

Article

Excess mortality and mortality displacement in England and Wales: 2020 to mid-2021

Deaths registered in England and Wales by week, from 28 December 2019 to 2 July 2021. Breakdowns include country, sex, age group, region, place of death, and leading cause. Includes analysis of excess deaths and relative cumulative age-standardised mortality rates.

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1 . Main points

- To date there has been some mortality displacement occurring, mainly since March 2021, however this was not enough to counter the high number of deaths seen in 2020 and 2021; we will continue to monitor mortality displacement over the coming months and years.
- In England and Wales, from week ending 3 January 2020 to 2 July 2021, there were 97,981 excess deaths (compared with what we would expect in a non-pandemic period).
- People in older age groups showed mortality displacement and had their peak excess deaths earlier in the coronavirus (COVID-19) pandemic than people in younger age groups; those aged under 65 years had not peaked in excess deaths by 2 July 2021, as we are yet to see a substantial decrease in this age group.
- Deaths in hospitals had shown two waves in excess mortality, with percentage of excess deaths going above and then below the average each time; in contrast deaths in care homes had shown some mortality displacement, but not enough to offset above average deaths during the pandemic, and excess deaths in private homes were 25.4% above average by 2 July 2021.
- By 29 May 2020, excess deaths due to dementia and Alzheimer's disease since the beginning of 2020 were 4.3% above expected; this reduced to 7.7% below average by 2 July 2021.
- Diabetes was the most common underlying cause of death that also mentioned COVID-19 on the death certificate (3.7% of deaths due to cause).

Statistician's Comment

"There have been suggestions that the coronavirus pandemic has led to the deaths of many 'vulnerable' people who would have otherwise been expected to die in the following days, weeks or months.

"However, today's analysis shows that while there is some evidence of this so-called 'mortality displacement' among older age groups – it does not account for the significant excess mortality seen since the beginning of the pandemic.

"In fact, we are yet to see any evidence that deaths in those aged under 65 or in private homes would have likely occurred over the following weeks or months, as deaths in these age groups and settings continue to be well above normal levels."

Data is up to 2 July 2021, the latest available when this analysis began. Our weekly deaths figures have since shown periods of deaths above average. High excess mortality means that it may take years for mortality rates to return to what would be expected without the pandemic. We will continue to monitor this.

2 . COVID-19 and its effect on death occurrences

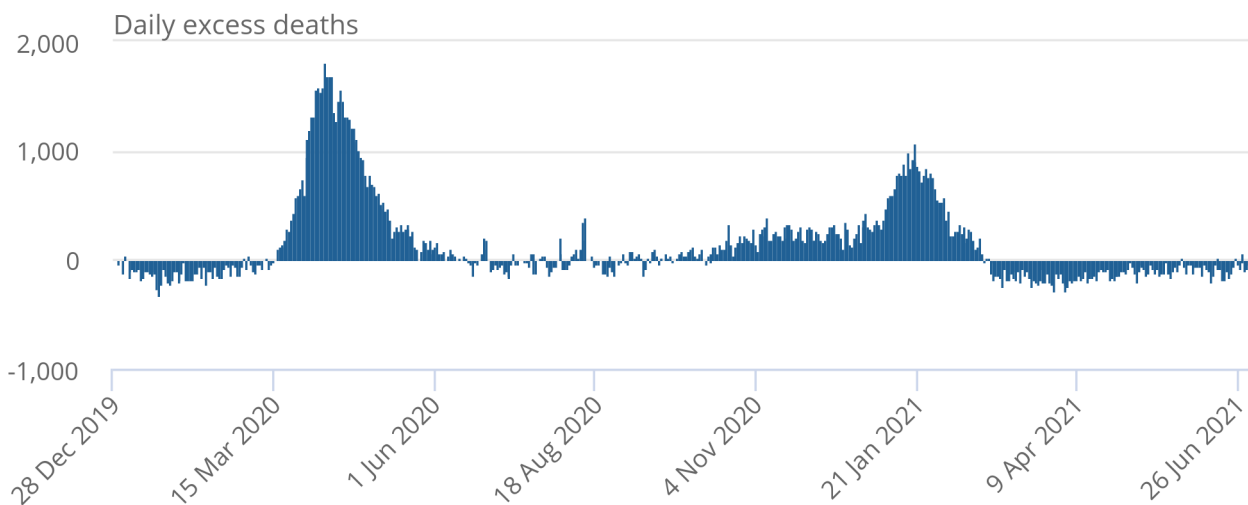
The coronavirus (COVID-19) pandemic has had a large impact on the number of deaths in 2020 and 2021 and was the main reason deaths increased above average in those years. Mortality displacement is a phenomenon by which a period of high mortality can be followed by below-average mortality. Mortality displacement occurs when vulnerable people, such as older people and those who already had medical conditions, die sooner than expected. Therefore, these individuals are not dying in the following days, weeks, or months, where they would likely have died, potentially leading to a lower-than-average period of mortality.

