



Development of the COVID-19 pandemic in the UK and similar countries (Part 2)

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COVID-19 Actuaries Response Group – Learn. Share. Educate. Influence.

Summary

In order to make meaningful international comparisons of the impact of the pandemic, it is important to allow for the dates at which infections began to take off in different countries and the relative population sizes. This note adjusts for these factors in order to provide a more appropriate comparison than is often presented and updates the results from an earlier article. Comparability with other countries remains a problem because of different approaches to determining the daily deaths reported as being from COVID-19. It is also likely that there is significant under-reporting of deaths in many countries, particularly outside of Europe and North America, and there is uncertainty about how many deaths are directly associated with COVID-19 and registered as such.

More information has become available about registered deaths in England & Wales, which suggests that deaths registered as being associated with COVID-19 are only a part of the story of the increased mortality that has been observed in the last few weeks. Comparison of weekly deaths with the average for the same weeks over the last five years gives one measure of the 'excess deaths', which may be directly or, more probably indirectly, the result of the pandemic.

Other relevant factors determining the death rate are the age and gender of those affected; preliminary consideration is given to the age and gender-related impact of deaths and the loading on normal mortality rates resulting from COVID-19 deaths.

Introduction

This note updates and expands my note published on 28 April. Shortly after that note was published the official daily figures for deaths in the UK began to include deaths in care homes and so jumped up sharply by 4419 in one day. After that the series of daily death figures was rebased to be consistent with the new definition. However, as is discussed later on in this note, there remain a significant number of deaths registered in the last few weeks which are not recorded as related to COVID-19 but which are materially higher than the normal level of deaths expected at this time of the year.

Different approaches to what is included in the daily reported figures continue to make it difficult to compare the experience of different countries. Belgium is thought to have one of the most inclusive approaches to reporting, which is one reason why their deaths are so high relative to population size. The figures for France jumped sharply on 7 April when they began to include deaths in care homes in the daily published numbers of deaths.

As explained in the previous note, my comparisons allow for the different starting points of the pandemic in different countries, by taking Day 1 for each country to be when deaths were reported from coronavirus at 0.8 per million of the population¹. This implies that Italy is 14 days ahead of the

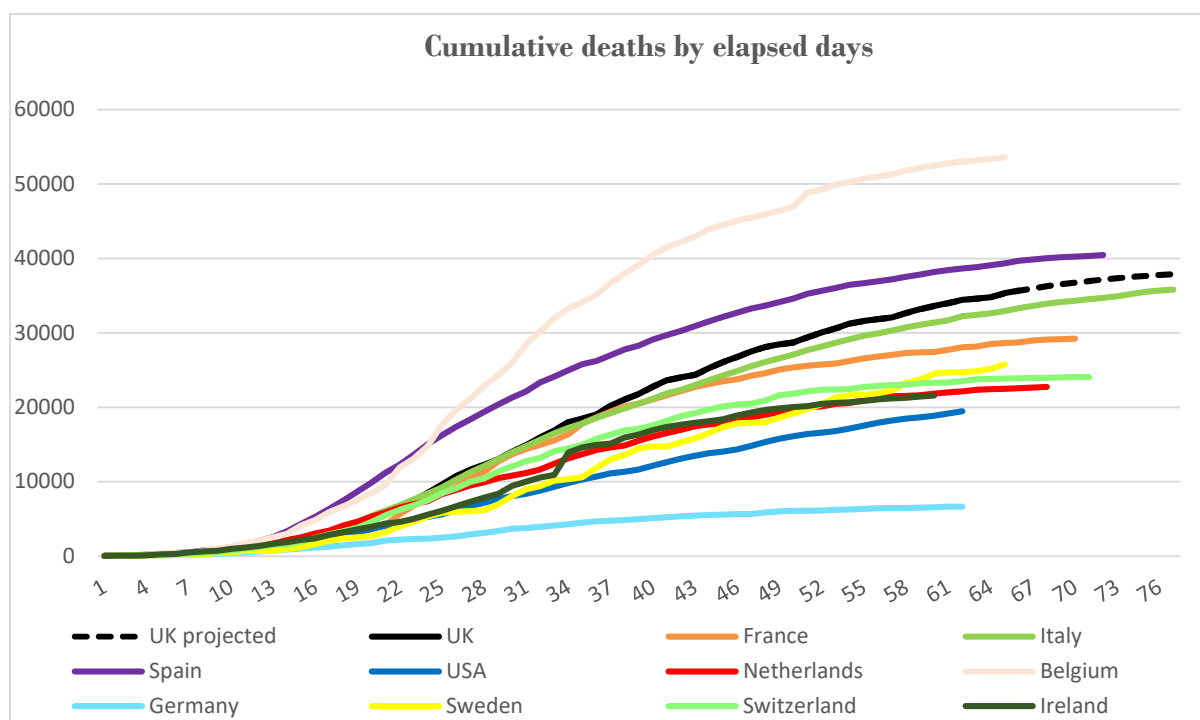
¹ Some graphs prepared by Public Health England make the assumption that Day 1 is the first day when 50 deaths are reported. For the UK this is roughly equivalent to 0.8 deaths per million total population.

