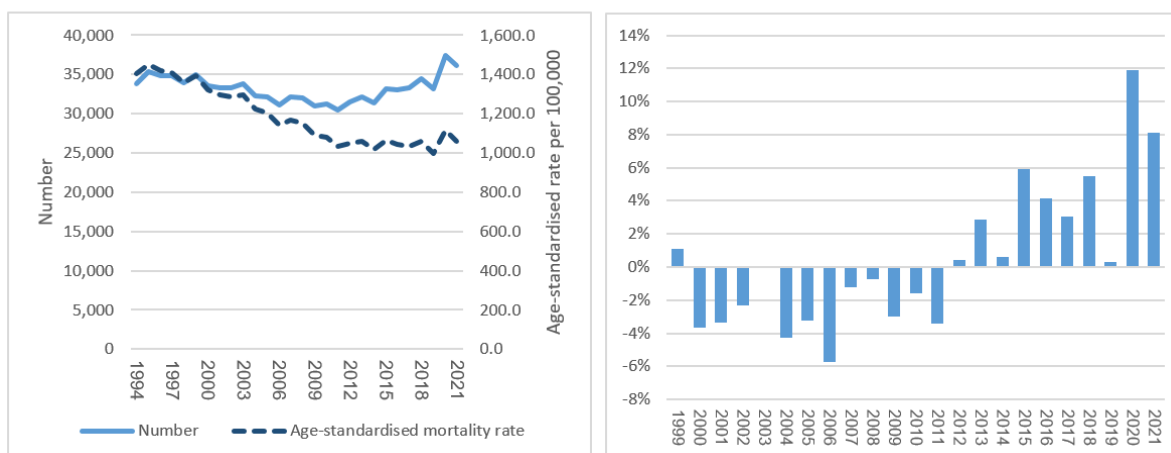
Analysis of Excess Deaths in Wales

Deaths in 2020 and 2021 in context

To put deaths during the pandemic into a longer term context, we can look at the historic pattern of deaths in recent decades. Figure 1 shows that the number and age-standardised rate of deaths decreased between 1994 and 2011. Numbers then increased gradually prior to a sharp increase for 2020, before falling back slightly for 2021 (while still being higher than those seen in 2019). Age-standardised rates were broadly stable for the period since 2011 (the difference between numbers and rates shows the impact of our growing and ageing population) prior to an increase for 2020, dropping slightly for 2021 but remaining above 2019 levels. Excess deaths generally fluctuate from year to year – they were mostly at or below average for the first decade of the 2000s and above average since, but stayed within +/- 6% of the annual 5-year average until 2020, which saw an excess death rate of 12%. 2021 also saw high numbers of excess deaths (with an excess death rate of 8% compared with 2015-19), but not as high as those in 2020.

Figure 1: Deaths, 1994 to 2021

Number of deaths and age-standardised mortality rate, 1994-2021 Excess deaths %, 1999-2021



Source: [Office for National Statistics](#) and [Office for National Statistics](#)

Deaths in Wales during the pandemic to date

Figure 2 shows the number of registered deaths from all causes, and of which those involving COVID-19, in 2020 and 2021. To contextualise this information we also

⁵ [Monthly mortality analysis, England and Wales - Office for National Statistics \(ons.gov.uk\)](#)

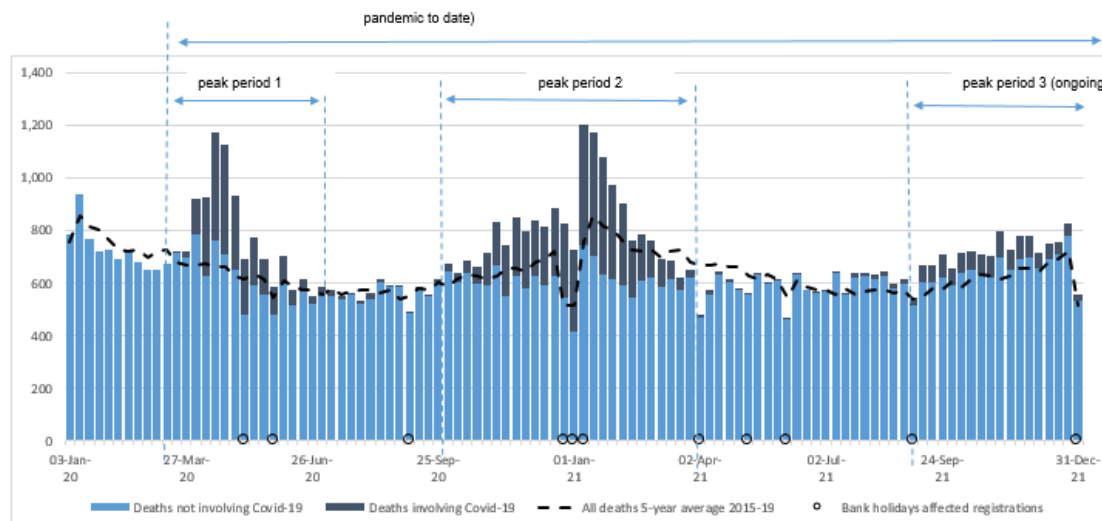
⁶ [Pre-existing conditions of people who died due to COVID-19, England and Wales - Office for National Statistics](#)

