



Excess mortality in England, week ending 26 February 2021

Experimental Statistics

What is an experimental statistic?

(<https://www.ons.gov.uk/methodology/methodologytopicsandstatisticalconcepts/guidetoexperimentalstatistics>)

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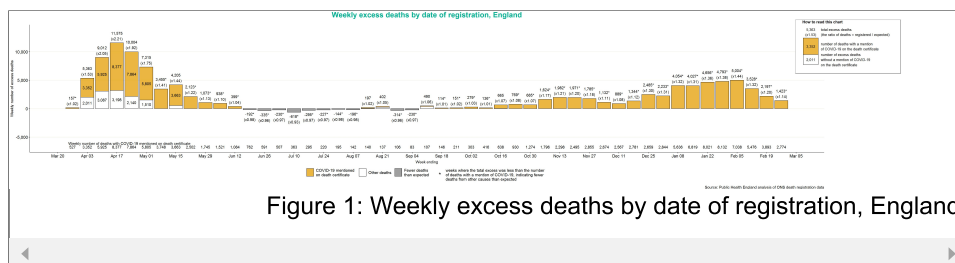
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Introduction

Monitoring excess mortality provides understanding of the impact of COVID-19 during the course of the pandemic and beyond. Excess mortality in this report is defined as the number of deaths throughout the pandemic which are above the number expected based on mortality rates in earlier years.

In this report the expected number of deaths is modelled using five years of data from preceding years to estimate the number of deaths we would expect on each week through the course of the pandemic. Excess deaths are estimated by week and in total since 21 March 2020, based on the date each death was registered rather than when it occurred. Excess deaths are presented by age, sex, region, ethnic group, level of deprivation, cause of death and place of death.

All Persons



The trend in total excess deaths by week, in England, since week ending 27 March 2020 is shown in Figure 1. Numbers above each of the columns show the total number of excess deaths and how these compare with the expected number based on modelled estimates for 2015 to 2019. For example, in week ending 24 April 2020 there were 10,004 excess deaths and this was nearly two times (1.92 times higher) the expected number of deaths in this week. When fewer deaths than expected occur in a week, the column is coloured grey.

Excess deaths where COVID-19 was mentioned on the death certificate are shown in orange. If the number of deaths is not shown in the orange part of the column, that means the total excess was less than the number of deaths with a mention of COVID-19, indicating fewer deaths from other causes than expected in these weeks.

The number of excess deaths without COVID-19 mentioned on the certificate (shown in the white part of the column) may be due to an increase in deaths from other causes during the period of the pandemic but may also reflect under-reporting of deaths involving COVID-19.

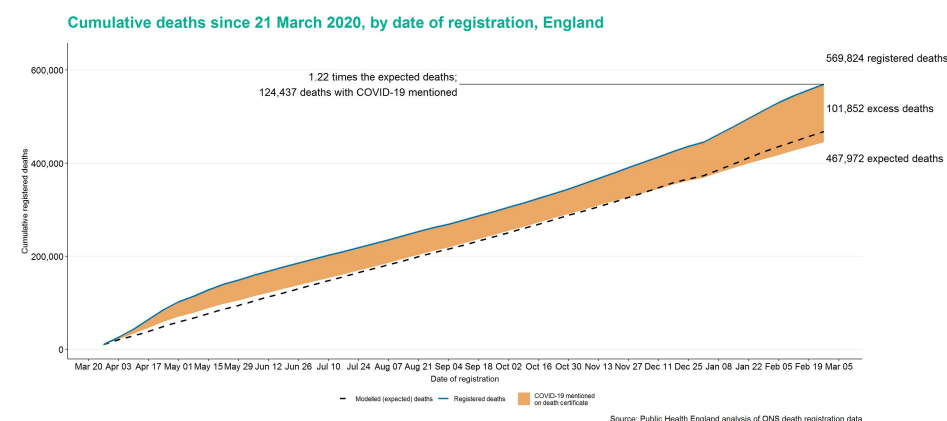
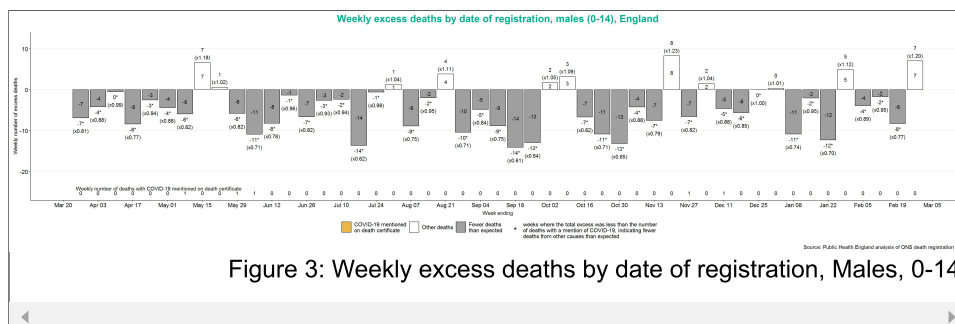


Figure 2: Cumulative deaths since 21 March 2020, by date of registration, England.

The trend in the total cumulative number of excess deaths in England since 21 March 2020 is shown in Figure 2.

Age Group Males

- 0-14
- 15-44
- 45-64
- 65-74
- 75-84
- 85+
- Total



The trend in excess deaths for males by age group is shown in Figures 3 to 9, which allows the extent of the excess each week to be compared over time and between age groups.