UK, Spain 6 days ahead, Switzerland 5 days ahead, France 4 days ahead and Netherlands 2 days ahead. Belgium and Sweden are 1 day behind the UK, Germany 4 days behind² and Ireland 6 days behind.

In addition to re-assessing the starting date for each country in this way, the deaths have been scaled to deem each country to be of equivalent size to the UK, so that the progression of deaths and the daily death figures are comparable with what we might expect for the UK if the UK were following a similar path.

Death comparisons³

The graph of cumulative deaths⁴ shows the UK tracking a similar path to Italy although persistently now a little higher. Of large countries only Spain and Belgium are higher than the UK. The US (4 days behind), Sweden (1 day behind) and Switzerland (5 days ahead) are below the UK trajectory, whereas Germany (also 4 days behind) is noticeably lower at about 60% of the UK figures at the same duration. At the same point in the development of the pandemic the cumulative number of deaths in the UK are 7% higher than in Italy and 24% higher than in France, 37% higher than in Sweden and five times as high as in Germany. At the same point the UK is 10% below Spain and 34% below Belgium. The projection shown for the UK is estimated by comparison with the developments in Italy, which is 14 days ahead. On the basis of this projection the total number of hospital and care home deaths from COVID-19 for the UK asymptotically approaches around 40,000.

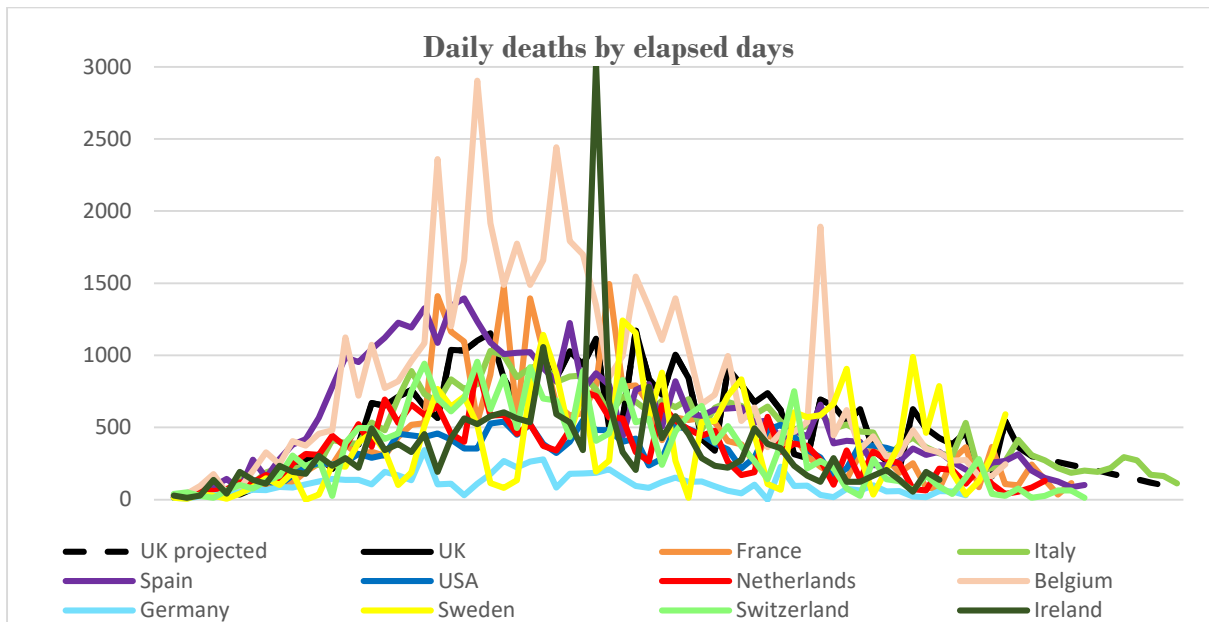


The second graph shows the daily deaths over the same periods. These are very volatile from day to day as the numbers are relatively small in population terms and there are variable delays in reporting. The projection for the UK broadly follows the Italian pattern and reached a peak number of deaths at the same point as Italy in the development of the pandemic (around 10/11 April in the UK).