⁷ [Dementia and Alzheimer's disease deaths including comorbidities, England and Wales - Office for National Statistics \(ons.gov.uk\)](#)

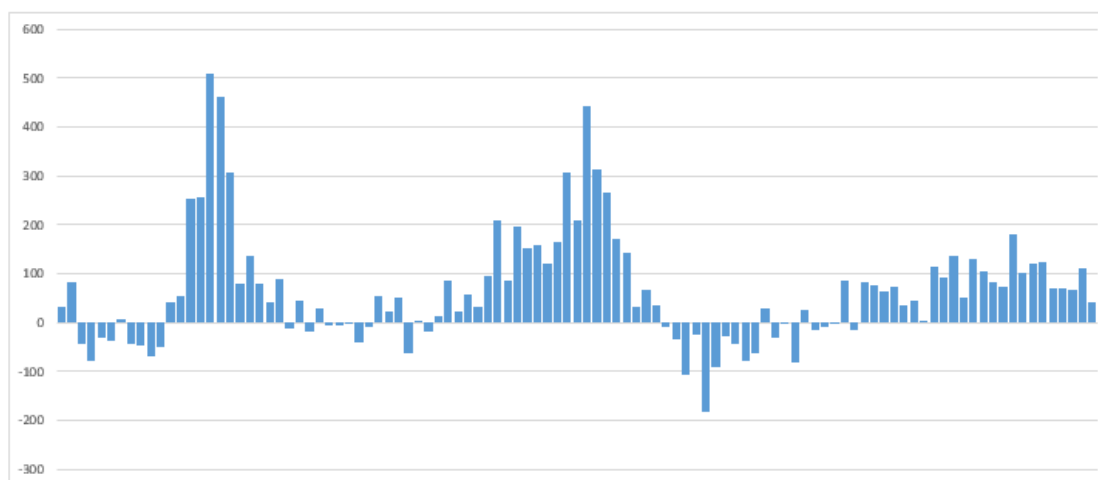
show the 5-year average to understand how the pandemic deviates from years gone by. Note that when comparing 2021, the five-year average continues to be 2015-19 in order compare to a period not affected by the pandemic.

Figure 2: Weekly registered deaths, January 2020 to 31 December 2021

Number of deaths registered by week in Wales, January 2020-31 December 2021



Number of excess deaths registered by week in Wales, January 2020-31 December 2021



Source: [Office for National Statistics](#)

Deaths in Wales were generally below average from early 2020 up until around mid-March. As the COVID-19 pandemic began, the number of deaths increased sharply, with excess deaths reaching their first peak in mid-April 2020. Deaths subsequently declined and returned to about average levels from early July 2020. Deaths involving COVID-19 followed a broadly similar pattern. For the purpose of this analysis, the first period of interest is therefore defined as Week 11 to Week 27 2020 (from 7 March to 3 July 2020).

From July until late September 2020, deaths were broadly similar to average, and the numbers of deaths involving COVID-19 were low. From late September 2020 the number of deaths involving COVID-19 started to increase again, with the number of

deaths also rising above average. A sustained period of above average deaths followed, reaching their second peak in early January 2021 before returning to more usual levels in March 2021. Again, deaths involving COVID-19 followed a broadly similar pattern, although taking slightly longer to return to low levels. For the purpose of this analysis, the second period of interest is therefore defined as Week 40 2020 to Week 12 2021 (from 26 September 2020 to 26 March 2021) – the end of this second period includes a short time when although excess deaths had returned to more usual levels, deaths involving COVID-19 were still slightly fairly high.