We can measure excess mortality and observe possible mortality displacement by calculating the difference between expected weekly deaths in a non-pandemic period (2015 to 2019 average) and observed weekly deaths in 2020 and 2021. The 2015 to 2019 average is used for both 2020 and 2021, to represent what we would expect in a non-pandemic time.

Figure 1: The number of deaths below average was not enough to offset the number of deaths above average during the pandemic

Number of excess deaths occurring on each day, from 28 December 2019 to 2 July 2021 and registered by 18 September 2021

At the start of the year, the number of deaths was below average and was followed by another period of high excess deaths. The following period of high excess deaths was not enough to offset the number of deaths above average during the pandemic. The following period of high excess deaths was not enough to offset the number of deaths above average during the pandemic. The following period of high excess deaths was not enough to offset the number of deaths above average during the pandemic.



Source: Office for National Statistics

Notes:

1. Based on date of occurrence rather than registration.
2. Figures include deaths of non-residents.
3. The average for 2015 to 2019 provides a comparison of the number of deaths expected per day in a non-pandemic year.
4. Figures for 2021 are based on provisional mortality data.

The number of death occurrences from 28 December until mid-March 2020 was generally below average, continuing the [decreased number of deaths seen in 2019](#) compared with previous years (Figure 1). This was followed by a period of excess deaths which peaked on 8 April 2020 when the number of deaths was 3,281 (1,805 above average). Although the number of excess deaths fell below average on 57 out of 124 days between 12 June and 13 October 2020, this was not enough to offset the increased deaths seen earlier in the year and was followed by another period of excess deaths, with a peak of 2,859 deaths (1,078 deaths above average) on 19 January 2021. From the end of February 2021 to 2 July 2021, the number of deaths was generally below average.

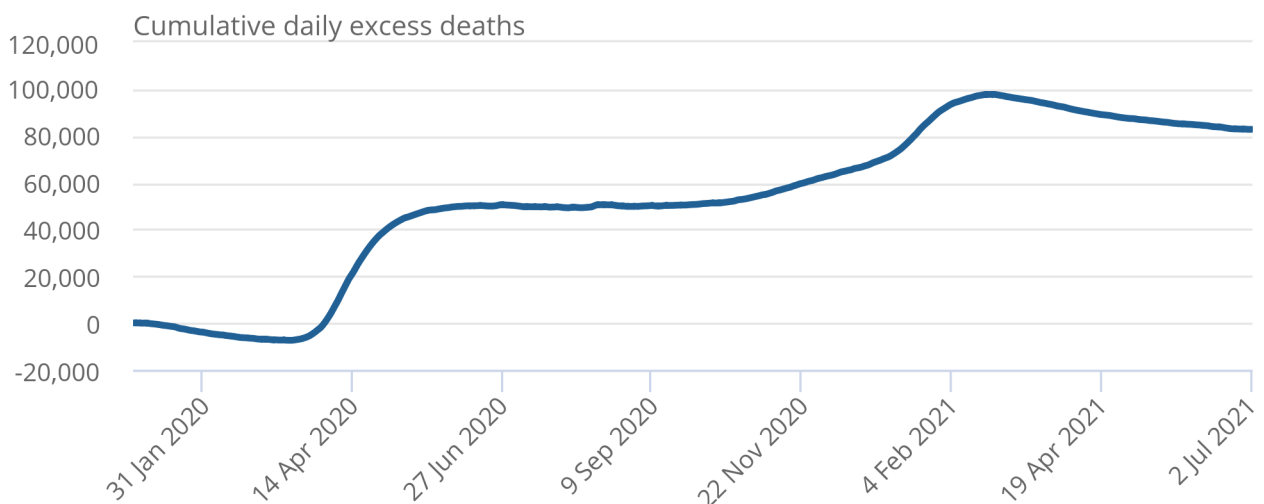
Excess deaths can be summed over time (cumulative excess) to measure the total difference from expected mortality. The cumulative number of deaths is the total above average for the whole period up to a given date. If numbers of deaths fall below average, the cumulative excess can go down instead of up and return to what we would expect in a non-pandemic period.