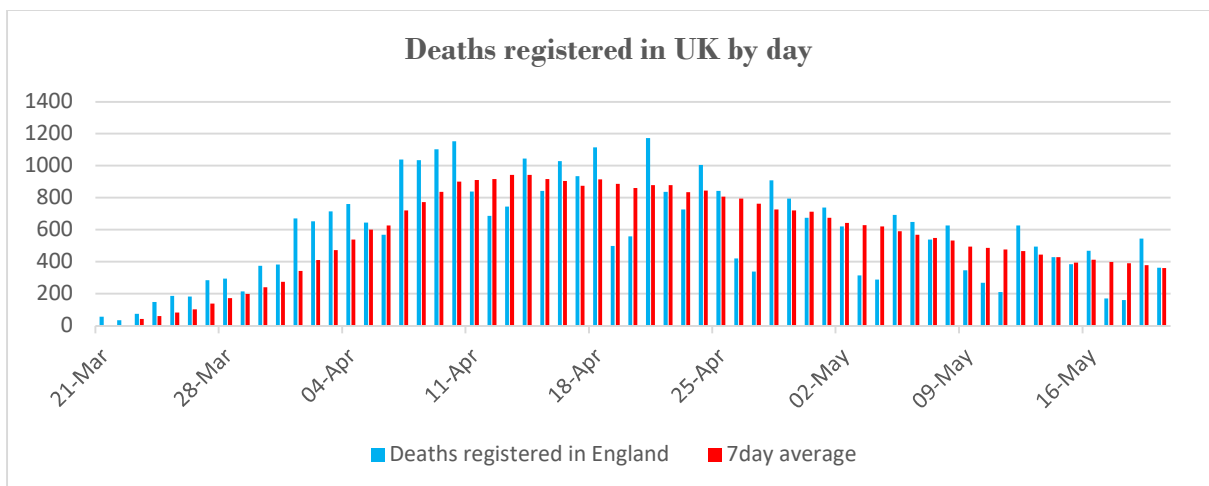
² In practice Germany may not be as far behind the UK as implied by this measure, since the level of deaths in Germany remains significantly lower than in the other countries monitored and the starting point could be taken to be a couple of days earlier.

³ The first two graphs drawn by author from statistics on <https://www.worldometers.info/coronavirus/xx>

⁴ The graphs use a normal scale rather than logarithmic as these are more readily understood by the layman and it is easier to distinguish the paths for different countries.



The pattern of deaths for the UK is shown more clearly in the third graph, which shows daily reported deaths from COVID-19 in the UK and also the 7-day moving average. Weekly totals are falling by about 20% each week and at 2518 for the week ending 20 May.



Source: Coronavirus (COVID-19) cases in the UK page on <https://coronavirus.data.gov.uk>, updated daily at around 18.00.

The Office for National Statistics publishes weekly information from death registrations which mention COVID-19 on the death certificate, albeit with a lag of several days. Figures published by ONS on 21 May, showing deaths for England & Wales registered in the weeks up to 8 May, disclosed a cumulative figure of 37,295 deaths which mentioned coronavirus as one or more of the causes of death. As of 8 May the daily figures for coronavirus deaths were reported at 31,241 for the whole of the UK. Nearly all the deaths registered with a mention of coronavirus were registered in the seven weeks from 21 March to 8 May. During this seven-week period there were a total of 121,002 deaths registered in England & Wales. The average number of deaths registered in these same seven reporting weeks over the past five years in England & Wales was 71,427, so by one measure the 'excess deaths' this year have been about 49,600 over those six weeks. Having regard to the number of registered deaths in those seven weeks which specifically mention coronavirus on the death certificate suggests that there were about 12,400 deaths more than usual in those seven weeks above and beyond those registered as having coronavirus as the only or a directly contributing, cause. Delving a little deeper, most of these 'excess deaths' are at ages 75 and over, with 4,900 males and 5,800 females. The remaining 1,600 excess deaths are nearly all at ages 45-74, with about two-thirds of the excess deaths in this younger age group being males.