From March to early September 2021 deaths were generally at or below average levels (including several weeks below average between March and July, although this was not enough to offset the high levels seen earlier in the pandemic), and there were relatively few deaths involving COVID-19. From early September 2021, the number of deaths involving COVID-19 and the number of excess deaths again began to increase, with this increase sustained until the end of the year, albeit at a lower level than the first two periods. This third period was still ongoing at the end of December 2021 and so we don't yet have a full picture, however there are signs of decline. For the purpose of this analysis, the third period of interest is therefore defined as Week 35 to Week 52 2021 (from 28 August to 31 December 2021). This period likely does not capture mortality following the Omicron wave, where prevalence peaked in early January 2022.

This analysis will consider registered deaths for the pandemic period so far (week starting 7 March 2020 to 31 December 2021), as well as for three distinct periods identified above (the third period, and the pandemic, is still ongoing and so the picture may change). It will consider differences between these three periods, and also look at the pandemic as a whole to date. Note there is a gap between the three periods, therefore the average of these will not equal the total pandemic period. The dates used within this report provide a general overview of the three main mortality periods of the pandemic to date, but they should be treated as indicative rather than absolute dates, as different areas will have experienced peaks at different time periods. Table 1 summarises the number of excess deaths and deaths involving COVID-19 for the pandemic period.

There have been some differences in the pattern of deaths seen in these three peak periods. The first period saw the sharpest increase, and included the week with the highest number of excess deaths. The second period saw a more gradual increase, but lasted for a longer period, and included the week with the most deaths involving COVID-19. The third period has to date seen a sustained increase but at a lower level and without the sharp peaks of both the first and second periods. This was the first period of interest after the main rollout of the vaccination programme, with reports suggesting vaccines offer high levels of protection against mortality⁸. A pattern of lower excess mortality during the 3rd period was also seen in England.

⁸ [COVID-19 vaccine surveillance report - week 1 \(publishing.service.gov.uk\)](https://www.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/1014217/covid-19-vaccine-surveillance-report-week-1.pdf)

Table 1: Summary of deaths 7 March 2020 to 31 December 2021

Pandemic period	Dates	Excess deaths (percentage)	Excess deaths (number)	Deaths involving COVID-19 (number)
Pandemic to date*	7 March 2020 to 31 December 2021	11.7	6,987	9,176
Peak period 1	7 March 2020 to 3 July 2020	21.5	2,295	2,455
Peak period 2	26 September 2020 to 26 March 2021	17.9	3,180	5,194
Peak period 3 to date	28 August 2021 to 31 December 2021	14.9	1,659	1,195

*Pandemic to date is based on all deaths between 7 March 2020 and 31 December 2021.

It is not the sum of the 3 peak periods as it includes the gaps between these 3 periods

Source: [Office for National Statistics](#)

Excess deaths by UK country, regions and within Wales

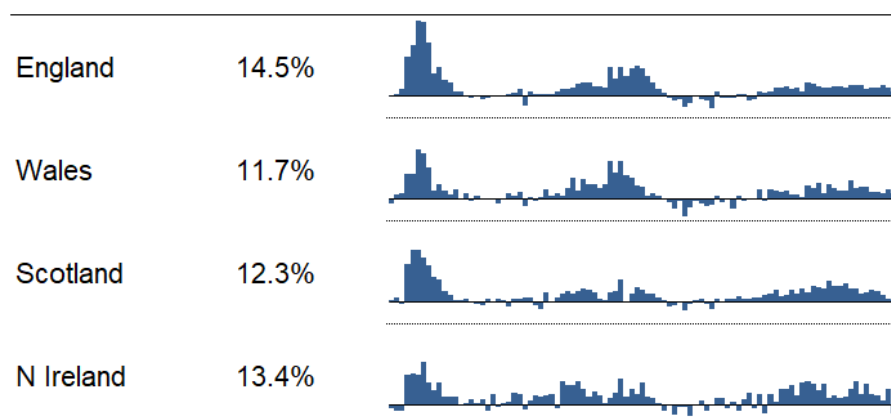
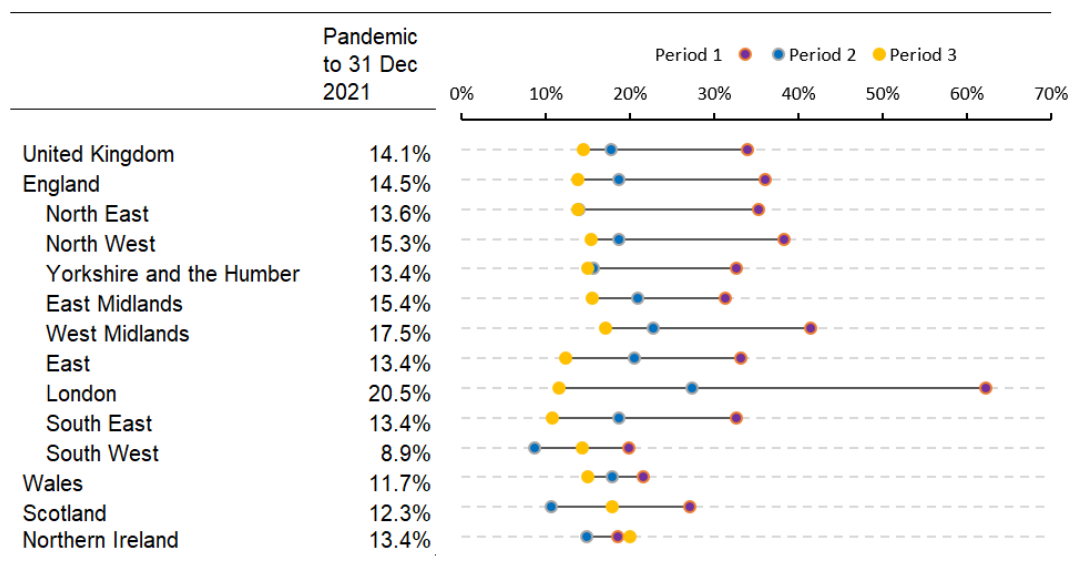
UK Countries and English Regions