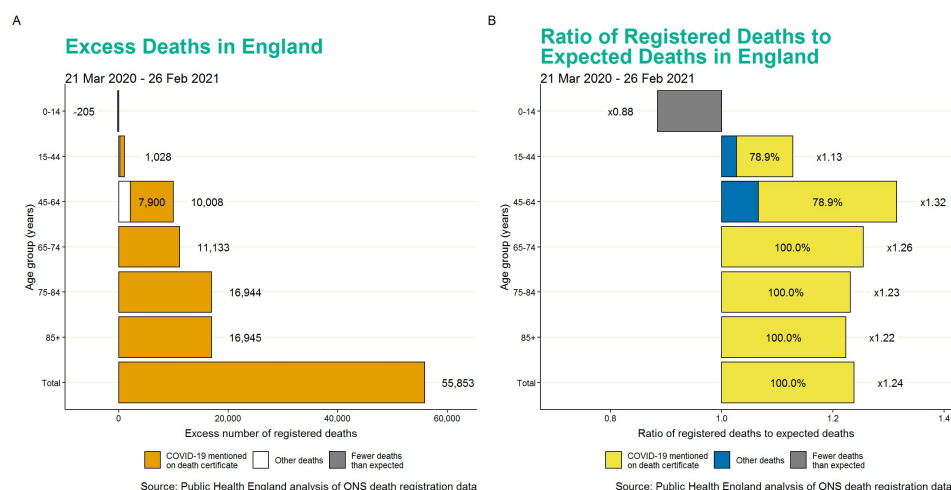


Figure 10: Cumulative excess deaths (A) and the ratio of registered deaths to expected deaths (B) by age group, males, England.

Figure 10A for males can be used to compare the cumulative total of excess deaths since 21 March 2020 between age groups.

Figure 10B compares the cumulative total of excess deaths among males with the number which would have been expected based on the modelled estimates for earlier years. Where the ratio of observed to expected is less than 1, this is shown in grey. The proportion of the excess where COVID-19 was mentioned on the death certificate is shown in yellow.

Table 1 - Males

Age group (years)	Registered deaths	Expected deaths	Ratio registered / expected	Excess deaths	COVID-19 deaths	COVID-19 deaths as % excess
0-14	1,568	1,773	0.88	-205	5	-
15-44	9,031	8,003	1.13	1,028	811	78.9%
45-64	41,775	31,767	1.32	10,008	7,900	78.9%
65-74	54,768	43,635	1.26	11,133	12,058	>100%*
75-84	90,102	73,158	1.23	16,944	22,890	>100%*
85+	92,815	75,870	1.22	16,945	23,888	>100%*
Total	290,059	234,206	1.24	55,853	67,552	>100%*

* the total excess was less than the number of deaths with a mention of COVID-19, indicating fewer deaths from other causes than expected

Why ratios are important

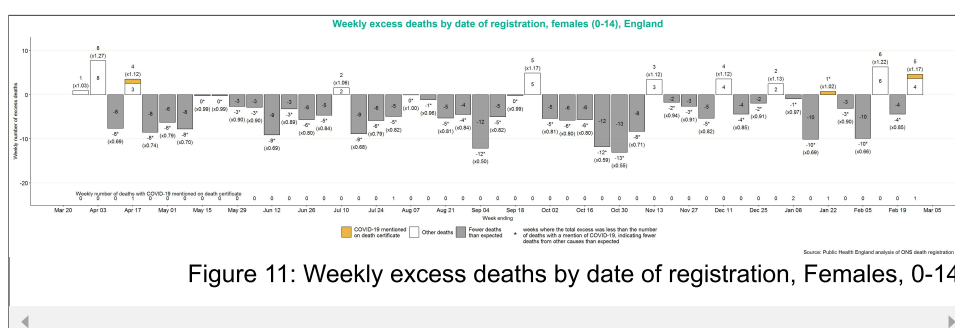
Ratios can be useful for comparing between groups when the expected number is very different between groups.

For example, if group A had 5 excess deaths and group B had 10, it could appear that the impact was twice as high in group B. However, if the expected number of deaths was 1 in group A and 5 in group B, and the registered numbers of deaths were 6 and 15 respectively, then the ratios would show that group A experienced 6 times the number of deaths compared to expected, while group B experienced 3 times the number expected. Therefore, the actual relative impact is higher in group A.

The ratios presented in this report are relative to historical trends within each group, and not in relation to another group. For example, in the ethnicity section the ratio for the Asian group is the ratio between deaths in this group registered in 2020 and the estimate of expected deaths in the Asian group based on the preceding 5 years. It is not the ratio between the Asian group and another ethnic group.

Age Group Females

• 0-14 • 15-44 • 45-64 • 65-74 • 75-84 • 85+ • Total



The trend in excess deaths for females by age group is shown in Figures 11 to 17, which allows the extent of the excess each week to be compared over time and between age groups.

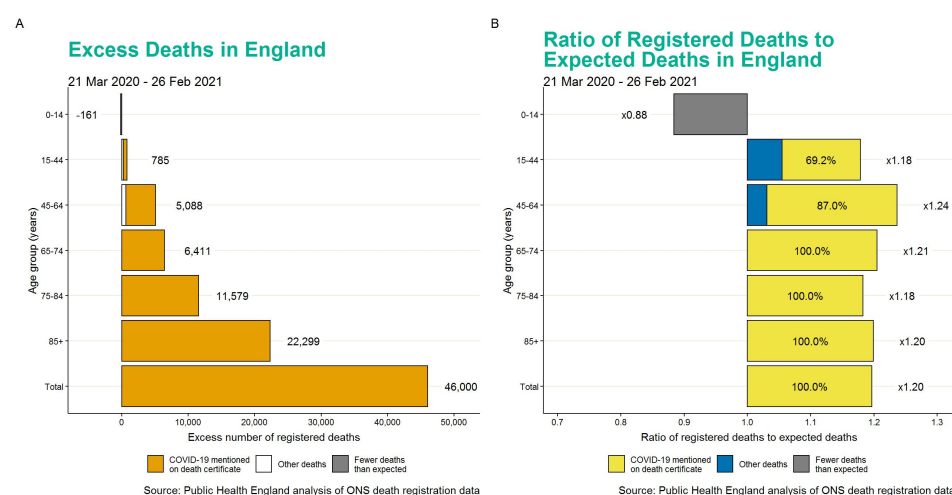


Figure 18: Cumulative excess deaths (A) and the ratio of registered deaths to expected deaths (B) by age group, females, England.

