Public Health England

Excess mortality in England, week ending 17 July 2020

Experimental Statistics

What is an experimental statistic? (https://www.ons.gov.uk/methodology/methodologytopicsandstatisticalconcepts/guidetoexperimentalstati

Generated on 2020-07-28

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 in 2020 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 day in 2020. Excess deaths are estimated by week and in total since 20 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

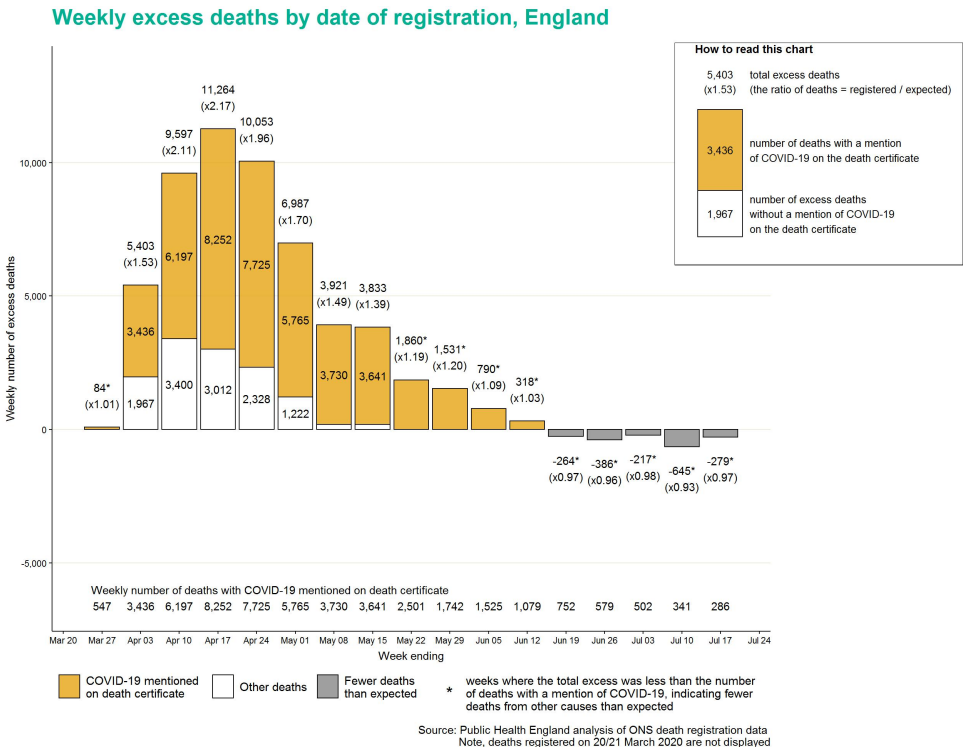

Figure 1: Weekly excess deaths by date of registration, England.

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 there were 10,053 excess deaths and this was almost double (1.96 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.

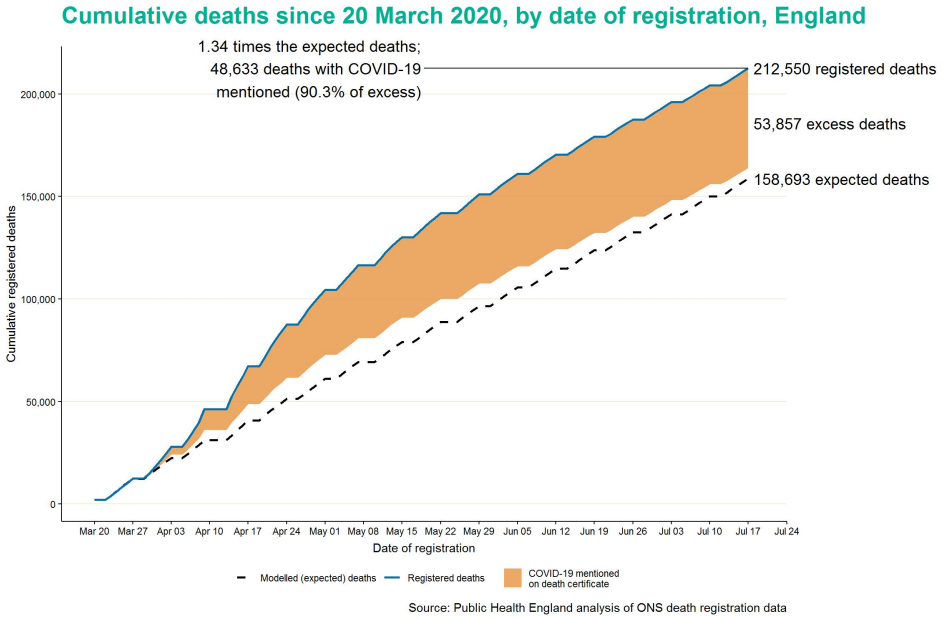

Figure 2: Cumulative deaths since 20 March 2020, by date of registration, England.

The trend in the total cumulative number of excess deaths in England since 20 March 2020 is shown in Figure 2.

