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Many people are claiming that the new coronavirus is as deadly as the 1918 Spanish flu, citing a case fatality rate (CFR) of ~2.5%

The truth is that this comparison is, at best, highly unreliable, and may be completely wrong. Here's why:

The CFR is the number of infected people that die.

This influential 2006 paper states that the 1918 pandemic infected 500 million people globally & killed 50 - 100 million, a CFR of 10 - 20%. But the paper states the CFR was 2.5%. Why the discrepancy?

1918 Influenza: the Mother of All Pandemics
The "Spanish" influenza pandemic of 1918–1919, which caused ≈50 million deaths worldwide, remains an ominous warning to public health. Many questions about its origins, its unusual epidemiologic feat…

https://www.ncbi.nlm.nih.gov/pmc/articles/PMC3291398/

An estimated one third of the world's population (or ≈500 million persons) were infected and had clinically apparent illnesses (_1_,_2_) during the 1918–1919 influenza pandemic. The disease was exceptionally severe. Case-fatality rates were >2.5%, compared to <0.1% in other influenza pandemics (_3_,_4_). Total deaths were estimated at ≈50 million (_5–7_) and were arguably as high as 100 million (_7_).

Accurately estimating the CFR of any pandemic is challenging, all the more so with incomplete historical records. Estimates of the number of infections and deaths during the 1918 pandemic have changed dramatically over time and continue to be debated.

To back up the 2.5% CFR the 2006 paper cites a 1976 & 1980 publication. The latter claims 20 million deaths & 500 million infections globally, a CFR of 4%. It further states the CFR was 1 to 3% "in some areas" and ranged as high as 10% in others

For global mortality, however, the 2006 paper relies on the much more recent (2002) estimate of 50 to 100 million deaths, but it didn't revise the CFR to match.

This creates a glaring mathematical impossibility which has been widely repeated.

If 500 mil were infected and 50 - 100 mil died, then the CFR was 10 - 20%.

If 500 mil were infected and the CFR was 2.5%, then 12.5 mil died.

To make 50 mil deaths and a 2.5% CFR compatible would require more infections than the number of people that existed in 1918.

Others have noticed these discrepancies as well. See this post by @edrybicki for example:

1918 Influenza Pandemic Case Fatality Rate
Seeing as I have written an ebook on influenza that includes a short history of the 1918 pandemic, I have a rather keen interest in looking up things like case fatality rates, incidences and the li…
https://rybicki.blog/2018/04/11/1918-influenza-pandemic-case-fatality-rate/

Here's a note from @lfspinney in her book Pale Rider:

12. Counting the dead

1. Patterson and Pyle, pp. 17–18.
2. 2.5 per cent is the case fatality rate often quoted for the Spanish flu. Note, however, that it doesn't fit with either Patterson and Pyle's or Johnson and Müller's updated death tolls. If one in three people on earth – roughly 500 million human beings – fell ill, and the 2.5 per cent figure is correct, then 'only' 12.5 million people died. On the other hand, if 50 million people died, as per Johnson and Müller's most conservative estimate, then the case fatality rate (global average) was actually closer to 10 per cent.

@edrybicki @lfspinney Interesting side note: until very recently Wikipedia's article on the 1918 pandemic cited the 10 to 20% CFR in line with more recent death toll estimates, but someone revised the section and it now contains conflicting figures and statements.

> Wikipedia even seems to have got it right, in their entry on the 1918 pandemic:
>
> > "The global mortality rate from the 1918/1919 pandemic is not known, but an estimated 10% to 20% of those who were infected died. With about a third of the world population infected, this case–fatality ratio means 3% to 6% of the entire global population died."

@edrybicki @lfspinney Moreover, fatality rate is not a fixed & absolute number. The global CFR is an average. CFR varies widely by country & region based on many factors. In 1918, total mortality ranged from < 0.5% of a given population to possibly ~20%. Indigenous & rural communities were hit hard

@edrybicki @lfspinney There are many other reasons not to blithely compare the lethality of the Spanish flu and new coronavirus.

The 1918 influenza was especially dangerous to infants, the elderly, AND, unusually, young adults, whereas the new coronavirus appears most lethal to the elderly

TABLE 1. Patients, deaths, and case fatality rates, as well as observed time and mortality for n=44,672 confirmed COVID-19 cases in Mainland China as of February 11, 2020.

Baseline Characteristics	Confirmed Cases, N (%)	Deaths, N (%)	Case Fatality Rate, %	Observed Time, PD	Mortality, per 10 PD
Overall	44,672	1,023	2.3	661,609	0.015
Age, years					
0–9	416 (0.9)	–	–	4,383	–
10–19	549 (1.2)	1 (0.1)	0.2	6,625	0.002
20–29	3,619 (8.1)	7 (0.7)	0.2	53,953	0.001
30–39	7,600 (17.0)	18 (1.8)	0.2	114,550	0.002
40–49	8,571 (19.2)	38 (3.7)	0.4	128,448	0.003
50–59	10,008 (22.4)	130 (12.7)	1.3	151,059	0.009
60–69	8,583 (19.2)	309 (30.2)	3.6	128,088	0.024
70–79	3,918 (8.8)	312 (30.5)	8.0	55,832	0.056
≥80	1,408 (3.2)	208 (20.3)	14.8	18,671	0.111

@edrybicki @lfspinney Differences in healthcare infrastructure also matter. In 1918, many, perhaps most deaths in some regions, were not due solely to the influenza virus itself, but rather to secondary bacterial infections & other complications, exacerbated by overcrowding and poor hygiene.

@edrybicki @lfspinney It's too early to definitively know the CFR for the new coronavirus, but evidence so far suggests it is low, perhaps around 2%. Considering that many people who have been infected with mild cases are never diagnosed or tallied, the true CFR could be much lower.

@edrybicki @lfspinney If the new coronavirus becomes a genuine pandemic, it may mean staggering numbers of illnesses and death—not because the new virus is as lethal as the Spanish flu, but because today's world is much more populous and interconnected than that of 1918.

@edrybicki @lfspinney Many experts are encouraged by data collected so far, which indicate that the new coronavirus is highly infectious but not nearly as lethal as some previous outbreaks and pandemics (the CFR of MERS was ~35%). The vast majority of new coronavirus cases appear to be mild.

@edrybicki @lfspinney In sum, although the death toll and fatality rate of the 1918 influenza pandemic remain uncertain, the most recent estimates suggest it was much deadlier than the new coronavirus.

Remember that the next time you see contextless two-sentence comparisons like this:

⏱ David Wallace-Wells Retweeted

Laurie Garrett ✔
@Laurie_Garrett

Perspective: 1918 #Influenza was a massive pandemic, circled the planet 3 times in 18 months, before commercial air travel. It killed 50 to 75 million. It had.a case fatality rate <2%.

Christian Althaus @C_Althaus · Feb 15
Including the third COVID-19 death outside China in our real-time analysis results in an overall case fatality ratio of 2.2% (95% confidence interval: 0.6%-5.8%) github.com/calthaus/ncov-...

8:28 PM · Feb 15, 2020 · Twitter for Android

676 Retweets   1.2K Likes

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