Figure 3 shows weekly excess death rates for the 4 UK countries during the pandemic – it shows that different areas experienced different patterns, with peaks at different times. Figure 4 shows a comparison of excess deaths between Wales and the other UK countries and English regions for the pandemic to date and the 3 periods of interest. Note that the 3 periods of interest are defined based on the pattern of deaths in Wales - these do not necessarily reflect patterns elsewhere, so there are some limitations to the comparisons as they are only covering selective periods. Information for the full pandemic period to date is also shown, which is less affected by differences in the timing and shape of peaks, and also includes the gaps between the peaks.

Overall, since the start of the pandemic to date, Wales has seen a slightly lower proportion of excess deaths than the other UK countries¹⁰ – however, this pattern does vary between the three peak periods of the pandemic. England, and in particular London, saw much higher rates during the first period, however there was less difference for the second and third periods, with England having (to date) the lowest rate for the third period. It's also worth noting that although overall excess death rates were relatively low in Wales, when looking at age-standardised mortality rates for deaths involving COVID-19, Wales (along with England) had higher rates than Scotland and Northern Ireland for the 22 month period March 2020 to December 2021⁹.

Comparing with English regions, for the pandemic to date Wales has a lower proportion of excess deaths than all regions except the South West – this is mainly due to relatively low levels during the first peak period, with less difference for the second and third periods.

⁹ [Deaths involving COVID-19 by month of registration, UK - Office for National Statistics \(ons.gov.uk\)](#)

Figure 3¹⁰: Weekly excess deaths by UK country, 7 March 2020 to 31 December 2021Figure 4¹⁰: Excess deaths by UK country and English region, 7 March 2020 to 31 December 2021

Source: [Office for National Statistics](#) and [National Records of Scotland and Northern Ireland Statistics and Research Agency](#)