Age Group Males

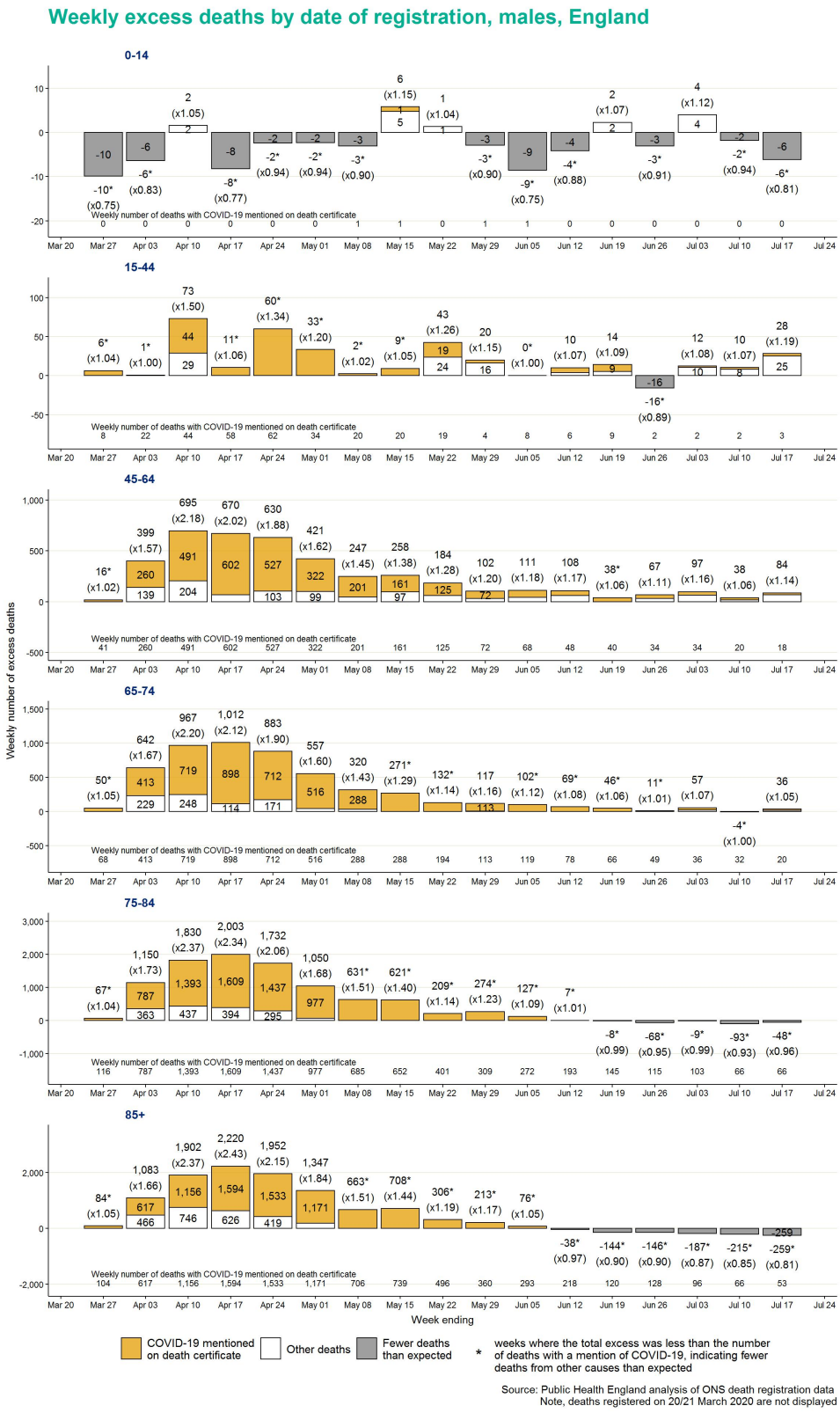

Figure 3: Weekly excess deaths, by date of registration and age group, males, England.

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

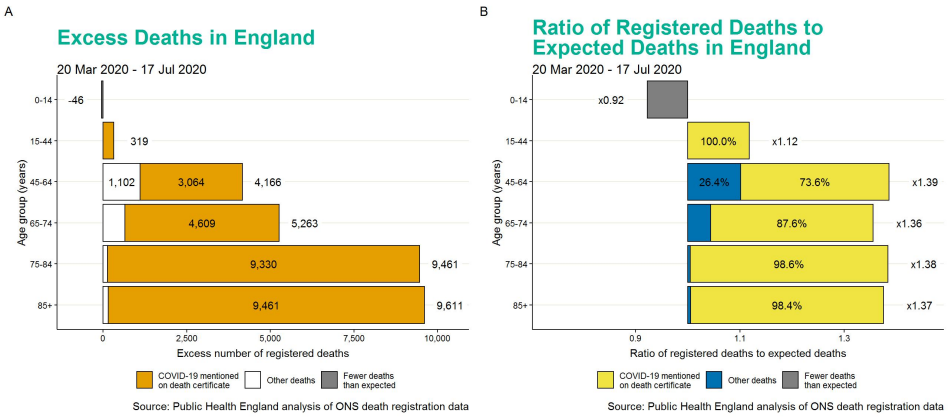

Figure 4: Cumulative excess deaths (A) and the ratio of registered deaths to expected deaths (B) by age group, males, England.

Figure 4A for males can be used to compare the cumulative total of excess deaths since 20 March 2020 between age groups.

Figure 4B 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	551	597	0.92	−46	4	-
15-44	3,025	2,706	1.12	319	323	>100%*
45-64	14,965	10,799	1.39	4,166	3,064	73.6%
65-74	20,082	14,819	1.36	5,263	4,609	87.6%
75-84	34,156	24,695	1.38	9,461	9,330	98.6%
85+	35,247	25,636	1.37	9,611	9,461	98.4%

*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.