Figure 18A for females can be used to compare the cumulative total of excess deaths since 21 March 2020 between age groups.

Figure 18B shows the ratio of the observed to the expected deaths by age group among females since 21 March 2020. This chart can be used to compare the relative excess mortality between age groups.

Table 2 - Females

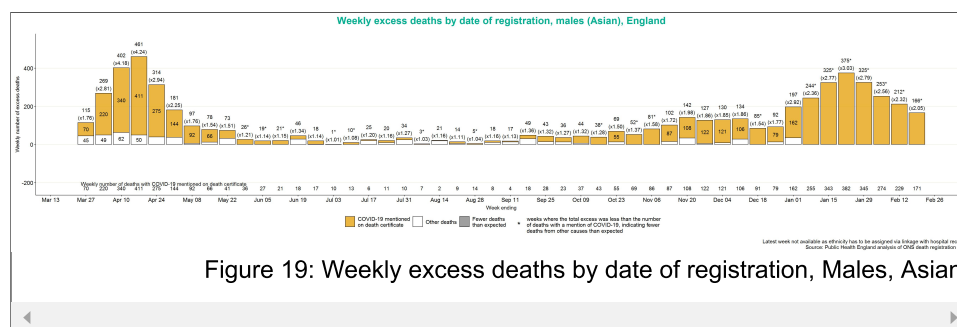
Table 2 - Females

Age group (years)	Registered deaths	Expected deaths	Ratio registered / expected	Excess deaths	COVID-19 deaths	COVID-19 deaths as % excess
0-14	1,226	1,387	0.88	-161	6	-
15-44	5,182	4,397	1.18	785	543	69.2%
45-64	26,581	21,493	1.24	5,088	4,427	87.0%
65-74	37,678	31,267	1.21	6,411	7,073	>100%*
75-84	74,879	63,300	1.18	11,579	16,384	>100%*
85+	134,219	111,920	1.20	22,299	28,452	>100%*
Total	279,765	233,765	1.20	46,000	56,885	>100%*

*the total excess was less than the number of deaths with a mention of COVID-19, indicating fewer deaths from other causes than expected

Ethnic Group Males

• Asian • Black • Mixed • Other • White



The trend in excess deaths for males is shown in Figures 19 to 23, which allows the extent of the excess each week to be compared over time and between ethnic groups.

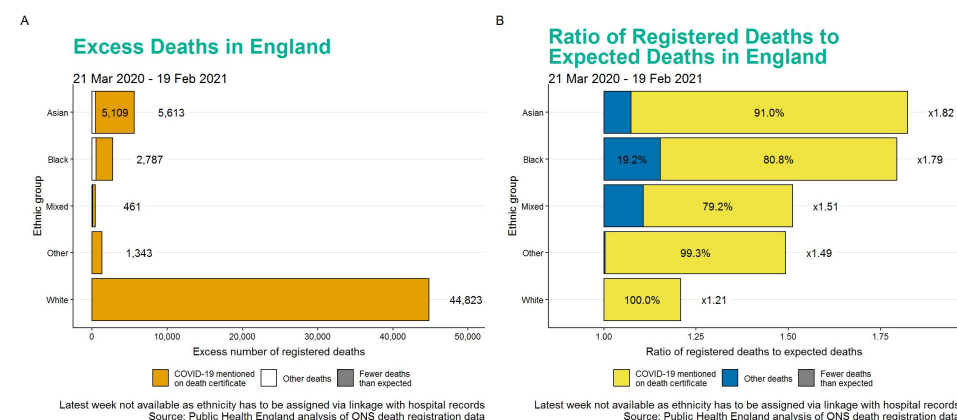


Figure 24: Cumulative excess deaths (A) and the ratio of registered deaths to expected deaths (B) by ethnic group, males, England.

Figure 24A for males can be used to compare the cumulative total of excess deaths since 21 March 2020 between ethnic groups.

Figure 24B shows the ratio of the observed to the expected deaths by ethnic group among males since 21 March 2020. This chart can be used to compare relative excess mortality between ethnic groups.

Table 3 - Males

Ethnic group	Registered deaths	Expected deaths	Ratio registered / expected	Excess deaths	COVID-19 deaths	COVID-19 deaths as % excess
Asian	12,428	6,815	1.82	5,613	5,109	91.0%
Black	6,298	3,511	1.79	2,787	2,251	80.8%
Mixed	1,362	901	1.51	461	365	79.2%
Other	4,066	2,723	1.49	1,343	1,335	99.3%
White	259,862	215,039	1.21	44,823	57,022	>100%*

* the total excess was less than the number of deaths with a mention of COVID-19, indicating fewer deaths from other causes than expected

Ethnic Group Females

• Asian • Black • Mixed • Other • White

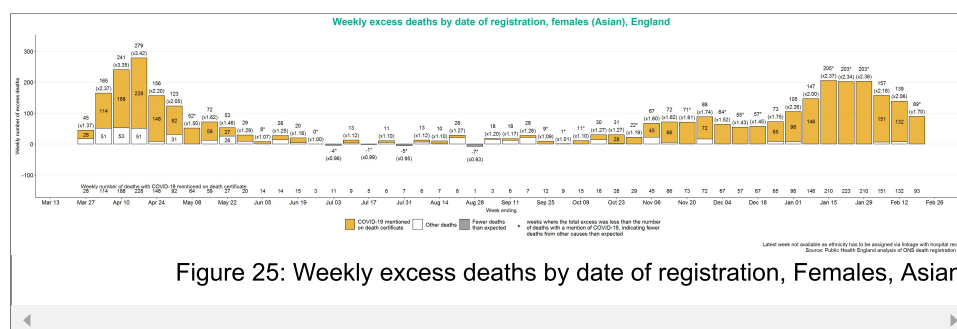


Figure 25: Weekly excess deaths by date of registration, Females, Asian.