Figure 2: From 28 December 2019 to 2 July 2021, the number of deaths remain above what we would expect in a non-pandemic period

Cumulative number of excess deaths each day, occurring from 28 December 2019 to 2 July 2021 and registered by 18 September 2021

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Source: Office for National Statistics

Notes:

1. Based on date of occurrence rather than registration.
2. Figures include deaths of non-residents.
3. The average for 2015 to 2019 provides a comparison of the number of deaths expected per day in a non-pandemic year.
4. Figures for 2021 are based on provisional mortality data.

Between the 28 December and 14 March 2020, there were 7,430 deaths fewer than expected compared with the 2015 to 2019 average for the same period (Figure 2; shown as 0 on the vertical axis). By 1 April 2020, the number of deaths was 1,112 deaths above average. Cumulative excess deaths continued to rise, reaching a peak of 97,749 by 24 February 2021. Despite the falling number of deaths and a period of deaths below average, total deaths between 28 December 2019 and 2 July 2021 were still well above average, with 82,797 deaths more than we would expect.

Figure 1 suggests that we have seen some mortality displacement, as there was a sustained period of fewer deaths than average following the second wave of the pandemic until 2 July 2021. However, Figure 2 shows that the mortality displacement currently seen does not account for the great majority of the excess deaths during the pandemic. In total, between 28 December 2019 to 2 July 2021, there were 109,009 excess deaths in the periods when deaths were above average, and a deficit of 26,212 deaths in periods when deaths were below average.

Death registrations and age-standardised mortality rates

A similar pattern can be seen when looking at death registrations. Death registration data is analysed from this point forward, rather than date of occurrence, because of the time taken for deaths to be registered. See the [Glossary](#) and [Data sources and quality](#) sections for more information.

From week ending 3 January 2020 to 2 July 2021, there were 918,767 deaths registered in England and Wales, of which 125,175 deaths were due to COVID-19. This is 97,981 more deaths than would usually be registered in this time, compared with the 2015 to 2019 five-year average (820,786 deaths).

Mortality rates allow comparability between different time periods and places by adjusting for population size and age structure. Age-standardised mortality rates (ASMRs) indicate the deaths per 100,000 people and are used here to calculate a relative cumulative age-standardised mortality rate (rcASMR).

rcASMRs express the percentage change in excess mortality up to a given date compared with the expected mortality rate in the same period, based on the 2015 to 2019 average. This lets us describe excess mortality and mortality displacement taking into account differences in populations.

For example, an rcASMR of 0.0% indicates that the ASMR from the beginning of 2020 to a given week was exactly as we would expect compared with the five-year average. A negative rate indicates mortality rates were below expected, whereas a positive rate indicates above expected. So an rcASMR of 10.0% would indicate that the ASMRs from the beginning of 2020 until that week were 10.0% above average. Figure 3 provides an example of changes in excess deaths effect on subsequent rcASMRs using artificial data.

Figure 3: The rcASMR increases as the observed deaths are continuously greater than average and decreases when they are continuously lower than average

Artificial data of excess deaths effect on the relative cumulative age-standardised mortality rate (rcASMR)

Notes:

1. This figure was created using artificial data and is not representative of any real world data.

Weekly cumulative excess deaths and the rcASMR are not always linear. This is because the rcASMR is the relative difference between the expected and observed cumulative ASMR, which considers changes in the population structure. Whereas cumulative excess deaths are the numerical difference between expected and observed number of deaths. As such, the ASMR may decrease if the estimated population increases, even if number of deaths increase.

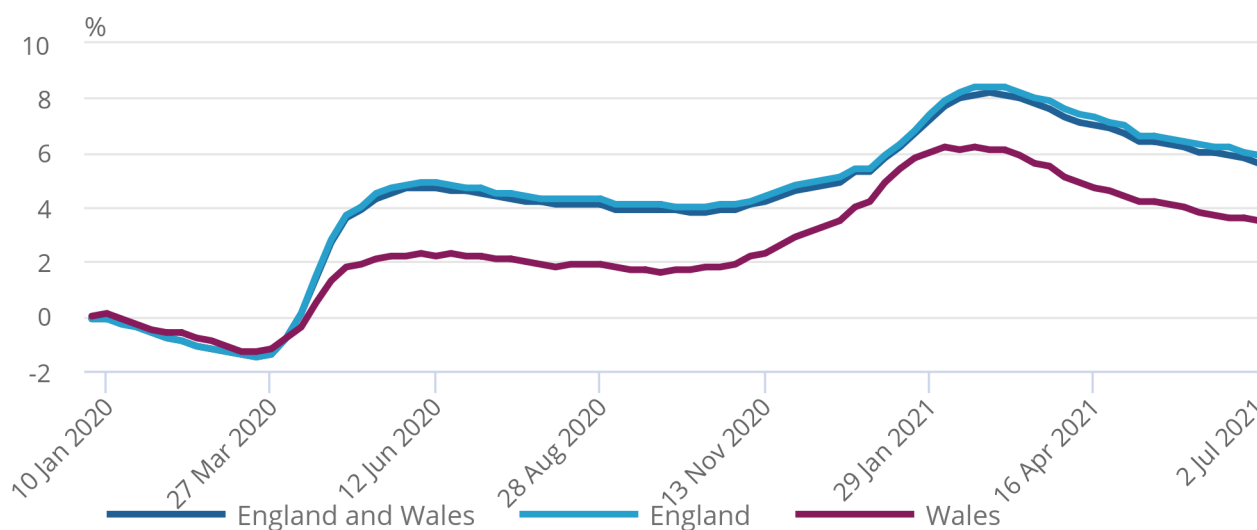
3 . Excess mortality and mortality displacement in England and Wales