Age Group Females

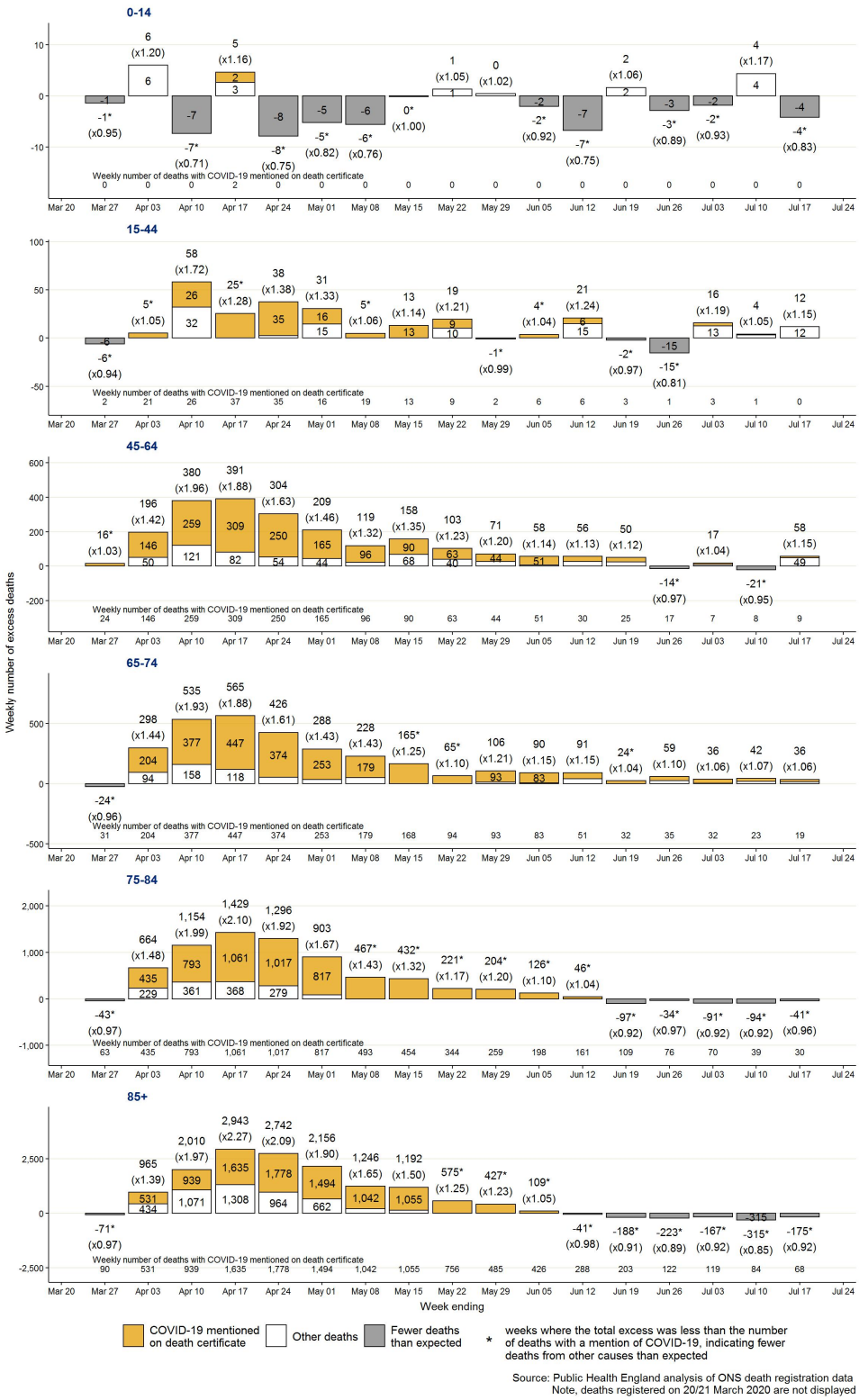

Figure 5: Weekly excess deaths, by date of registration and age group, females, England.

The trend in excess deaths for females by age group is shown in Figure 5, which allows the extent of the excess each week to be compared over time and between age groups.

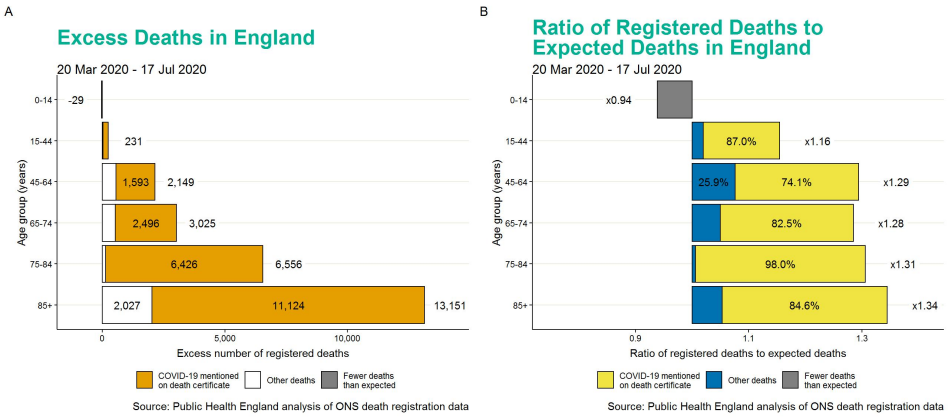

Figure 6: Cumulative excess deaths (A) and the ratio of registered deaths to expected deaths (B) by age group, females, England.

Figure 6A for females can be used to compare the cumulative total of excess deaths since 20 March 2020 between age groups.

Figure 6B shows the ratio of the observed to the expected deaths by age group among females since 20 March 2020. This chart can be used to compare the relative excess mortality between age groups.

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	438	467	0.94	−29	2	-
15-44	1,720	1,489	1.16	231	201	87.0%
45-64	9,460	7,311	1.29	2,149	1,593	74.1%
65-74	13,644	10,619	1.28	3,025	2,496	82.5%
75-84	27,973	21,417	1.31	6,556	6,426	98.0%
85+	51,289	38,138	1.34	13,151	11,124	84.6%

Ethnic Group Males

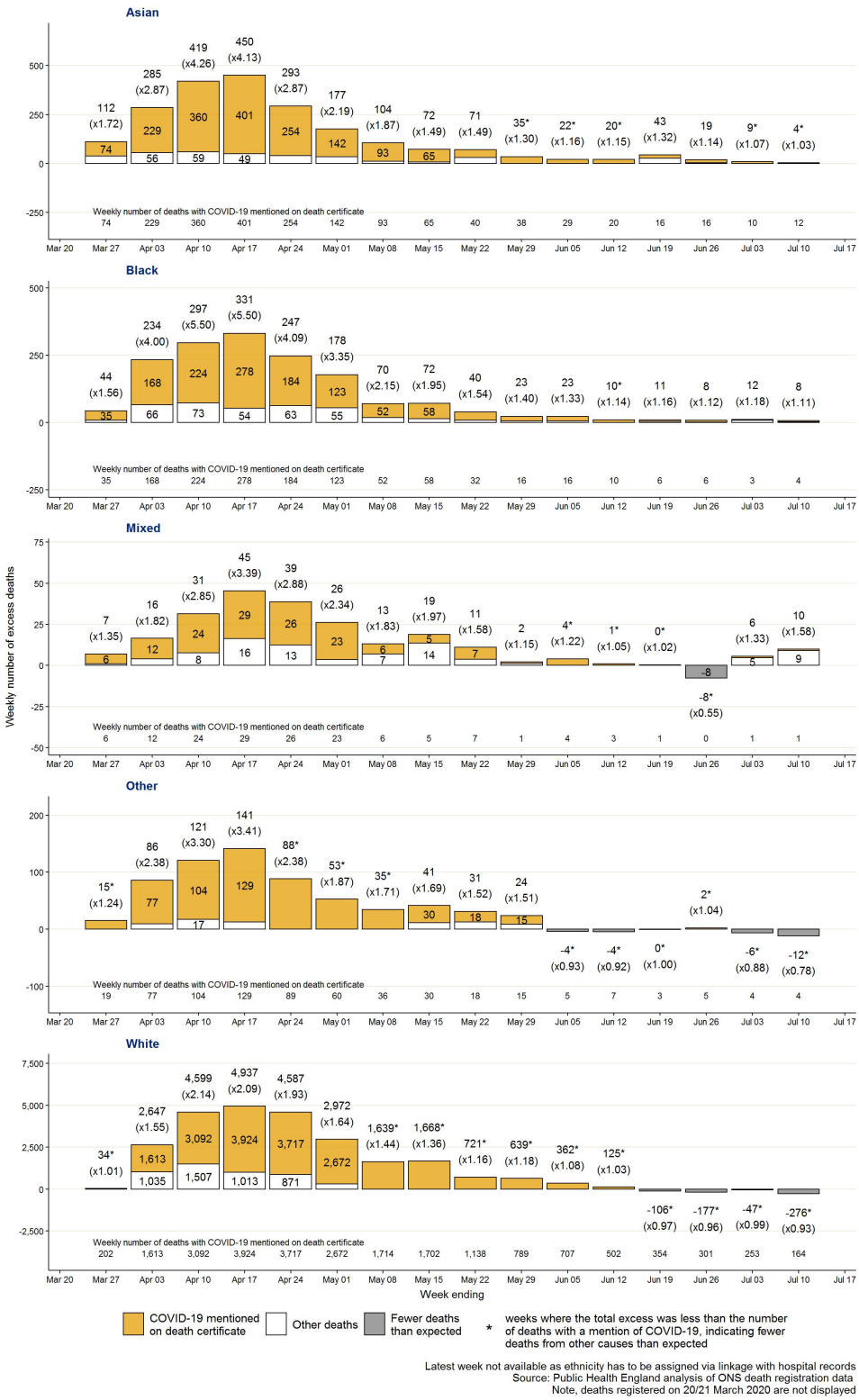

Figure 7: Weekly excess deaths, by date of registration and ethnic group, males, England.