The trend in excess deaths for females is shown in Figures 25 to 29, which allows the extent of the excess each week to be compared over time and between ethnic groups.

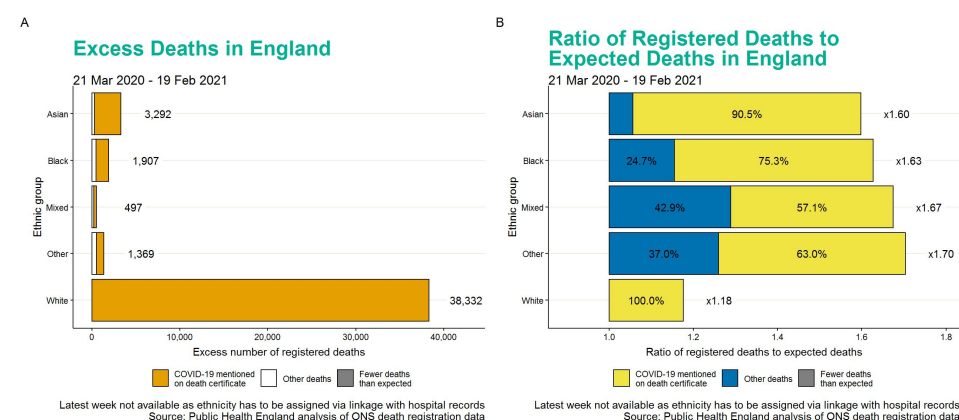


Figure 30: Cumulative excess deaths (A) and the ratio of registered deaths to expected deaths (B) by ethnic group, females, England.

Figure 30A for females can be used to compare the cumulative total of excess deaths since 21 March 2020 between ethnic groups.

Figure 30B shows the ratio of the observed to the expected deaths by ethnic group among females since 21 March 2020. This chart can be used to compare relative excess mortality between ethnic groups.

Table 4 - Females

Ethnic group	Registered deaths	Expected deaths	Ratio registered / expected	Excess deaths	COVID-19 deaths	COVID-19 deaths as % excess
Asian	8,798	5,506	1.60	3,292	2,980	90.5%
Black	4,951	3,043	1.63	1,907	1,437	75.3%
Mixed	1,233	736	1.67	497	284	57.1%
Other	3,314	1,946	1.70	1,369	863	63.0%
White	255,662	217,329	1.18	38,332	50,018	>100%*

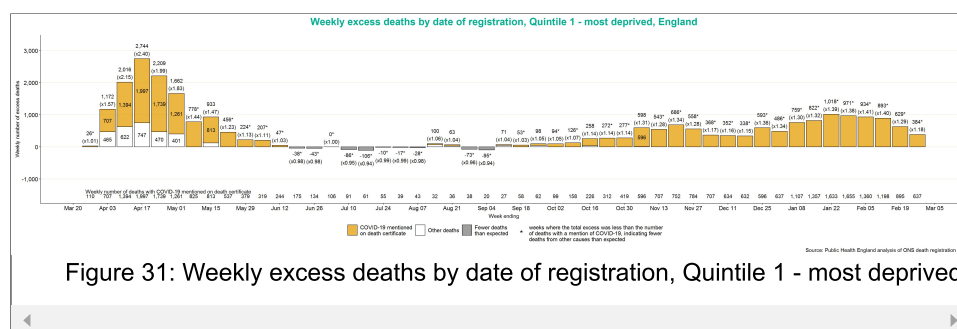
* the total excess was less than the number of deaths with a mention of COVID-19, indicating fewer deaths from other causes than expected

Ethnicity coding

Ethnicity is not collected at death registration, so these estimates were made by linking death records to hospital records to find the ethnicity of the deceased. This approach has some limitations. Ethnicity is supposed to be self-reported by the patient in hospital records, but this may not always be the case. Patients may also report different ethnicities in different episodes of care. For this analysis the most recent reported ethnic group was used. Population estimates have been used to calculate mortality rates to estimate the expected numbers of deaths, and these were based on the 2011 Census. This may lead to a mismatch between ethnicity reported in hospital records and self-reported ethnicity in the census. It appears, for example, that more people are assigned to the 'Other' group in hospital records than in the 2011 Census.

Deprivation

- Quintile 1 - most deprived • Quintile 2 • Quintile 3 • Quintile 4
- Quintile 5 - least deprived



The trend in excess deaths among deprivation quintiles is shown in Figures 31 to 35, which allows the extent of the excess each week to be compared over time and between deprivation quintiles.

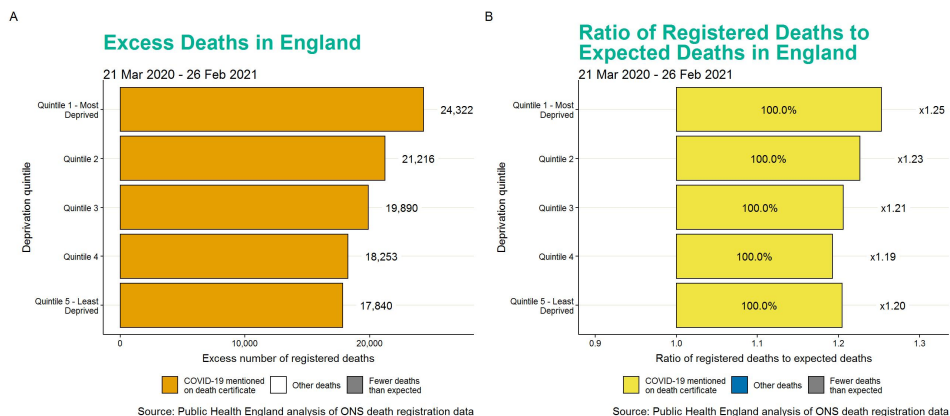


Figure 36: Cumulative excess deaths (A) and the ratio of registered deaths to expected deaths (B) by deprivation quintile, England

Figure 36A can be used to compare the cumulative total of excess deaths since 21 March 2020 between deprivation quintiles.