European countries

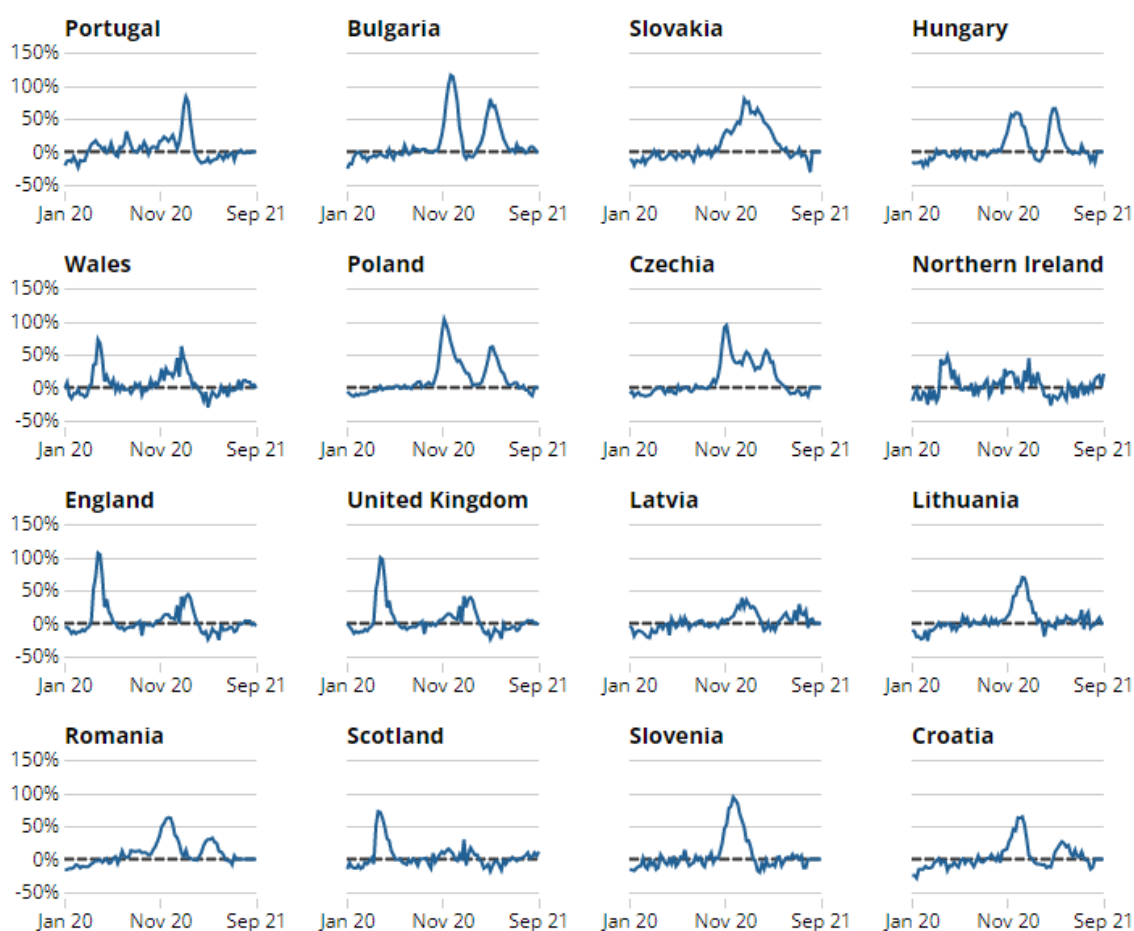
The Office for National Statistics published a [report](#) on mortality comparisons between selected European countries for January 2020 to 3 September 2021. The results from that report are not comparable with the analysis in this paper for two reasons:

¹⁰ Figures 3 and 4 are based on data on the number of deaths registered per week compared with the 5-year average for 2015-19. Other approaches might yield slightly different results – for instance, Northern Ireland published a [report](#) on excess deaths, but using deaths occurring between the months of March 2020 and December 2021 rather than registrations during this time period; it also compared deaths in 2021 with the 5-year average for 2016-20, rather than 2015-19. This different cut of data and methods produced a lower estimate of excess deaths than the analysis in this report.

- It covered a different time period – January 2020 to 3 September 2021 – so including the early weeks of 2020 when mortality rates were generally below average, but excluding the third peak seen since September 2021.
- It used a different methodology, based on comparing age-standardised mortality rates with the average rather than, as we have done, comparing the number of deaths.

As shown in figure 5, this analysis suggested that different countries have peaked at different periods, and shown different numbers of peaks of mortality. In 2021 countries in central Europe increasingly overtook western Europe (including the UK) to have the highest relative cumulative excess mortality between January 2020 and mid-2021.

Figure 5: Relative age-standardised mortality rates, all ages, 15 selected European countries (and the UK as a whole)



Source: [Office for National Statistics](#)

Local Health Board Analysis

Figures 6 and 7 look at the variation of excess deaths within Wales. Since the start of the pandemic we have seen excess deaths across all health boards in Wales compared with 2015-19. Overall, excess death rates were lowest in Hywel Dda, Betsi Cadwaladr, and Powys, and highest in Cwm Taf Morgannwg. During the first

period, Cardiff and Vale also saw high rates, but while rates here reduced considerably for the second period, rates in Cwm Taf Morgannwg remained high. Most areas saw their highest rates in the first period, with the exception of Hywel Dda and Swansea Bay. The first period saw the biggest difference between health boards, with less difference for the following periods.