The trend in excess deaths for males is shown in Figure 7, which allows the extent of the excess each week to be compared over time and between ethnic groups.

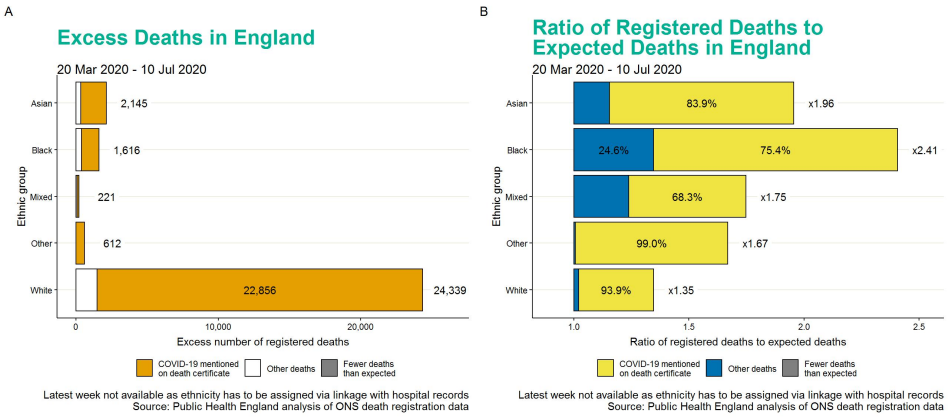

Figure 8: Cumulative excess deaths (A) and the ratio of registered deaths to expected deaths (B) by ethnic group, males, England.

Figure 8A for males can be used to compare the cumulative total of excess deaths since 20 March 2020 between ethnic groups.

Figure 8B shows the ratio of the observed to the expected deaths by ethnic group among males since 20 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	4,388	2,243	1.96	2,145	1,800	83.9%
Black	2,765	1,149	2.41	1,616	1,219	75.4%
Mixed	517	296	1.75	221	151	68.3%
Other	1,527	915	1.67	612	606	99.0%
White	94,712	70,372	1.35	24,339	22,856	93.9%

Ethnic Group Females

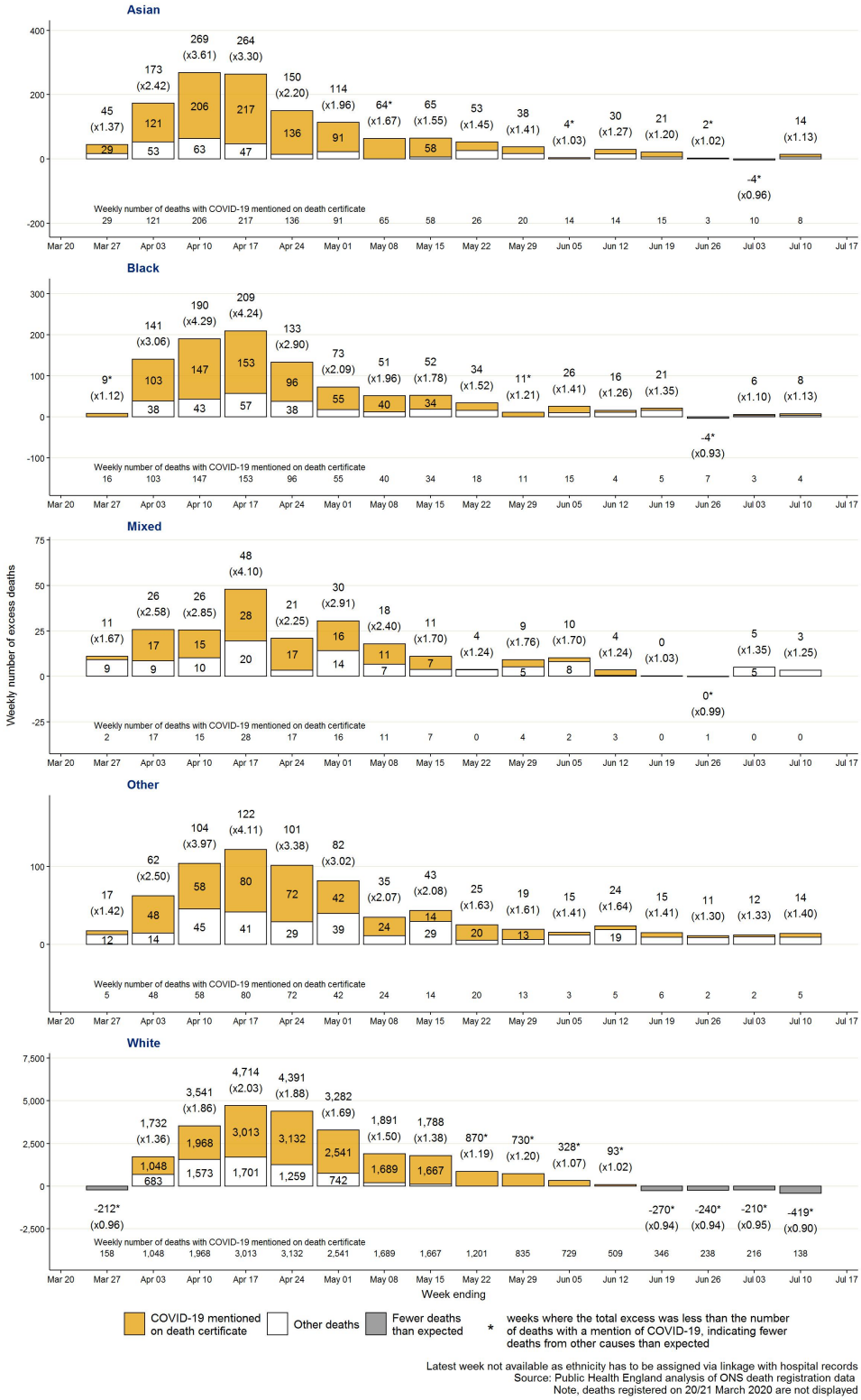

Figure 9: Weekly excess deaths, by date of registration and ethnic group, females, England.