Figure 36B shows the ratio of the observed to the expected deaths by deprivation quintile since 21 March 2020. This chart can be used to compare relative excess mortality between deprivation quintiles.

Table 5

Deprivation quintile	Registered deaths	Expected deaths	Ratio registered / expected	Excess deaths	COVID-19 deaths	COVID-19 deaths as % excess
Quintile 1 - Most Deprived	120,462	96,140	1.25	24,322	28,403	>100%*
Quintile 2	114,821	93,605	1.23	21,216	26,507	>100%*
Quintile 3	116,403	96,513	1.21	19,890	24,524	>100%*
Quintile 4	113,002	94,749	1.19	18,253	23,529	>100%*
Quintile 5 - Least Deprived	105,136	87,296	1.20	17,840	21,474	>100%*

* the total excess was less than the number of deaths with a mention of COVID-19, indicating fewer deaths from other causes than expected

Region

- North East
- North West
- Yorkshire and The Humber
- East Midlands
- West Midlands
- East of England
- London
- South East
- South West

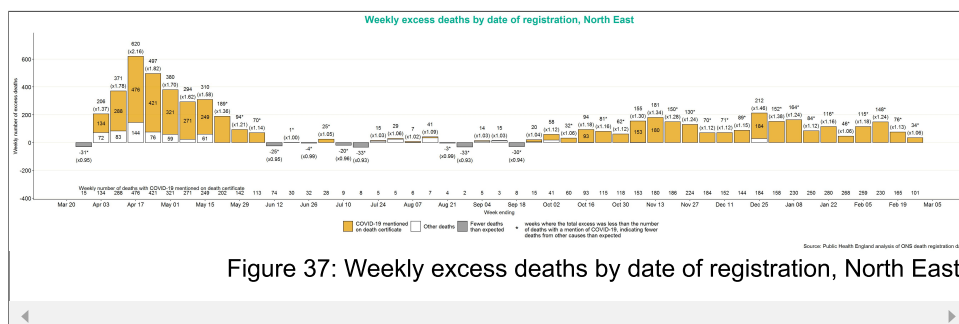


Figure 37: Weekly excess deaths by date of registration, North East.

The trend in excess deaths by region is shown in Figures 37 to 45, which allows the extent of the excess each week to be compared over time and for selected regions.

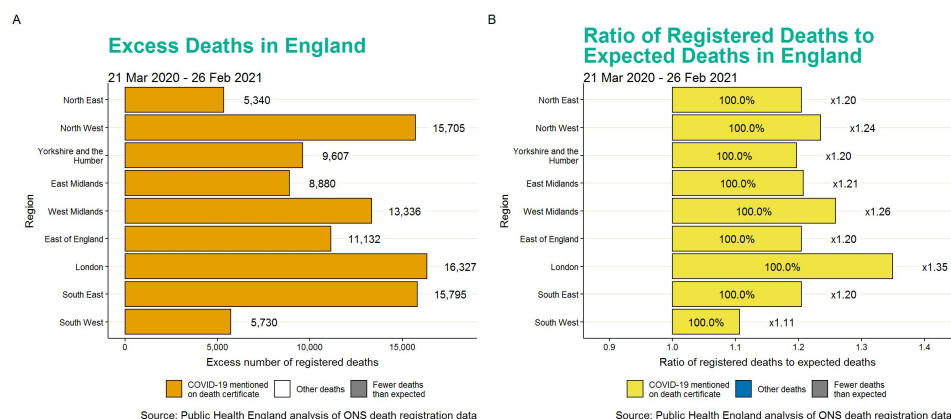


Figure 46: Cumulative excess deaths (A) and the ratio of registered deaths to expected deaths (B) by region, England.

Figure 46A can be used to compare the cumulative total of excess deaths since 21 March 2020 between regions.

Figure 46B shows the ratio of the observed to the expected deaths by region since 21 March 2020. This chart can be used to compare relative excess mortality between regions.

Table 6

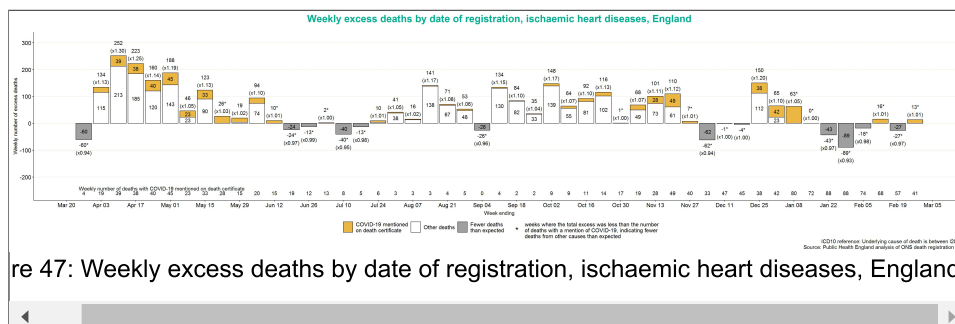
Region	Registered deaths	Expected deaths	Ratio registered / expected	Excess deaths	COVID-19 deaths	COVID-19 deaths as % excess
North East	31,455	26,115	1.20	5,340	6,648	>100%*
North West	82,532	66,827	1.24	15,705	19,527	>100%*
Yorkshire and the Humber	58,414	48,807	1.20	9,607	12,184	>100%*
East Midlands	51,591	42,711	1.21	8,880	10,971	>100%*
West Midlands	64,838	51,502	1.26	13,336	14,717	>100%*
East of England	65,533	54,401	1.20	11,132	14,359	>100%*
London	63,027	46,700	1.35	16,327	18,341	>100%*
South East	92,975	77,180	1.20	15,795	19,850	>100%*
South West	59,459	53,729	1.11	5,730	7,840	>100%*