Figure 6: Weekly excess deaths by health board, 7 March 2020 to 31 December 2021

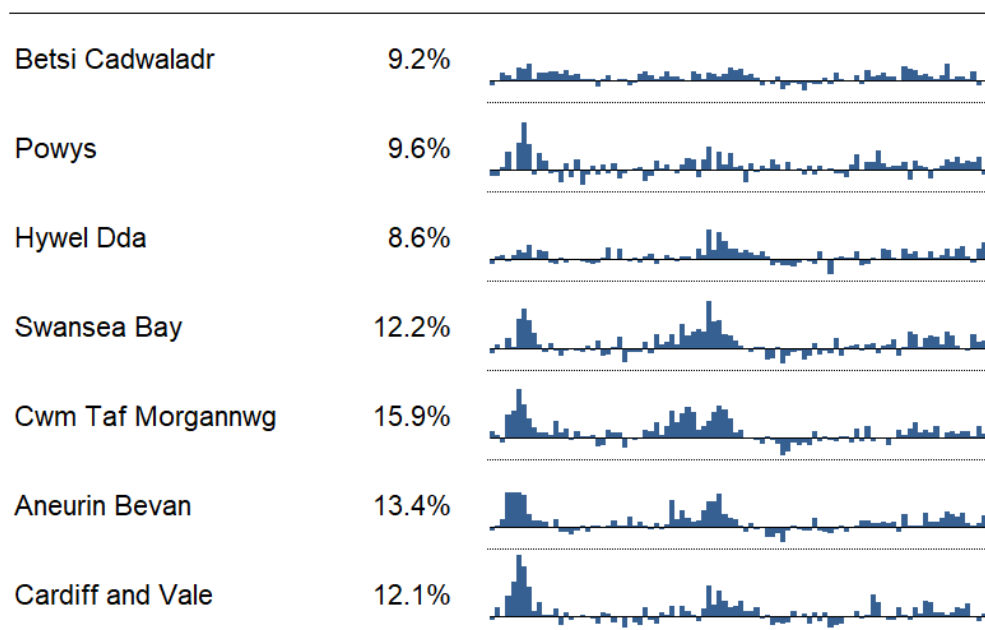
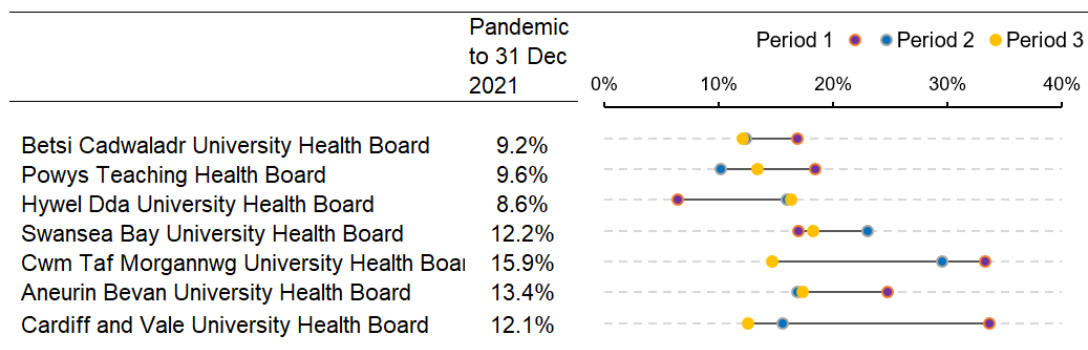


Figure 7: Excess deaths by health board, 7 March 2020 to 31 December 2021



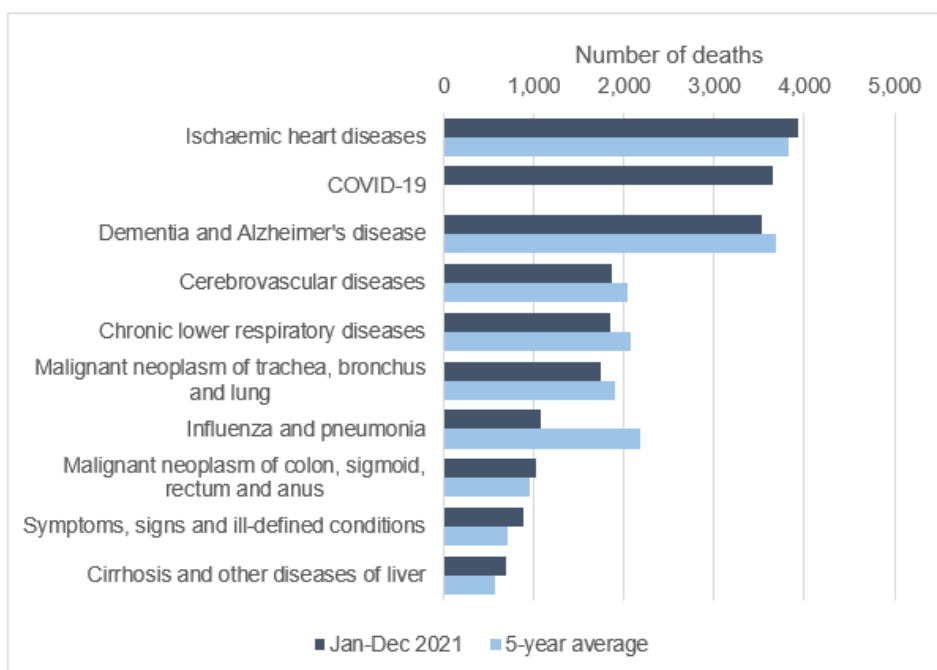
Source: [Office for National Statistics](#)