The trend in excess deaths for females is shown in Figure 9, which allows the extent of the excess each week to be compared over time and between ethnic groups.

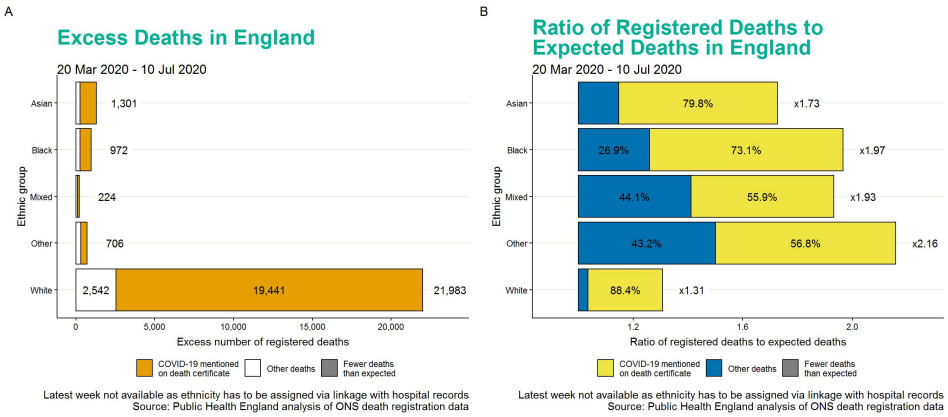

Figure 10: Cumulative excess deaths (A) and the ratio of registered deaths to expected deaths (B) by ethnic group, females, England.

Figure 10A for females can be used to compare the cumulative total of excess deaths since 20 March 2020 between ethnic groups.

Figure 10B shows the ratio of the observed to the expected deaths by ethnic group among females since 20 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	3,092	1,791	1.73	1,301	1,038	79.8%
Black	1,978	1,006	1.97	972	711	73.1%
Mixed	465	241	1.93	224	125	55.9%
Other	1,316	610	2.16	706	401	56.8%
White	93,500	71,517	1.31	21,983	19,441	88.4%

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

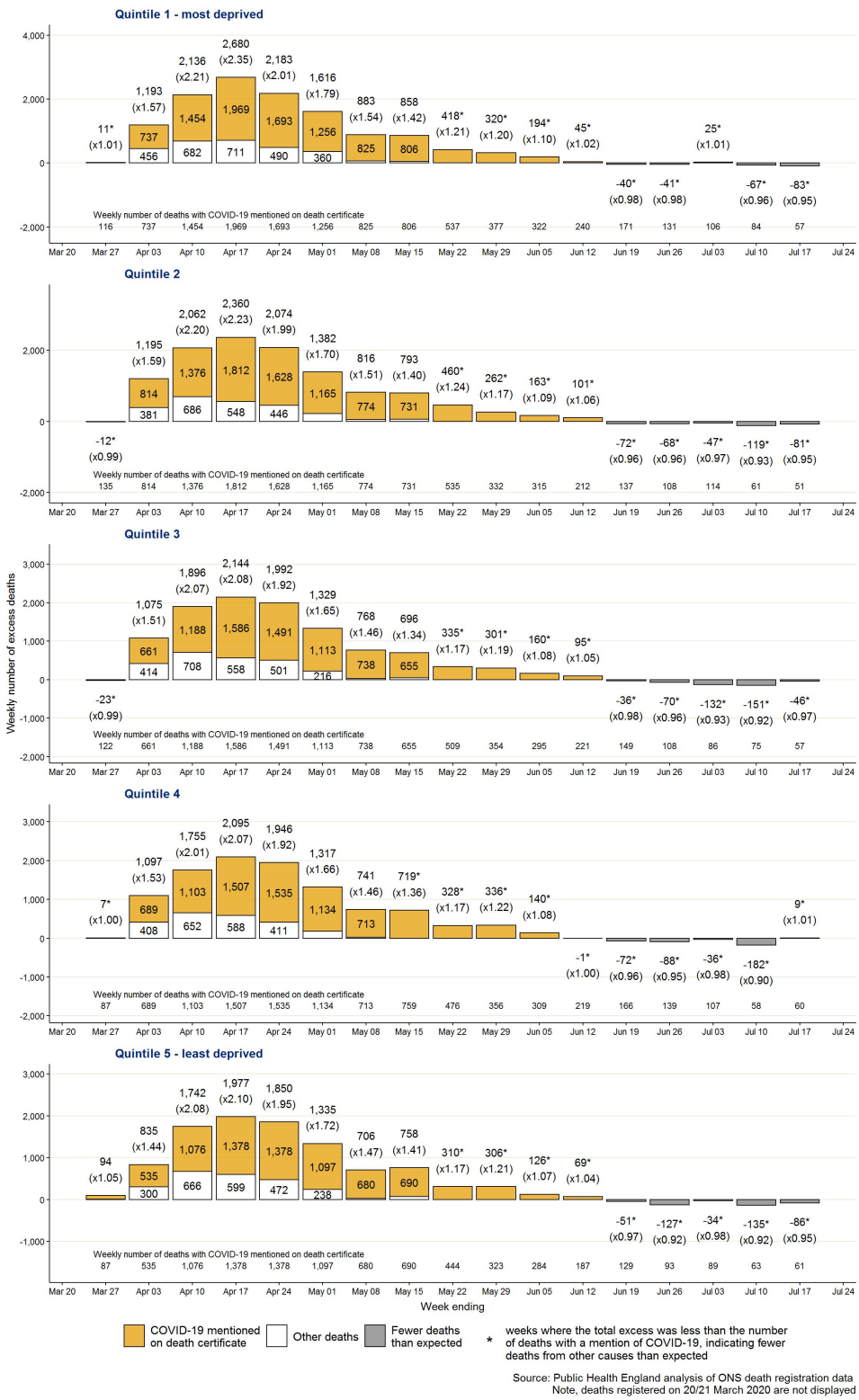

Figure 11: Weekly excess deaths, by date of registration and deprivation quintile, England

The trend in excess deaths among deprivation quintiles is shown in Figure 11, which allows the extent of the excess each week to be compared over time and between deprivation quintiles.