* the total excess was less than the number of deaths with a mention of COVID-19, indicating fewer deaths from other causes than expected

Deaths by Underlying Cause

- Ischaemic heart diseases • Stroke (cerebrovascular diseases)
- Other circulatory diseases • Cancer
-

- Acute respiratory infections (including flu/pneumonia)
- Chronic lower respiratory diseases
- Dementia and Alzheimer's disease
- Cirrhosis and other liver disease
- Other causes (excluding COVID-19)
- Other respiratory diseases
- Diseases of the urinary system
- Parkinson's disease



re 47: Weekly excess deaths by date of registration, ischaemic heart diseases, England.

The trend in excess deaths for selected underlying causes of death (UCOD) is shown in Figures 47 to 58 which allow the extent of the excess to be compared over time for each cause. For each cause, the number of excess deaths without COVID-19 mentioned on the certificate (shown in the white part of the column) may be due to an increase in deaths from this cause during the period of the pandemic, but may also reflect under-reporting of deaths involving COVID-19.

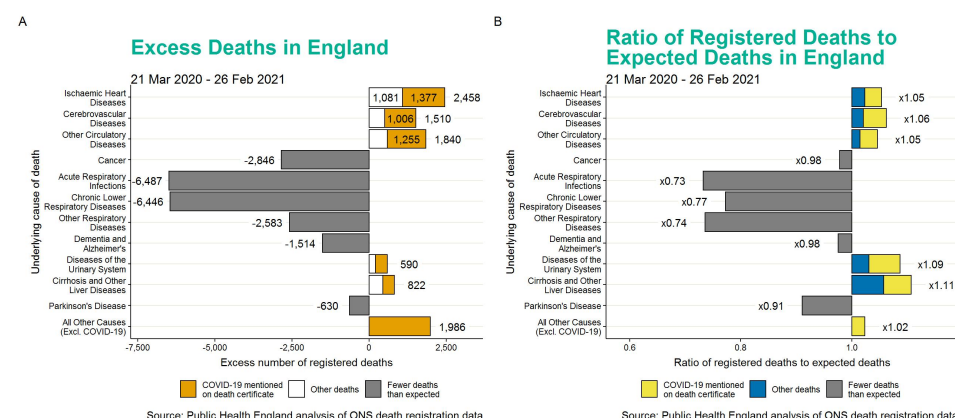


Figure 59: Cumulative excess deaths (A) and the ratio of registered deaths to expected deaths (B) by underlying cause of death, England

Figure 59A shows the total cumulative excess deaths by UCOD since 21 March 2020.

The chart can be used to compare the number of excess deaths for each UCOD.

This chart can be used to compare the cumulative total of excess deaths since 21 March 2020 between underlying causes.

Figure 59B shows the ratio of the observed to the expected deaths by UCOD since 21 March 2020. This chart can be used to compare relative excess mortality between underlying causes of death.

Table 7

* the total excess was less than the number of deaths with a mention of COVID-19, indicating fewer deaths from other causes than expected

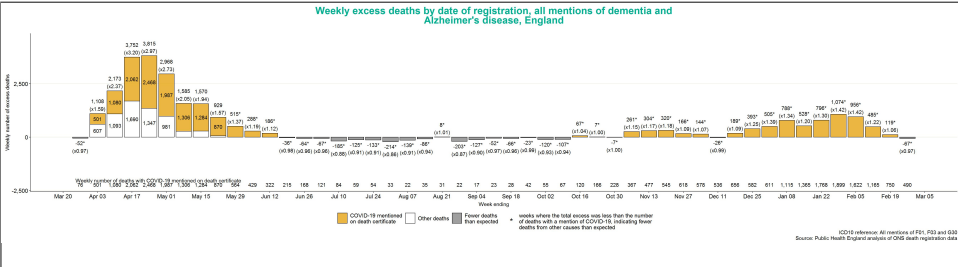
Table 7

Underlying cause of death	Registered deaths	Expected deaths	Ratio registered / Excess expected deaths		COVID-19 deaths	COVID-19 deaths as % excess
Ischaemic Heart Diseases	48,540	46,082	1.05	2,458	1,377	56.0%
Cerebrovascular Diseases	25,770	24,260	1.06	1,510	1,006	66.6%
Other Circulatory Diseases	41,628	39,788	1.05	1,840	1,255	68.2%
Cancer	127,748	130,594	0.98	-2,846	3,177	-
Acute Respiratory Infections	17,784	24,271	0.73	-6,487	12	-
Chronic Lower Respiratory Diseases	21,900	28,346	0.77	-6,446	335	-
Other Respiratory Diseases	7,193	9,776	0.74	-2,583	158	-
Dementia and Alzheimer's	60,063	61,577	0.98	-1,514	2,339	-
Diseases of the Urinary System	7,392	6,802	1.09	590	378	64.0%
Cirrhosis and Other Liver Diseases	8,486	7,664	1.11	822	378	46.0%
Parkinson's Disease	6,415	7,045	0.91	-630	264	-
All Other Causes (Excl. COVID-19)	85,181	83,195	1.02	1,986	2,035	>100%*

* the total excess was less than the number of deaths with a mention of COVID-19, indicating fewer deaths from other causes than expected

Deaths with a Mention of Specific Causes

- Dementia and Alzheimer's disease
- Acute respiratory infections (including flu/pneumonia)
- Diabetes Mellitus

