



## Are this year's COVID-19 victims already 'on death row'?

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### Summary

Although many COVID-19 deaths involve those with chronic health problems (e.g. diabetics), such health problems are normal at high ages. People with managed conditions such as diabetes, even in the presence of adverse risk factors (e.g. obesity, smoking) would generally have several years of life expectancy at high ages. The contention that the majority of this year's COVID-19 victims would have died this year absent the coronavirus is incorrect.

Furthermore, it is a dangerous message as it could easily lead to an 'it doesn't matter' attitude to the health crisis, and in particular, could weaken the case for social distancing.

### Background

There has been comment and speculation in the media about the actual and likely future life expectancy of COVID-19 victims – often with an implication of 'it doesn't matter as they were about to die anyway'. This became a perceived official view when Professor Neil Ferguson said in a recent session (25 March) with the UK Parliament's Science and Technology Committee that 'the latest research suggested as many as half to two-thirds of deaths from coronavirus might have happened this year anyway, because most fatalities were among people at the end of their lives or with other health conditions'<sup>i</sup>.

### Data on COVID-19 deaths

Deaths from COVID-19 have generally been occurring at high ages. For instance:

- Italy: 84% of male deaths above age 70<sup>ii</sup>
- UK: 93% of deaths above age 65<sup>iii</sup>

At these ages, it is important to note that many people will have some form of 'existing condition'. For instance, in the UK, the 2018 Health Survey for England<sup>iv</sup> shows the following prevalence at ages 65 and over:

- Hypertension: 29%
- Diabetes: 16%
- Obesity: 30%

These proportions are certainly not less than the proportions of COVID-19 deaths with co-morbidities reported in China – for instance, diabetes (7%), hypertension (6%). While the change in country reduces comparability, it is clear that the prevalence of existing conditions at high ages is not out of line with the proportions being seen amongst those dying from COVID-19.

## Typical life expectancies of impaired lives

‘Impaired lives’ is a term used to denote people with health conditions associated with below-average life expectancy. The accurate calculation of life expectancies for impaired lives is a long established part of actuarial practice in the UK, given the importance of the ‘impaired life’ annuity sector.

For this bulletin, we have made use of a proprietary underwriting engine that calculates life expectancies for people according to age, gender, disease history, lifestyle (body-mass index, smoking habits) and various other factors. The engine was calibrated to very rich data, has been used by or on behalf of most of the UK’s annuity writers, and has been validated extensively against market data.

Using this underwriting engine, a life expectancy below a couple of years can be found only by assuming acute cancers, or other serious but less critical conditions at ages above 90, or such conditions conjoined with adverse risk factors (e.g. smoking) from the mid-80s.

For anything else, life expectancy is typically five years or more. For instance, the table below shows the life expectancy for obese male smokers for various combinations of age and disease. COPD (Chronic Obstructive Pulmonary Disease) is of particular interest in the context of a virus that kills through a pneumonia-like mechanism causing respiratory failure.

### Life expectancy bands

Age	Diabetes	COPD
75	>5	>5
80	3-5	>5
85	1-3	3-5
90	1-3	1-3

*Life expectancies are shown in broad bands for simplicity:*

**Red** <1 year (not found)

**Amber** 1 to 3 years

**Green** 3 to 5 years, or more than 5

By looking at men rather than women (men having a lower life expectancy) and considering the ‘obese smoker’ subset only of these impaired lives, this table shows a worst case scenario. But even with this extreme selection, we do not see life expectancy of below one year, and it takes a lot of ‘forcing’ the factors in the engine to find life expectancy as low as two or three years.

We should clarify, however, that life expectancy is a one-figure representation of a whole future lifetime, with mortality risk in every year. Thus, a life expectancy of e.g. five years does not of course mean you will live for five years – there would be appreciable mortality risk in the first year.

Although some of these cases would die over the course of a year in the absence of COVID-19, the growing study of frailty helps understand the process. Severe shocks such as COVID-19 lead to deaths in vulnerable people because COVID-19 overwhelms their already impaired ‘defence mechanisms’, but without that shock these people would otherwise have continued to live.

## Expected deaths from UK ICU experience in March

The Intensive Care National Audit & Research Centre's report of 4 April 2020<sup>6</sup> on COVID-19 critical care patients and their outcomes presents a useful profile of the 2,249 patients recorded. The table below summarises the profile of these patients:

Category	Descriptor
Age (mean)	60 years
Sex	73% male, 27% female
Obese (BMI > 30)	38%
Severe comorbidities	7%

If we take an extreme view, we can ignore the actual age and comorbidity data and represent them en-masse with the 85-year old obese male diabetic smoker considered previously, we can calculate the deaths expected absent COVID-19 and compare with the actual outcome.