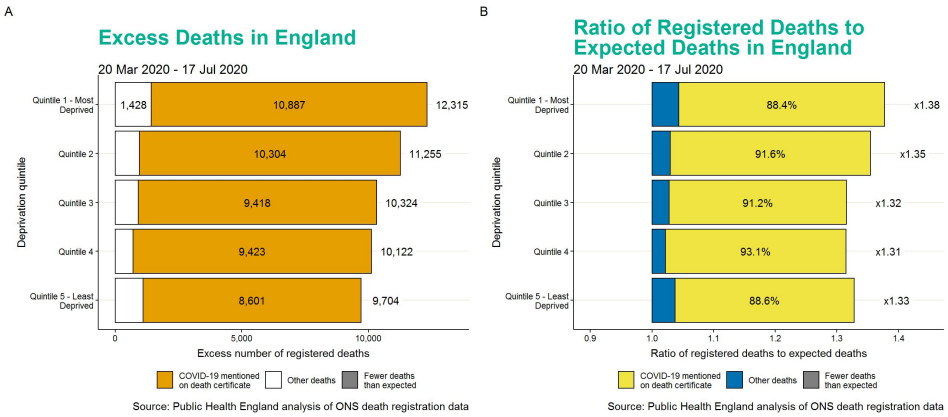

Figure 12: Cumulative excess deaths (A) and the ratio of registered deaths to expected deaths (B) by deprivation quintile, England

Figure 12A can be used to compare the cumulative total of excess deaths since 20 March 2020 between deprivation quintiles.

Figure 12B shows the ratio of the observed to the expected deaths by deprivation quintile since 20 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	44,937	32,622	1.38	12,315	10,887	88.4%
Quintile 2	43,003	31,748	1.35	11,255	10,304	91.6%
Quintile 3	43,062	32,738	1.32	10,324	9,418	91.2%
Quintile 4	42,262	32,140	1.31	10,122	9,423	93.1%
Quintile 5 - Least Deprived	39,286	29,582	1.33	9,704	8,601	88.6%

Region

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

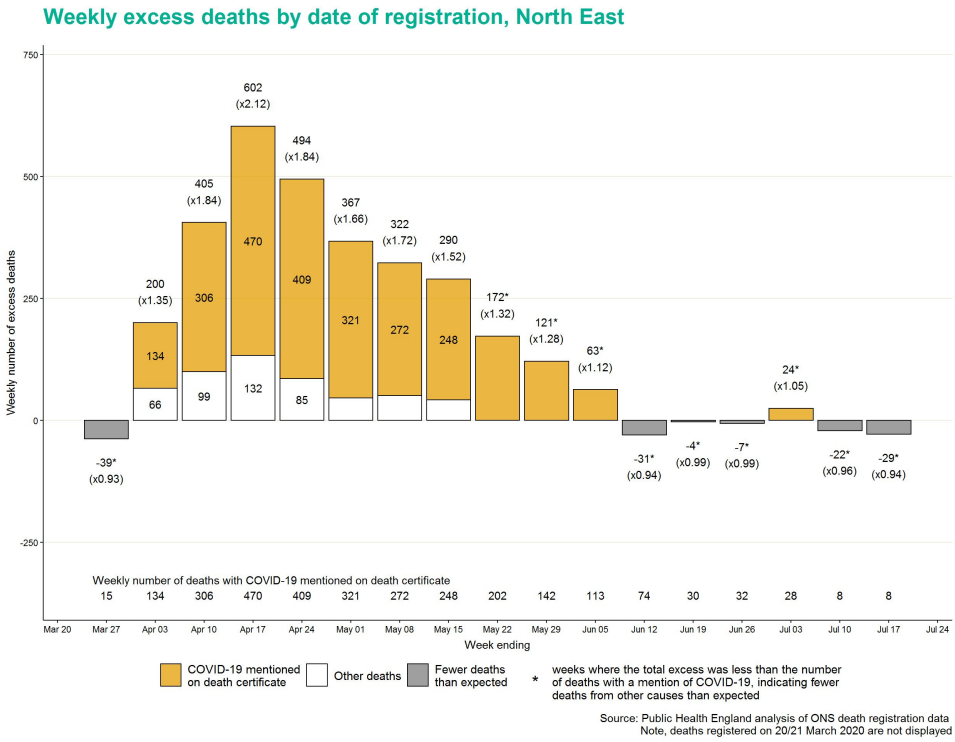

Figure 13: Weekly excess deaths by date of registration, North East.

The trend in excess deaths by region is shown in Figures 13 to 21, which allows the extent of the excess each week to be compared over time and for selected regions.

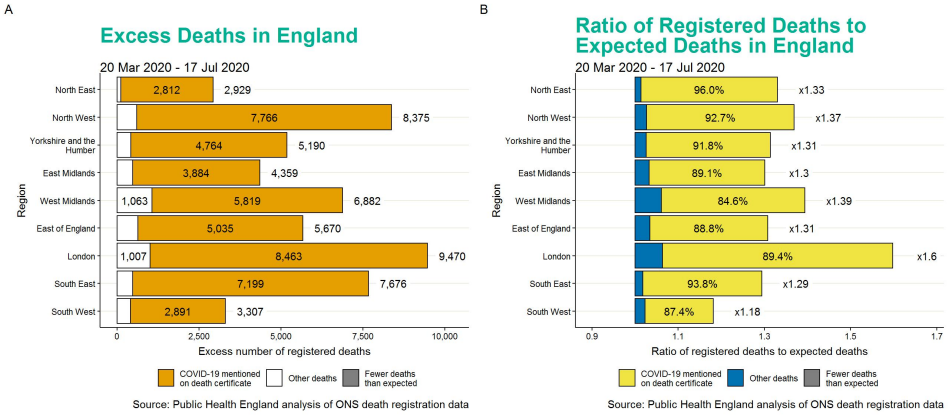

Figure 22: Cumulative excess deaths (A) and the ratio of registered deaths to expected deaths (B) by region, England.

Figure 22A can be used to compare the cumulative total of excess deaths since 20 March 2020 between regions.

Figure 22B shows the ratio of the observed to the expected deaths by region since 20 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	11,803	8,874	1.33	2,929	2,812	96.0%
North West	31,063	22,688	1.37	8,375	7,766	92.7%

Table 6

Yorkshire and the Humber	21,753	16,563	1.31	5,190	4,764	91.8%
East Midlands	18,842	14,483	1.30	4,359	3,884	89.1%
West Midlands	24,359	17,477	1.39	6,882	5,819	84.6%
East of England	24,080	18,410	1.31	5,670	5,035	88.8%
London	25,311	15,841	1.60	9,470	8,463	89.4%
South East	33,816	26,140	1.29	7,676	7,199	93.8%
South West	21,523	18,216	1.18	3,307	2,891	87.4%