Deaths by cause

Figure 8 shows the top 10 leading broad causes of death for the year of 2021. During 2021, COVID-19 was provisionally the 2nd leading cause of death. Ischaemic heart disease was the leading cause of death, and the number of such deaths was similar to the average seen in the 5-years 2015-19. Looking at other leading causes in the top 10, many saw fewer deaths than 5-year average – in particular, there was a large reduction for influenza and pneumonia (possibly linked to people social distancing, reducing the spread of infections such as flu). Symptoms, signs and ill-

defined conditions (includes 'old age' and 'frailty'), and cirrhosis and other diseases of the liver saw more deaths than average.

Figure 8: Top 10 leading causes of death, 2021 (provisional)



Source: [Office for National Statistics](#)

Excess deaths by setting

Figure 9 shows the breakdown of excess deaths by setting - if the data is above zero, this means there were more deaths than the 5-year average. This captures deaths of Welsh residents, and therefore some of these individuals may have died outside of Wales (e.g. in English hospitals). Deaths in care homes refer to deaths which occurred in the setting and not to care home residents (who could have died in other settings).

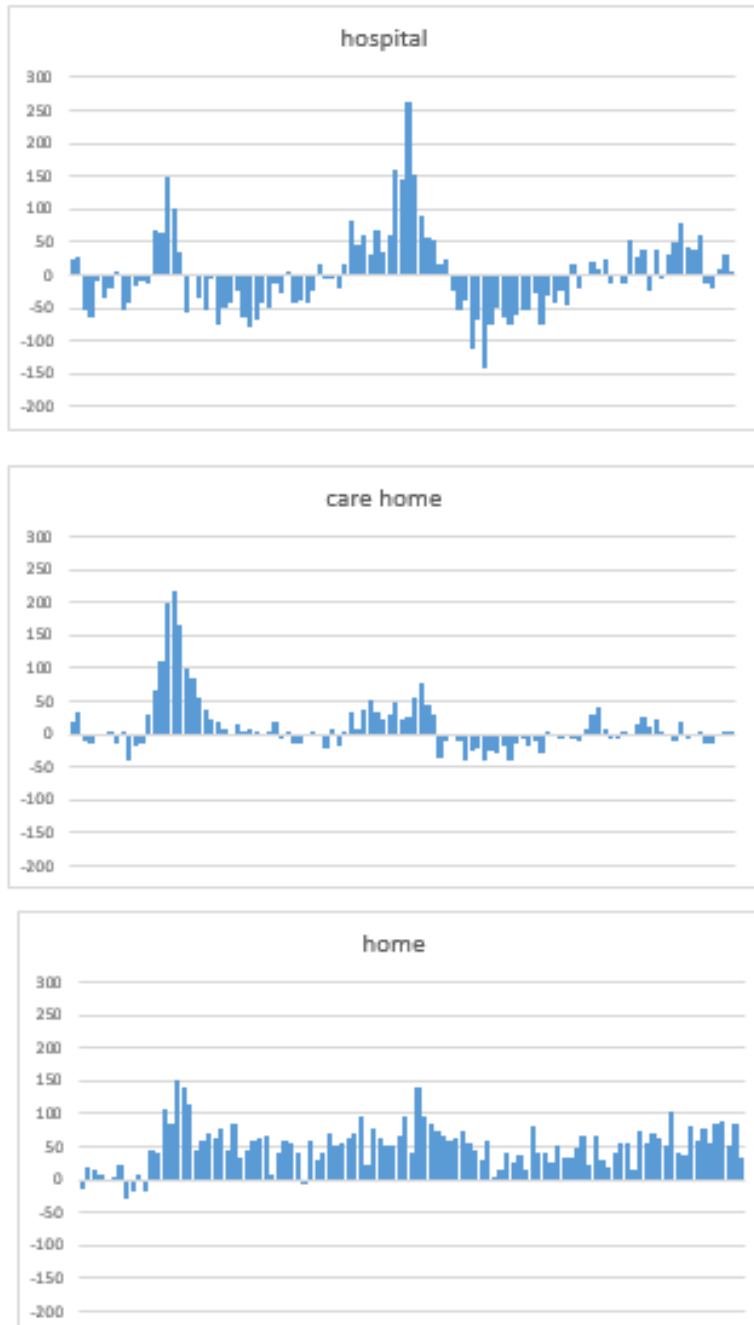
Looking at excess deaths in hospital, these have been below average for much of the period with the exception of raised numbers of deaths around the time of the three peak periods of the pandemic. In particular, there was a peak around December 2020 – January 2021. There was a pronounced peak in excess deaths in care homes during the first peak period of the pandemic (around April 2020), with a much lower number of excess death during the second peak period. For the rest of the period, deaths were generally similar to or below average.