Figure 4: Wales showed lower excess mortality rates than England from 10 April 2020

Relative cumulative age-standardised mortality rates (rcASMRs) by week, 28 December 2019 to 2 July 2021, England and Wales

Figure 4: Wales showed lower excess mortality rates than England from 10 April 2020

Relative cumulative age-standardised mortality rates (rcASMRs) by week, 28 December 2019 to 2 July 2021, England and Wales



Source: Office for National Statistics

Notes:

1. Based on area of usual residence.
2. Figures for "England and Wales" include deaths of non-residents. Therefore, the sum of "England" and "Wales", which exclude non-residents, will differ from "England and Wales" figures.
3. Deaths registered rather than occurred.
4. For information on relative cumulative age-standardised rates, see the [Data sources and quality section](#).
5. Figures for 2021 are based on provisional mortality data.

In England and Wales, the relative cumulative age-standardised mortality rate (rcASMR) was lower than expected before the start of the pandemic. The lowest rcASMR was in week ending 20 March 2020, at 1.5% below average (Figure 4).

By week ending 29 May 2020, the rate increased to 4.7% above average, further increasing to 8.2% higher than expected in week ending 26 February 2021. There was some small displacement seen in the summer of 2020, but this was not enough to reduce the excess mortality seen during the first wave of the coronavirus (COVID-19) pandemic. Deaths were then generally below average, however when looking between week ending 3 January 2020 and 2 July 2021 the rate was still higher than expected at 5.6% above the five-year average.

The decrease in excess mortality rates suggests that we have experienced some mortality displacement in England and Wales, but this was not enough to counter the large increase in excess deaths seen during the pandemic. Therefore, it could take some more time for the extent of the displacement to become fully apparent. Data for England and Wales separately, as well as breakdowns for males and females, showed a similar pattern; this can be found in the [accompanying dataset](#).

4 . Excess mortality and mortality displacement by age

Figure 5: Older age groups showed the greatest excess mortality during the first wave, whereas younger age groups showed the greatest excess in the second wave

Relative cumulative age-standardised and age-specific mortality rates by week and age group, 28 December 2019 to 2 July 2021, England and Wales

Notes:

1. Includes deaths of non-residents.
2. Deaths registered rather than occurred.
3. For information on relative cumulative age-standardised and age-specific rates, see the [Data sources and quality section](#).
4. Figures for 2021 are based on provisional mortality data.

Download the data

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At the beginning of the pandemic, the two oldest age groups had the highest relative cumulative age-standardised mortality rate (rcASMR) above expected, however from 12 February 2021 the rates were predominantly decreasing in both age groups (Figure 5). For both age groups, the percentage change from expected decreased but remained above average, both showing deaths for the period at 4.0% above average by 2 July 2021.

People aged under 65 years recorded the highest rcASMR of all age groups, at 9.7% above what we would expect by 26 March 2021. The rate for those aged under 65 years remained similar to 2 July 2021, at 9.6% above average. We had not seen any mortality displacement in those aged under 65 years by 2 July 2021, the age group with usually the lowest mortality.

Excess mortality in older age groups declining at a greater rate than younger age groups is indicative of mortality displacement. This is because people in older age groups are more likely to have died of other causes in the following weeks or months without the coronavirus (COVID-19) pandemic. Whereas we would expect those in younger age groups to live much longer, therefore their deaths have been displaced outside of the period of this analysis.

When looking from oldest to youngest, the peak rcASMR occurs at an earlier week in the observed period (Table 1). This may be because of the protective effect of the COVID-19 vaccine, which was largely made available to older people first.