Deaths by Underlying Cause

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

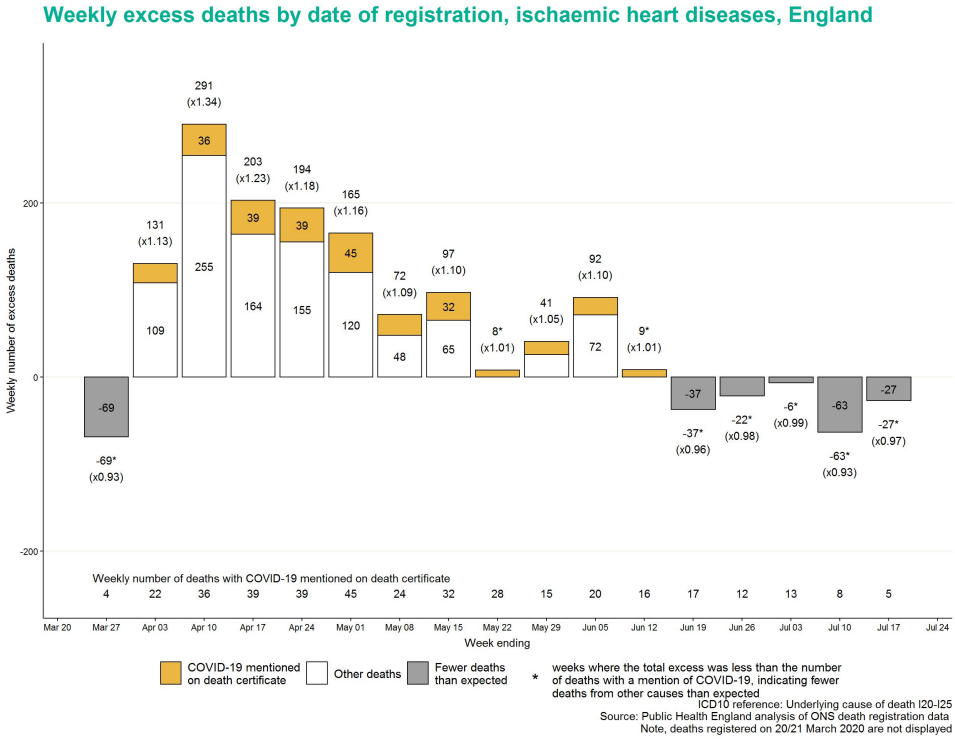

Figure 23: Weekly excess deaths by date of registration, ischaemic heart diseases, England.

The trend in excess deaths for selected underlying causes of death (UCOD) is shown in Figures 23 to 34 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.

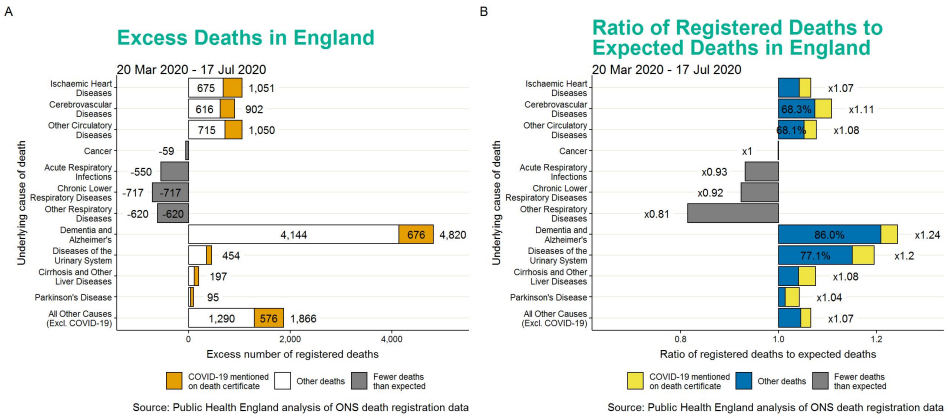

Figure 35: Cumulative excess deaths (A) and the ratio of registered deaths to expected deaths (B) by underlying cause of death, England

Figure 35A shows the total cumulative excess deaths by UCOD since 20 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 20 March 2020 between underlying causes.

Figure 35B shows the ratio of the observed to the expected deaths by UCOD since 20 March 2020. This chart can be used to compare relative excess mortality between underlying causes of death.

Table 7

Underlying cause of death	Registered deaths	Expected deaths	Ratio registered / expected	Excess deaths	COVID-19 deaths	COVID-19 deaths as % excess
Ischaemic Heart Diseases	17,002	15,951	1.07	1,051	376	35.8%
Cerebrovascular Diseases	9,240	8,338	1.11	902	286	31.7%
Other Circulatory Diseases	14,741	13,691	1.08	1,050	335	31.9%
Cancer	44,721	44,780	1.00	−59	873	-
Acute Respiratory Infections	7,444	7,994	0.93	−550	9	-
Chronic Lower Respiratory Diseases	8,611	9,328	0.92	−717	143	-
Other Respiratory Diseases	2,712	3,332	0.81	−620	60	-
Dementia and Alzheimer's	24,648	19,828	1.24	4,820	676	14.0%

Table 7

Diseases of the Urinary System	2,778	2,324	1.20	454	104	22.9%
Cirrhosis and Other Liver Diseases	2,807	2,610	1.08	197	91	46.1%
Parkinson's Disease	2,373	2,278	1.04	95	65	68.1%
All Other Causes (Excl. COVID-19)	30,434	28,568	1.07	1,866	576	30.9%

Deaths with a Mention of Specific Causes

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

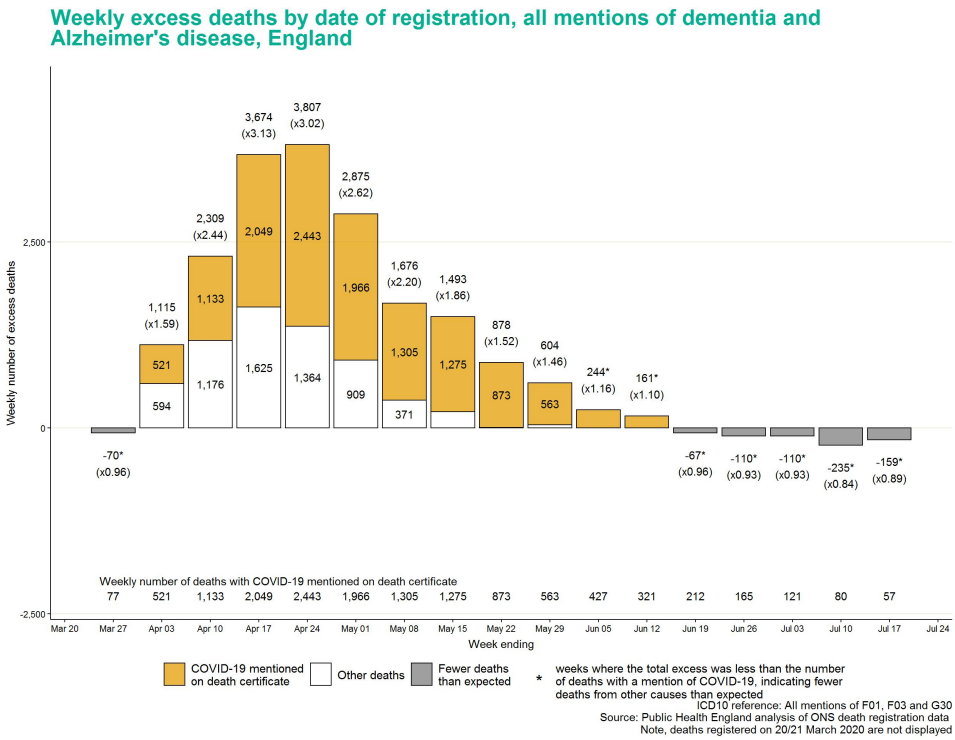

Figure 36: Weekly excess deaths by date of registration, all mentions of dementia and Alzheimer’s disease, England.