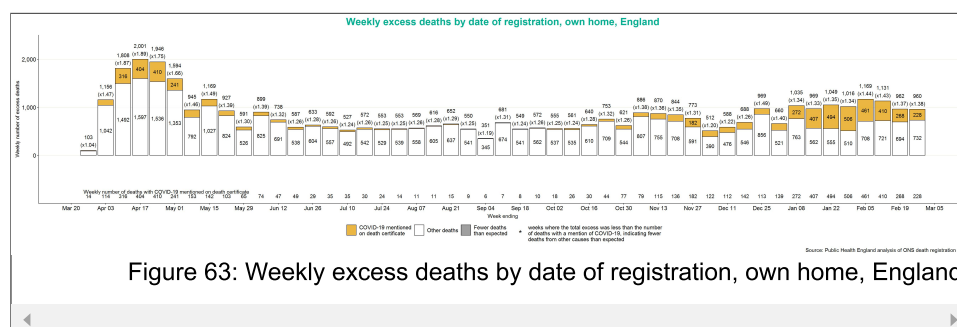


aths by date of registration, all mentions of dementia and Alzheimer's disease, England.

Figures 60 to 62 show weekly excess deaths where a specific cause was mentioned anywhere on the death certificate. These causes will have contributed to the death but not necessarily been the underlying cause.

Place of Death

- Own home • Care home (nursing or residential)
- Hospital (acute or community, not psychiatric) • Hospice • Other places



Figures 63 to 67 show the weekly total excess registered deaths by place of death since week ending 27 March 2020. These charts can be used to understand the trend in excess deaths by place of death. This analysis should be interpreted as excess deaths within each place of death compared to what would have been expected based on data over the past five years.

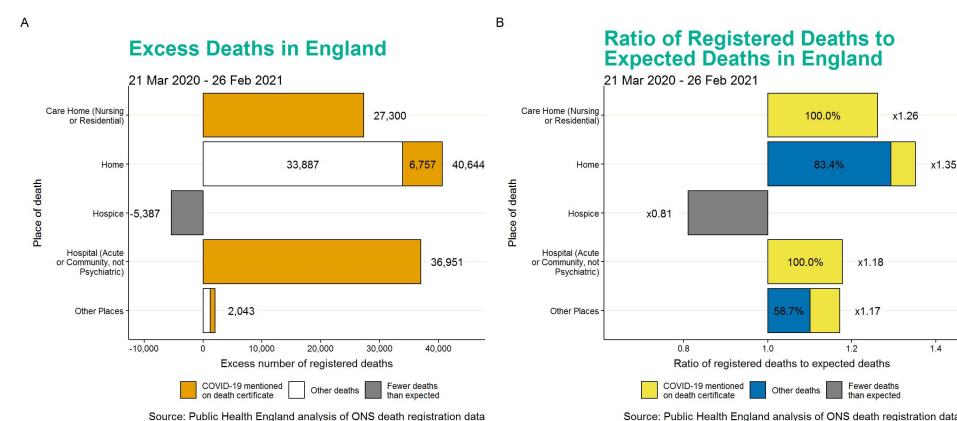


Figure 68A shows the total cumulative excess deaths in each place of death since 21 March 2020. The chart can be used to compare the numbers of excess deaths in each place of death. This chart can be used to compare the cumulative total of excess deaths since 21 March 2020 between places of death.

Figure 68B shows the ratio of the observed to the expected deaths in each place of death since 21 March 2020. This chart can be used to compare relative excess mortality between places of death.

Table 8

Table 8

Place of death	Registered deaths	Expected deaths	Ratio		COVID-19 deaths	COVID-19 deaths as % excess
			registered / expected	Excess deaths		
Care Home (Nursing or Residential)	131,783	104,483	1.26	27,300	29,287	>100%*
Home	156,251	115,607	1.35	40,644	6,757	16.6%
Hospice	22,988	28,375	0.81	-5,387	1,890	-
Hospital (Acute or Community, not Psychiatric)	244,819	207,868	1.18	36,951	85,660	>100%*
Other Places	13,983	11,940	1.17	2,043	843	41.3%

*the total excess was less than the number of deaths with a mention of COVID-19, indicating fewer deaths from other causes than expected

Comparisons to other measures of excess deaths in England

The Office for National Statistics also publishes a weekly report on excess deaths in England & Wales. The numbers reported by ONS are broadly in line with the overall excess death figures in this report but there are some differences as the 'expected' numbers in this report are not just the simple five-year average for 2015 to 2019, as used by ONS. As explained in the Methods, they are instead modelled estimates which adjust for factors such as the ageing of the population and the underlying trend in mortality rates from year to year.

PHE produces other estimates of excess mortality using the daily General Register Office model and the EuroMOMO model. These are reviewed in this blog (<https://publichealthmatters.blog.gov.uk/2021/02/08/counting-deaths-during-the-pandemic/>).

Updates to Excess Mortality Methodology, December 2020

Several changes to the models were introduced in the report for the week ending 18 December 2020 and subsequent reports:

- Estimates are modelled on weekly periods, rather than modelled on daily periods and aggregated to weeks for publication
- Weeks begin on Saturday and end on Friday, rather than Sunday to Saturday. This is consistent with ONS reporting weeks
- The ONS Annual Death Extract is used as the source for 2019 deaths, instead of the previous (provisional) weekly data from the Mortality & Births Information System (MBIS)
- 2019 mid-year population estimates are now used instead of 2019 population projections
- The model now includes additional interaction terms for age and time of year (seasonality), age and deprivation, and age and ethnic group

The methodology document has been updated to reflect these changes.