People from older age groups were more likely to have died earlier in the pandemic than those in younger age groups. For example, at the peak of the first wave (week ending 5 June 2020) the rcASMR for people aged 85 to 89 years was 5.5% above what we would expect. While the rate for those aged under 65 years was 3.5% above average.

Table 1: Older age groups reported their peak excess deaths earlier than younger age groups
Excess number of deaths and relative cumulative age-standardised mortality rate by age group and week with greatest cumulative excess mortality, England and Wales

	Week with highest excess deaths	Week with highest excess deaths	Week with highest excess deaths	Week ending 2 July 2021	Week ending 2 July 2021
Age group	Week ending	rcASMR	Excess deaths	rcASMR	Excess deaths
Under 65	26 March 2021	9.7%	15,959	9.6%	16,753
65 to 69	5 March 2021	9.4%	3,292	7.7%	1,906
70 to 74	26 February 2021	7.7%	13,495	5.6%	13,751
75 to 79	19 February 2021	7.6%	16,147	4.7%	16,128
80 to 84	19 February 2021	9.0%	18,342	6.0%	16,069
85 to 89	12 February 2021	7.7%	17,674	4.0%	14,327
90 and over	12 February 2021	7.6%	22,513	4.0%	19,045

Source: Office for National Statistics

Notes

1. Includes deaths of non-residents.
2. Deaths registered rather than occurred.
3. For information on relative cumulative age-standardised and age-specific rates, see the Data sources and quality section.
4. Figures for 2021 are based on provisional mortality data.

5 . Excess mortality and mortality displacement by region

Figure 6: London showed the greatest excess mortality change out of all English regions, whereas the South West showed the least change

Relative cumulative age-standardised mortality rates (rcASMRs) by week and region, 28 December 2019 to 2 July 2021, English regions and Wales

Notes:

1. Based on area of usual residence.
2. Excludes deaths of non-residents.
3. Deaths registered rather than occurred.
4. For information on relative cumulative age-standardised rates, see the [Datasources and quality section](#).
5. Figures for 2021 are based on provisional mortality data.

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All English regions and Wales reported their lowest relative cumulative age-standardised mortality rates (rcASMRs) between week ending 6 March 2020 and 27 March 2020; all of these rates were below the five-year average.

The English region that reported the lowest rcASMR was London, at 2.0% below what would be expected (Figure 6). However, London consistently had the highest rcASMR above average from week ending 3 April 2020. The highest rate for London occurred in week ending 26 February 2021, at 14.8% above what we would expect. Deaths in London were then generally below average, decreasing the rate for the region to 11.8% above what we would expect by 2 July 2021.

The South West of England consistently had the lowest rcASMR from week ending 10 April 2020. The highest rate for the South West occurred in week ending 12 February 2021 at 2.2% above what we would expect. Deaths within the region were then generally below average, with the rcASMR returning to equal that of what we would expect in a non-pandemic period by 21 May 2021. The rate continued to decrease, reaching 0.7% below what we would expect by 2 July 2021. The South West was the only region to have the rcASMR return to what we would expect in a non-pandemic period by 2 July 2021.

Wales' lowest rcASMR was in week ending 13 March 2020 at 1.3% below what we would expect. The highest rate was in week ending 5 February 2021 at 6.2% above what we would expect. Deaths were then generally below average, with the rate decreasing to 3.5% above expected when looking between the beginning of 2020 and 2 July 2021. From week ending 10 April 2020 to 2 July 2021, Wales consistently showed less difference to the five-year average compared with England.

6 . Excess mortality and mortality displacement by place of death

Figure 7: Private homes had not shown any reduction in excess mortality by 2 July 2021

Relative cumulative age-standardised mortality rates (rcASMRs) by place of death and week, 28 December 2019 to 2 July 2021, England and Wales

Notes:

1. Includes deaths of non-residents.
2. Deaths registered rather than occurred.
3. For information on relative cumulative age-standardised rates, see the [Data sources and quality section](#).
4. "Other communal establishment" includes deaths that did not occur in private homes, hospitals, or care homes. More information on place of death definitions can be found in the [accompanying dataset](#).
5. Figures for 2021 are based on provisional mortality data.

Download the data

[.xlsx](#)

In England and Wales, the relative cumulative age-standardised mortality rate (rcASMR) in hospitals was 1.5% above what we would expect by week ending 15 May 2020 (Figure 7). The lowest rate for deaths in hospitals occurred in week ending 16 October 2020 at 2.4% below average, and the highest in week ending 19 February 2021 at 2.6% above what we would expect. Deaths in hospitals were then generally below average, returning to equal that what we would expect in a non-pandemic time by week ending 30 April 2021. The rate continued to decrease, reaching 2.2% below average by 2 July 2021.