Place of Death

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

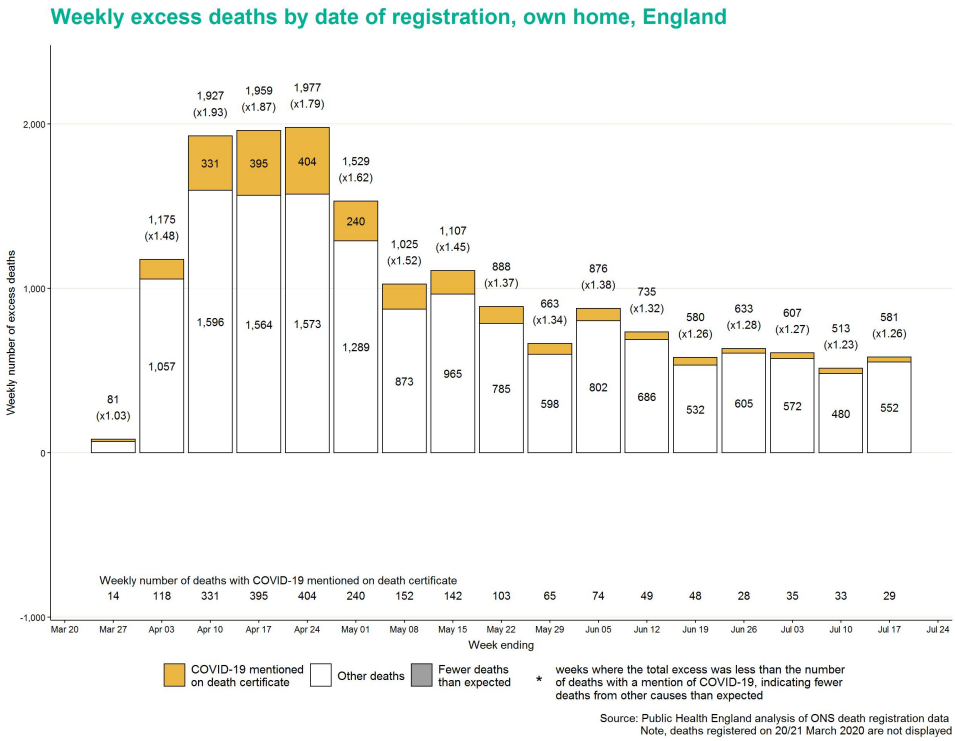

Figure 39: Weekly excess deaths by date of registration, own home, England.

Figures 39 to 43 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.

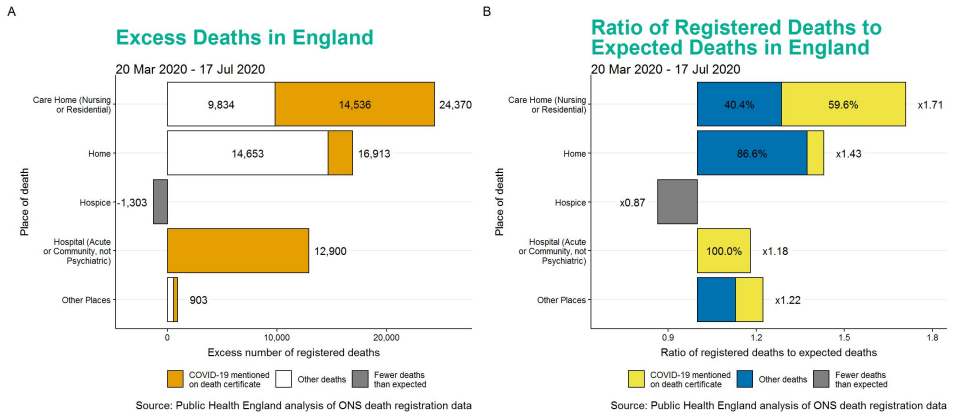

Figure 44: Cumulative excess deaths (A) and the ratio of registered deaths to expected deaths (B), by place of death, England.

Figure 44A shows the total cumulative excess deaths in each place of death since 20 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 20 March 2020 between places of death.

Figure 44B shows the ratio of the observed to the expected deaths in each place of death since 20 March 2020. This chart can be used to compare relative excess mortality between places of death.

Table 8

* 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 8

Place of death	Registered deaths	Expected deaths	Ratio registered / expected	Excess deaths	COVID-19 deaths	COVID-19 deaths as % excess
Care Home (Nursing or Residential)	58,737	34,367	1.71	24,370	14,536	59.6%
Home	56,195	39,282	1.43	16,913	2,260	13.4%
Hospice	8,350	9,653	0.87	−1,303	708	-
Hospital (Acute or Community, not Psychiatric)	84,314	71,414	1.18	12,900	30,749	>100%*
Other Places	4,954	4,051	1.22	903	380	42.1%

*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. The ONS report also defines weeks as seven-day periods ending on a Friday. Excess deaths in this report were estimated only for weekdays, with deaths registered on a Saturday added to the preceding Friday each week.

EuroMOMO is a European mortality monitoring programme that aims to measure excess deaths related to seasonal influenza and other public health threats that uses a standardised methodology across 24 European countries. The methodology used by EuroMOMO is similar to that used by the PHE model, however, the EuroMOMO model looks at deaths by date of occurrence, and the PHE model looks at deaths by date of registration. Because there is a time lag between date of occurrence of death and date of registration, analysis of excess deaths by date of occurrence requires a delay correction, the reliability of which improves over time. These two models produce very similar results but with small differences due to the delay correction applied by EuroMOMO.

The PHE Daily GRO mortality model is used in PHE’s COVID-19 surveillance report for all-cause mortality. It uses a 5-year average to estimate expected deaths, similar to that used by the ONS but with a trend included. It looks at deaths by date of occurrence based on rapidly reported deaths from the General Register Office and uses a registration delay correction, the reliability of which improves over time. Overall, the excess deaths are similar in the COVID-19 surveillance report and this report, but may show some differences in specific weeks due to use of occurrence date compared with registration date, and in recent weeks due to the delay corrections.

Links to historic reports

- 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)