The pattern for deaths at home is different. These increased above average at the start of the pandemic, and have remained so. Unlike deaths occurring in hospitals (and to some extent care homes), the excess in deaths at home is largely driven by deaths not involving COVID-19. From January 2020 to 31 December 2021, 2% of deaths at home involved COVID-19, compared with 12% across all settings¹¹. For 2020, the leading cause of death at home with the biggest proportional increase

¹¹ [Deaths registered weekly in England and Wales, provisional - Office for National Statistics \(ons.gov.uk\)](#)

compared with average was dementia and Alzheimer's disease¹². The consistently high number of deaths above average in private homes could be because of a combination of factors which may include health service disruption, people choosing to stay away from health care settings or terminally ill people staying at home rather than being admitted to other settings for end of life care.

Figure 9: Excess deaths by setting, January 2020 to 31 December 2021



Source: [Office for National Statistics](#)

¹² [Deaths registered in private homes, England and Wales - Office for National Statistics \(ons.gov.uk\)](#)

What else do we know?

Other reports have suggested that rates of death involving COVID-19 are higher in older people and people in deprived communities¹³. Analysis for England suggests higher rates for people from some Black, Asian and Minority Ethnic backgrounds. Adjusting for socio-demographic and economic factors, health, and vaccination status accounted for much of the difference in most ethnic minority groups, but some differences remained¹⁴. Also for England, analysis suggests lower rates for fully vaccinated people compared with unvaccinated people¹⁵.

The previous reports considered mortality following COVID-19 nosocomial infection (or hospital-onset¹⁶), as an area for further work. For this report, we have therefore worked with PHW to provide high level estimates. PHW publish the number of hospital-onset cases on their [dashboard](#) weekly. They estimate that up to the end of January 2022, around 2,400 people have died following hospital-onset of COVID-19. However, this represents deaths from all-causes, and not just COVID-19, within 28 days of their positive COVID sample. This analysis does not use the ONS mortality data, therefore we cannot compare this to the data in the rest of this report or provide further breakdowns of the underlying causes of death. Nor can this number be compared with PHW rapid mortality surveillance estimates. This is an area where further investigation may be considered in the future.

Conclusions and Areas for Further Work

The number of deaths in 2020, and to a lesser extent 2021, was well above average. There have been some differences in the pattern of deaths seen in the three peak periods of the pandemic. The first period saw the sharpest increase, and included the week with the highest number of excess deaths. The second period saw a more gradual increase, but lasted for a longer period, and included the week with the most deaths involving COVID-19. The third period has to date seen a sustained increase but at a lower level and without the sharp peaks of both the first and second periods.

Over the course of the pandemic so far, Wales has experienced lower levels of excess deaths than some parts of the UK. However this is largely due to lower levels in Wales during period 1, with less difference seen subsequently.

Whilst looking back retrospectively is important to assess what we can learn from the pandemic, it also proposes unexplored questions.

Wider / future questions:

- How has the vaccine affected mortality?

¹³ https://publichealthwales.shinyapps.io/COVID19_Recovery_Profile_PHWO/

¹⁴ [Updating ethnic contrasts in deaths involving the coronavirus \(COVID-19\), England - Office for National Statistics \(ons.gov.uk\)](#)

¹⁵ [Deaths involving COVID-19 by vaccination status, England - Office for National Statistics](#)

¹⁶ Hospital-onset cases defined as:

- probable (positive sample within 8 to 14 days of admission);
- or definite (positive sample after 14 days of admission).

- What impact has the emergence of new variants of COVID-19 had on excess mortality?
- What can we learn about deaths following hospital-onset COVID-19?
- What will the long term impact from the pandemic be on deaths over the next few years?
- What are the biggest factors behind inequalities in COVID-19 mortality?
- To what extent can geographical differences, including differences between UK countries, be explained by different characteristics of the resident population?