These decreases in deaths occurring in hospitals are likely to reflect a higher than usual proportion of people dying at home. This could indicate patients are not being admitted to hospital or being discharged sooner. For deaths at older ages, it could be that individuals choose to die at home rather than be admitted to hospital. This is another form of displacement, indirectly caused by the coronavirus (COVID-19) pandemic, rather than a direct consequence of deaths occurring sooner because of the pandemic.

For deaths in care homes, the lowest rcASMR was in week ending 20 March 2020 at 1.9% below average. The highest was in week ending 5 June 2020 at 11.4% above average. Deaths in care homes then generally decreased, to 5.5% above what we would expect by 2 July 2021.

Deaths in private homes continued to increase above what we would expect throughout the pandemic. The highest rate was in week ending 2 July 2021 at 25.4% above average. A future release on [Deaths in private homes, England and Wales](#) will be released shortly.

It's important to note that the number of expected deaths vary greatly across these locations, for example, the number of deaths that usually occur in hospitals are much greater than in private homes. Therefore, the excess mortality rate for private homes indicates a greater percentage change because of a much lower expected mortality.

7 . Excess mortality and mortality displacement by cause of death

This section looks at excess mortality by Office for National Statistics (ONS) [leading causes of death groupings](#). For more information, see the [Data sources and quality section](#).

Figure 8: Excess deaths due to dementia and Alzheimer's disease increased during the first wave, before decreasing to below average from January 2021

Relative cumulative age-standardised mortality rates (rcASMRs) by underlying cause of death and week, 28 December 2019 to 2 July 2021, England and Wales

Notes:

1. Includes deaths of non-residents.
2. Deaths registered rather than occurred.
3. For information on relative cumulative age-standardised rates and International Classification of Diseases version 10 codes, see the [Data sources and quality section](#).
4. Figures for 2021 are based on provisional mortality data.

Download the data

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The highest relative cumulative age-standardised mortality rate (rcASMR) for deaths due to dementia and Alzheimer's disease was in week ending 29 May 2020, at 4.3% above average. The rate consistently decreased thereafter, returning to what we would expect in a non-pandemic period by week ending 15 January 2021. By week ending 2 July 2021, the rcASMR was 7.7% below average.

The other leading causes considered showed either consistently higher than average (symptoms, signs, and ill-defined conditions, diabetes, hypertensive diseases) or consistently lower than average (all other cause groupings shown) mortality throughout the coronavirus (COVID-19) pandemic period.

Deaths due to symptoms, signs, and ill-defined conditions consistently showed the greatest rcASMR above average. This grouping includes old age and frailty as well as ill-defined symptoms where diagnosis is not classifiable elsewhere. The lowest rate for deaths due to this was in week ending 3 January 2020 at 0.2% above what we would expect. Weekly deaths due to this cause generally increased week-on-week to 19.8% above average by 2 July 2021, the highest rate for this cause.

Deaths due to influenza and pneumonia consistently showed the rcASMR most below average. The highest rate for this cause was in week ending 3 January 2020 at 0.2% below what we would expect. The lowest rate was reported in week ending 2 July 2021, at 42.3% below average. This is likely in part because of coronavirus restrictions and guidance, such as social distancing, reducing the spread of infections generally.

This information looks at the underlying cause of death as indicated on death certificates. When looking at deaths by mention on death certificates, there may be slightly different patterns, as can be seen in [Excess mortality in England: weekly reports](#) from the Office for Health Improvement and Disparities.

8 . COVID-19 and leading causes of death

A death certificate can have up to 15 conditions mentioned as contributing towards the death, of which multiple can be from the same cause grouping. By examining mentions on death certificates, we can observe the relationship between coronavirus (COVID-19) and [leading causes](#).

Between week ending 13 March 2020 (when the first death due to COVID-19 was registered) and 2 July 2021, there were 125,175 deaths due to COVID-19. Across all these deaths, 1,910 different conditions were reported as contributory causes, with a combined total of 477,370 mentions on all death certificates due to COVID-19.

The most common leading cause of death grouping mentioned on death certificates was influenza and pneumonia, accounting for 13.9% of all mentions on COVID-19 death certificates (Table 2). These contributory causes are more likely to be pneumonia than influenza, as pneumonia can be a symptom of COVID-19.