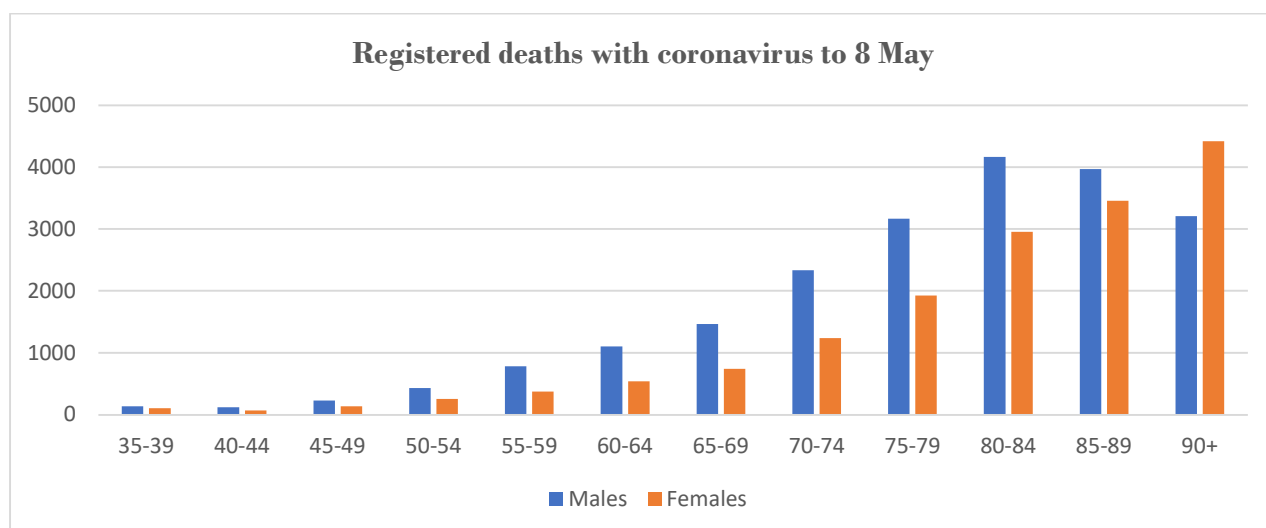
It is not possible at present to fully explain these excess deaths. As we have seen they are predominantly at ages 75 and over. Some may be deaths due to coronavirus where the virus was not explicitly recognised as a factor and some other cause of death appeared to be more relevant to record on the death certificate. There may also be some excess deaths from non-COVID-19 causes which occurred as a result of not seeking hospitalisation or treatment because of fears of contracting the virus in hospital or concern not to bother the NHS at this time of stress. One way and another it appears that the level of deaths resulting either directly or indirectly from the pandemic could be around 50,000 for England & Wales in those seven weeks. A corresponding figure for the United Kingdom would be about 58,000, compared to the 31,241 reported as COVID-19 deaths in the daily totals up to 8 May

The excess over the five-year average of deaths in a particular week is not a perfect measure, since there is always some variation from year to year. However, looking at deaths in the seven weeks in question over the past five years, the annual values have not been more than 4,000 above the average for the five years (in the relative heavy mortality year 2016) and not less than 2,600 below the average for the five years (in the relatively light mortality year 2017). So the excess deaths calculated against the average for the past five years is at least indicative of unusually high mortality this year, in addition to deaths specifically recorded as due to COVID-19.

Of all deaths registered in the latest week to 8 May, 31.1% mentioned COVID-19, reducing from 33.6% in the previous week. Over the latest seven weeks of registrations the proportion of COVID-19 deaths has been 30.7%.

For 37,295 deaths registered in England & Wales up to 8 May where COVID-19 is specifically mentioned on the death certificate, the ONS figures provide a break-down of cases by age-group and gender, which shows that 56.6% of deaths were males and 82.6% of cases were at ages 70 and over, as depicted in the graph below.