In doing this, we have taken the expected first year mortality of this extreme case, increased it by 50% as a further margin (as our estimates may hide some additional material, but unknown, health variation), and assumed two weeks of potential mortality exposure (rather than the real ICU duration of 2-3 days, because that would follow a period of onset and worsening of problems). This leads to:

- Expected deaths: 43
- Actual deaths: 346

Note that the expected result (43) is likely to be an over-estimate, because of the fairly extreme model point used, while the actual deaths (346) will be an under-estimate as many of the 2,249 patients are still in critical care. Thus, the real Actual:Expected ratio is likely to be greater than the 346:43 ratio (i.e. a ratio of 8:1 of COVID-19 deaths to comorbidity-related deaths) shown.

It seems clear from this high ratio that the majority of deaths can be regarded as due to COVID-19, not due to other conditions.

For reference, of the actual deaths detailed in the report, only 12% were recorded as occurring in the presence of severe comorbidities (although this may underestimate the real number, to the extent that triage taking place before ICU is likely to exclude some patients thought unlikely to survive).

While it is very likely that other conditions, or unhealthy lifestyles, weaken the immune system and increase the chance of death from COVID-19, that is quite different from attributing the deaths to those other conditions.

### Other perspectives

As with much work on COVID-19, this particular question cannot be answered fully and precisely at the moment. The strongest case we have seen for the 'they would die soon anyway' position is based on use of Bayes' theorem. Sparing readers the details, this allows us to look at 'probability of COVID-19 causation given death' from an assumption about 'probability of death given COVID-19' (i.e. the case fatality rate, 'CFR'), along with equivalent probabilities of deaths from other causes. If the CFR is very low compared with the 'other causes' probability of death for an individual, it follows (via Bayes) that their death in any year can be attributed largely to natural causes, not COVID-19.

Overall, given the arguments already noted, we do not feel that this approach justifies the assertion that the majority of COVID-19 deaths are of people who would have died soon.

The question will not be fully resolved at a population level (as opposed to the perspective of individual cases) until we are in a position to compare total deaths over a reasonable period against total deaths in the same period in previous years. Some work has been done following this approach in the Bergamo region of Italy, and also parts of Spain, showing recent mortality to be of the order of 2.5x (Spain), 4.5x (Northern Italy) what was expected given the experience of recent years<sup>vi</sup>. Equivalent UK data to allow a meaningful comparison are not yet available.

The EuroMOMO<sup>vii</sup> data will be an extremely useful resource for these comparisons.

## Conclusion

Actuaries are able to provide well-based advice in the context of life expectancies, given our extensive experience in this area.

While the impact of COVID-19 may seem to be disproportionately associated with chronic health problems, consideration of both the age ranges affected by the disease, and the fact that only a tiny fraction of impaired lives have life expectancies of the order of one year, makes it seem unfounded to claim that a large proportion of the COVID-19 deaths of 2020 would have died in any case this year.

As well as this being false, this claim is dangerous from a public health perspective if it encourages a 'so why should I care' attitude, thus endangering adherence to Government policy on social distancing.

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## References

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<sup>i</sup> <https://www.bbc.co.uk/news/health-52035615>

<sup>ii</sup> ISS statistics as at 26 March 2020 [www.iss.it](http://www.iss.it)

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<https://www.ons.gov.uk/peoplepopulationandcommunity/healthandsocialcare/conditionsanddiseases/articles/coronaviruscovid19roundup/2020-03-26>

<sup>iv</sup> <https://digital.nhs.uk/data-and-information/publications/statistical/health-survey-for-england/2018>

<sup>v</sup> <https://www.icnarc.org/About/Latest-News/2020/04/04/Report-On-2249-Patients-Critically-Ill-With-Covid-19>

<sup>vi</sup> <https://www.economist.com/graphic-detail/2020/04/03/covid-19s-death-toll-appears-higher-than-official-figures-suggest>; [https://www.corriere.it/politica/20\\_marzo\\_26/the-real-death-toll-for-covid-19-is-at-least-4-times-the-official-numbers-b5af0edc-6eeb-11ea-925b-a0c3cdbe1130.shtml#](https://www.corriere.it/politica/20_marzo_26/the-real-death-toll-for-covid-19-is-at-least-4-times-the-official-numbers-b5af0edc-6eeb-11ea-925b-a0c3cdbe1130.shtml#)

<sup>vii</sup> <https://www.euromomo.eu/>