Table 2: Proportion of mentions on certificates of deaths due to COVID-19 by leading cause, 7 March 2020 to 2 July 2021, England and Wales

Mentioned cause on certificates of deaths due to COVID-19	Percentage of all mentions on COVID-19 death certificates
Influenza and pneumonia	13.9
Symptoms, signs, and ill-defined conditions	8.6
Dementia and Alzheimers disease	6.1
Diabetes	5.4
Hypertensive diseases	4.9
Chronic lower respiratory diseases	4.6
Ischaemic heart diseases	3.8
Cerebrovascular diseases	1.9
Malignant neoplasms of trachea, bronchus and lung	0.4

Source: Office for National Statistics

Notes

1. Includes deaths of non-residents.
2. Deaths registered rather than occurred.
3. Figures are based on the percentage of total mentions on all COVID-19 death certificates, rather than the percentage of COVID-19 deaths.
4. Each leading cause can be mentioned more than once on a death certificate.
5. Figures for 2021 are based on provisional mortality data.

Diabetes was the most common underlying cause of death that involved COVID-19, with 3.7% of all deaths due to the cause mentioning COVID-19 on the death certificate (see Table 3). This could explain why deaths due to diabetes have increased above average; although the underlying cause of death is diabetes, COVID-19 contributed towards the death.

Table 3: Deaths registered that had COVID-19 mentioned on the death certificate, 7 March 2020 to 2 July 2021, England and Wales

Underlying cause of death	Percentage of deaths due to this cause that had COVID-19 mentioned on the death certificate
Diabetes	3.7
Dementia and Alzheimers disease	3.4
Cerebrovascular diseases	3.2
Ischaemic heart diseases	2.3
Hypertensive diseases	2.2
Malignant neoplasm of trachea, bronchus and lung	2.0
Chronic lower respiratory diseases	1.3
Influenza and pneumonia	0.1
Symptoms, signs, and ill-defined conditions	0.0

Source: Office for National Statistics

Notes

1. Includes deaths of non-residents.
2. Deaths registered rather than occurred.
3. Figures for 2021 are based on provisional mortality data.

9 . Excess mortality and mortality displacement in England and Wales data

[Excess mortality and mortality displacement in England and Wales: 2020 to mid-2021](#)

Dataset | Released 15 October 2021

Deaths registered in England and Wales by week, from 28 December 2019 to 2 July 2021. Breakdowns include country, sex, age group, region, place of death, and leading cause. Includes analysis of excess deaths and relative cumulative age-standardised mortality rates

10 . Glossary

Age-specific mortality rates

Age-specific mortality rates are used to allow comparisons between specified age groups.

Age-standardised mortality rates

Age-standardised mortality rates (ASMRs) are used to allow comparisons between populations that may contain different proportions of people of different ages. The [2013 European Standard Population](#) is used to standardise rates. In this bulletin, we have adjusted the weekly ASMRs to allow for comparisons with annual rates.

Relative cumulative age-standardised mortality rates

Relative cumulative age-standardised mortality rates (rcASMRs) are expressed as the percentage change per week in 2020 of the cumulative age-standardised mortality rate from the average cumulative age-standardised mortality rate in 2015 to 2019.

A zero value for rcASMR indicates that age-standardised mortality for the year to date has been equal to the average. A positive value indicates worse than average mortality, and a negative value indicates better than average mortality.

rcASMRs are the best measure for assessing the cumulation of excess mortality over the course of the year. They are calculated weekly and the value at the end shows how much above or below the mortality rate is compared with the five-year average. For more information, see [Section 12: Data sources and quality](#).

Coronaviruses

The World Health Organization (WHO) defines coronaviruses as “a large family of viruses that are known to cause illness ranging from the common cold to more severe diseases such as Middle East Respiratory Syndrome (MERS) and Severe Acute Respiratory Syndrome (SARS)”. Between 2001 and 2018, there were 12 deaths in England and Wales due to a coronavirus infection, with a further 13 deaths mentioning the virus as a contributory factor on the death certificate.

Coronavirus (COVID-19)

COVID-19 refers to the "coronavirus disease 2019" and is a disease that can affect the lungs and airways. It is caused by a type of coronavirus. We use the term "due to COVID-19" when referring only to deaths with an underlying cause of death of COVID-19. When taking into account all of the deaths that had COVID-19 mentioned anywhere on the death certificate, whether as an underlying cause or not, we use the term "involving COVID-19".

Further information is available from the World Health Organization.

Registration delay

Mortality statistics are compiled from information supplied when deaths are certified and registered as part of civil registration, a legal requirement. According to the Births and Deaths Registration Act 1953, a death should be registered within five days unless it is referred to a coroner for investigation. Mortality statistics for a given time period can be based on occurrence (death date) or registration (registration date); registration delay is the difference between date of occurrence and date of registration.