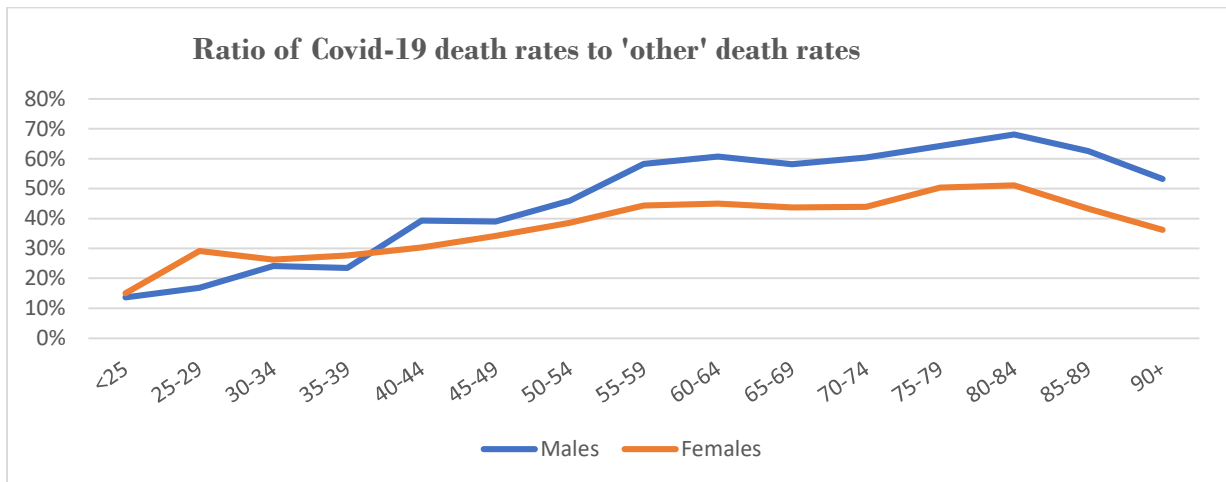
Other studies which have been published suggests that a high proportion of deaths occur in people with other underlying health conditions, including diabetes, obesity, respiratory problems, cancer, high blood pressure and heart conditions. All of these tend to be more prevalent in older people.



Source: ONS bulletin Deaths in England & Wales involving COVID-19 up to 8 May 2020, 19 May 2020

It is too early to draw specific conclusions from this, except that it appears that the death rate in otherwise completely healthy individuals is quite low and particularly at younger ages. There is some evidence also that genetic factors may play a part in determining the severity of the disease in those who become infected, with a higher number of cases than might be expected on a proportionate basis among those with an African or Asian heritage.

Mortality rates would be expected to go up quite steeply by age even without COVID-19. The graph below shows the ratio of COVID-19 death rates to death rates from all other causes by five-year age groups for the six weeks to 8 May 2020.



The ratio is between 55% and 60% for males and about 40% and 45% for females between the ages of 55 and 74, rising a little up to 84 and then falling off at the highest ages. The loading for COVID-19 would clearly be higher if a significant proportion of the 'other' deaths are in fact directly COVID-19 related, but if they are only indirectly the result of the pandemic the resulting higher values would not be an accurate reflection of the risk of dying from catching COVID-19. Total death rates are about 200% of the average of the last five years for males over 75 and about 180% for females over 75, based on the six weeks up to 8 May 2020.

The simplest comparison between countries at the global level is based on COVID-19 deaths per million of population. The Annex shows the 30 countries with the highest incidence on this basis. Sadly there are 10 small island (or small enclave) countries among these 30 (counting the Channel Islands as two), with populations of under 100,000, and for these the incidence rate is very sensitive to a small number of deaths. The tabulation does not take into account the maturity of the pandemic in different countries, with most European countries now well past the peak of deaths whereas countries in Latin America, the Middle East and Africa are probably still some way from reaching the peak. There is also a severe problem with comparability because of the anticipated under-reporting of COVID-19 deaths in many countries. There are also a large number of factors which may result in a lower incidence of infection and a lower case fatality rate in different countries, including the age distribution of the population (since younger people seem far less affected by it), climate, incidence and timing of lockdowns, different strains of the virus, how the virus was introduced, internal population movements and so on.

With the numbers of deaths now declining in most European countries, the next 'hot spots' may be in the Americas, with the USA, Brazil, Mexico, Ecuador and Peru showing rapid growth in the number of cases.

Chris Daykin
20 May 2020

Annex. Countries with highest deaths per million population (reported to 20 May 2020)

As at 20 May 2020	COVID deaths	COVID deaths per million
San Marino*	41	1208.1
Belgium	9,150	789.5
Andorra*	51	660.1
Spain	27,888	596.5
Italy	32,330	534.7
UK	35,704	525.8
France	28,132	431.0
Sweden	3,831	379.3
Sint Maarten*	15	349.8
Netherlands	5,748	335.4
Ireland	1,571	318.0
USA	94,936	286.8
Isle of Man*	24	282.2
Channel Islands*	44	253.1
Switzerland	1,892	218.7
Montserrat*	1	200.0
Luxembourg	109	174.1
Ecuador	2,888	163.7
Canada	6,028	159.7
Bermuda*	9	144.5
Portugal	1,263	123.8
Monaco*	4	101.9
Germany	8,265	98.7
Denmark	554	95.7
Peru	3,024	91.7
Brazil	18,894	88.9
Iran	7,183	85.5
China (Hubei)	4,634	79.2
Saint Martin*	3	77.6
Austria	633	70.3

* these are small countries with population of <100,000