Links to historic reports

- [illegible]

- [excess-mortality-in-england-week-ending-16-Oct-2020.html](https://fingertips.phe.org.uk/static-reports/mortality-surveillance/excess-mortality-in-england-week-ending-16-Oct-2020.html)
(<https://fingertips.phe.org.uk/static-reports/mortality-surveillance/excess-mortality-in-england-week-ending-16-Oct-2020.html>)
- [excess-mortality-in-england-week-ending-09-Oct-2020.html](https://fingertips.phe.org.uk/static-reports/mortality-surveillance/excess-mortality-in-england-week-ending-09-Oct-2020.html)
(<https://fingertips.phe.org.uk/static-reports/mortality-surveillance/excess-mortality-in-england-week-ending-09-Oct-2020.html>)
- [excess-mortality-in-england-week-ending-02-Oct-2020.html](https://fingertips.phe.org.uk/static-reports/mortality-surveillance/excess-mortality-in-england-week-ending-02-Oct-2020.html)
(<https://fingertips.phe.org.uk/static-reports/mortality-surveillance/excess-mortality-in-england-week-ending-02-Oct-2020.html>)
- [excess-mortality-in-england-week-ending-25-Sep-2020.html](https://fingertips.phe.org.uk/static-reports/mortality-surveillance/excess-mortality-in-england-week-ending-25-Sep-2020.html)
(<https://fingertips.phe.org.uk/static-reports/mortality-surveillance/excess-mortality-in-england-week-ending-25-Sep-2020.html>)
- [excess-mortality-in-england-week-ending-18-Sep-2020.html](https://fingertips.phe.org.uk/static-reports/mortality-surveillance/excess-mortality-in-england-week-ending-18-Sep-2020.html)
(<https://fingertips.phe.org.uk/static-reports/mortality-surveillance/excess-mortality-in-england-week-ending-18-Sep-2020.html>)
- [excess-mortality-in-england-week-ending-11-Sep-2020.html](https://fingertips.phe.org.uk/static-reports/mortality-surveillance/excess-mortality-in-england-week-ending-11-Sep-2020.html)
(<https://fingertips.phe.org.uk/static-reports/mortality-surveillance/excess-mortality-in-england-week-ending-11-Sep-2020.html>)
- [excess-mortality-in-england-week-ending-04-Sep-2020.html](https://fingertips.phe.org.uk/static-reports/mortality-surveillance/excess-mortality-in-england-week-ending-04-Sep-2020.html)
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- [excess-mortality-in-england-week-ending-28-Aug-2020.html](https://fingertips.phe.org.uk/static-reports/mortality-surveillance/excess-mortality-in-england-week-ending-28-Aug-2020.html)
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- [excess-mortality-in-england-week-ending-21-Aug-2020.html](https://fingertips.phe.org.uk/static-reports/mortality-surveillance/excess-mortality-in-england-week-ending-21-Aug-2020.html)
(<https://fingertips.phe.org.uk/static-reports/mortality-surveillance/excess-mortality-in-england-week-ending-21-Aug-2020.html>)
- [excess-mortality-in-england-week-ending-14-Aug-2020.html](https://fingertips.phe.org.uk/static-reports/mortality-surveillance/excess-mortality-in-england-week-ending-14-Aug-2020.html)
(<https://fingertips.phe.org.uk/static-reports/mortality-surveillance/excess-mortality-in-england-week-ending-14-Aug-2020.html>)
- [excess-mortality-in-england-week-ending-07-Aug-2020.html](https://fingertips.phe.org.uk/static-reports/mortality-surveillance/excess-mortality-in-england-week-ending-07-Aug-2020.html)
(<https://fingertips.phe.org.uk/static-reports/mortality-surveillance/excess-mortality-in-england-week-ending-07-Aug-2020.html>)
- [excess-mortality-in-england-week-ending-31-Jul-2020.html](https://fingertips.phe.org.uk/static-reports/mortality-surveillance/excess-mortality-in-england-week-ending-31-Jul-2020.html)
(<https://fingertips.phe.org.uk/static-reports/mortality-surveillance/excess-mortality-in-england-week-ending-31-Jul-2020.html>)
- [excess-mortality-in-england-week-ending-24-Jul-2020.html](https://fingertips.phe.org.uk/static-reports/mortality-surveillance/excess-mortality-in-england-week-ending-24-Jul-2020.html)
(<https://fingertips.phe.org.uk/static-reports/mortality-surveillance/excess-mortality-in-england-week-ending-24-Jul-2020.html>)
- [excess-mortality-in-england-week-ending-17-Jul-2020.html](https://fingertips.phe.org.uk/static-reports/mortality-surveillance/excess-mortality-in-england-week-ending-17-Jul-2020.html)
(<https://fingertips.phe.org.uk/static-reports/mortality-surveillance/excess-mortality-in-england-week-ending-17-Jul-2020.html>)
- [excess-mortality-in-england-week-ending-10-Jul-2020.html](https://fingertips.phe.org.uk/static-reports/mortality-surveillance/excess-mortality-in-england-week-ending-10-Jul-2020.html)
(<https://fingertips.phe.org.uk/static-reports/mortality-surveillance/excess-mortality-in-england-week-ending-10-Jul-2020.html>)
- [excess-mortality-in-england-week-ending-03-Jul-2020.html](https://fingertips.phe.org.uk/static-reports/mortality-surveillance/excess-mortality-in-england-week-ending-03-Jul-2020.html)
(<https://fingertips.phe.org.uk/static-reports/mortality-surveillance/excess-mortality-in-england-week-ending-03-Jul-2020.html>)

Download the data

Click to download data as an excel spreadsheet (https://fingertips.phe.org.uk/static-reports/mortality-surveillance/weekly_chart_data.xlsx)

Click to download data as CSV (https://fingertips.phe.org.uk/static-reports/mortality-surveillance/weekly_chart_data.csv)

Code repository

The code used to create this report is stored here
(<https://github.com/publichealthengland/excess-deaths>).