11 . Data sources and quality

More quality and methodology information on strengths, limitations, appropriate uses, and how the data were created is available in the [Mortality statistics in England and Wales QMI](#) and [User guide to mortality statistics](#).

Data coverage, timeliness and registration delays

In England and Wales, deaths should be registered within five days of the death occurring, but there are some situations that result in the registration of the death being delayed. See [Impact of registration delays](#).

Leading causes of death

This article uses [leading causes of death](#) groupings, categorising causes using the International Classification of Diseases version 10 (ICD-10), specially designed for determining the leading causes of death.

The following leading cause of death groupings were investigated for this analysis. These were selected based on the assumption that their observed mortality was most likely to have been affected by the coronavirus (COVID-19) pandemic.

- Cerebrovascular diseases (I60-I69); leading cause of death, 2015 to 2019.
- Chronic lower respiratory diseases (J40-J47); leading cause of death, 2015 to 2019.
- Dementia and Alzheimer's disease (F01, F03, G30); leading cause of death, 2015 to 2019.
- Diabetes (E10-E14); pre-existing condition of deaths registered due to [COVID-19 in 2020](#).
- Hypertensive diseases (I10-I15); pre-existing condition of deaths registered due to [COVID-19 in 2020](#).
- Ischaemic heart diseases (I20-I25); leading cause of death, 2015 to 2019.
- Influenza and pneumonia (J09-J18); consequence mentioned on a certificate of death due to [COVID-19 in 2020](#).
- Malignant neoplasm of trachea, bronchus, and lung (C33-C34); leading cause of death, 2015 to 2019.
- Symptoms, signs and ill-defined conditions (R00-R99); consequence mentioned on a certificate of death due to [COVID-19 in 2020](#).

Technical information about rcASMRs

Relative cumulative age-standardised mortality rates (rcASMRs) were developed by the Continuous Mortality Investigation (CMI) and originally described in [working paper 111 \(PDF, 1.07MB\)](#). Rather than number of deaths, rcASMRs sum all age-standardised mortality rates between two time points.

In this article, rcASMRs are calculated cumulatively from week ending 3 January 2020 to 2 July 2021, relative to the 2015 to 2019 average cumulative age-standardised mortality rate (cASMR) for that 79-week period. This difference is expressed as a percentage of the average cASMR for Week 79 of the time period, equivalent to the average 79-week rate.

Of the 2015 to 2019 five-year average, 2015 was the only year to include a Week 53, making it difficult to draw a meaningful comparison for Week 53, 2020. To adjust for this, pseudo-Week 53s were calculated for 2016 to 2019, from an average of the Week 52 age-standardised mortality rate (ASMR) and Week 1 ASMR of the following year.

To generate a 79-week period for this analysis, the average cASMRs for Week 1 to 26 were appended onto the Week 53 cASMR. This allows for a continuous measure to be used across a 79-week period, while also allowing for a meaningful comparison to be drawn between Week 1 2021, and the appended Week 1 average cASMR.

Weekly cumulative excess deaths and the rcASMR are not always linear. This is because ASMRs consider population size and age-structure at a given week; if the population changes, as does the rate of death per 100,000 people. As such, the ASMR may decrease if the estimated population increases, even if number of deaths increase.

Population projections

[Mid-year population estimates](#) were used for the populations of 2015 to 2020 and [population projections](#) (2018 based) were used for the population of 2021. These are calculated based on expected values of the population on July 1 of each year. Between these dates, weekly population estimates have been calculated by means of linear interpolation. For example:

Writing $P(x,s,w,y)$ for the population in week w of year y , we set $P(x,s,1,y)$ equal to the population estimates at July 1 and calculate exposure by:

$$E(x, s, w, y) = P(x, s, 1, y) + \frac{(w - 1)}{52} (P(x, s, 1, y + 1) - P(x, s, 1, y))$$

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12 . Related links

[Deaths registered weekly in England and Wales](#)

Bulletin | Released weekly

Provisional counts of the number of deaths registered in England and Wales, including deaths involving coronavirus (COVID-19), in the latest weeks for which data are available.

[Deaths due to COVID-19, registered in England and Wales: 2020](#)

Article | Released 6 July 2021

Deaths registered in England and Wales due to coronavirus (COVID-19) by age, sex, region, place of death, and pre-existing condition.

[Deaths registered in England and Wales: 2020](#)

Bulletin | Released 6 July 2021

Registered deaths by age, sex, selected underlying causes of death and the leading causes of death. Contains death rates and death registrations by area of residence and single year of age.

[Leading causes of death, UK: 2001 to 2018](#)

Article | Released 27 March 2020

Registered leading causes of death by age, sex and country.