Could Data Available in February 20 Have Helped Define the World Response to COVID19?

Michael Levitt (@MLevitt_NP2013)
Stanford University School of Medicine, CA

TWEET 1/4

Here is my clearer analysis of the Population Fatality Rate (PFR) related to influential predictions by Ferguson et al. 2020. It uses data released by the Chinese CDC on 14Apr20 @ChinaCDCWeekly , not full-text indexed by Google @Google but released in The @guardian on 1Mar20.

TWEET 2/4

Here is the evidence showing Google still does not full-text index this essential report. The Guardian @guardian finally gave CCDC @chinacdc age-range death numbers on 1 Mar.
http://weekly.chinacdc.cn/en/article/id/e53946e2-c6c4-41e9-9a9b-fea8db1a8f51...
https://theguardian.com/world/2020/mar/01/li-zehuajournalist-wouldnt-stay-quiet-covid-19-coronavirus...
Vulnerability of OLDER people is not even headlined!

TWEET 3/4

A perceptive reader will ask for the Verity et al., 2020 IFR. My 25Mar report to UK scientific leaders used that data. After normalization to percent, Verity IFR data is identical (0.6% RMSD) to deaths/Chinese_population in Col. F on Tweet1 Excel. My numbers are unchanged.
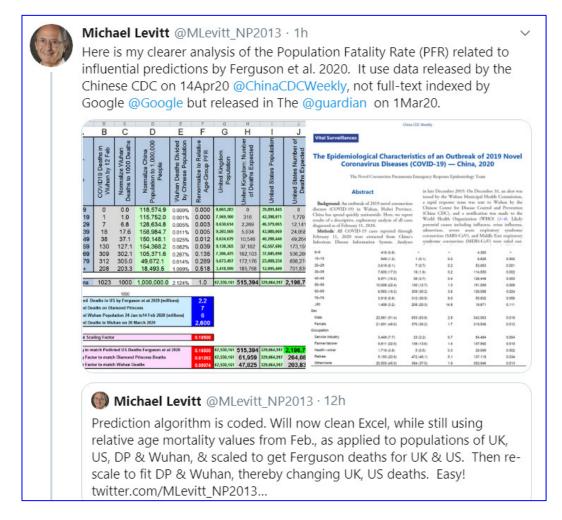
TWEET 4/4

This analysis has been extraordinarily interesting. I will write it up as a PDF report with the Excel and also make a video today. Just shows that we can learn from every question and critique.

https://twitter.com/MLevitt_NP2013/status/1265550265589137408?s=20

Here is my clearer analysis of the Population Fatality Rate (PFR) related to influential predictions by Ferguson et al. 2020. It uses data released by the Chinese CDC on 14Apr20 @ChinaCDCWeekly , not full-text indexed by Google @Google but released in The @guardian on 1Mar20.

Age Group	COVID19 Deaths in Wuhan by 12 Feb	Normalize Wuhan Deaths to 1000 Deaths	Normalize China Population to 1,000,000 People	Wuhan Deaths Divided by Chinese Population	Renormalize to Relative Age-Group PFR	United Kingdom Population	United Kingdom: Number of Deaths Expected	United States Population	United States Number of Deaths Expected	Diamond Princess: Population from Russell et al 2020 Table 2	Diamond Princess: Number of Deaths Expected	Wuhan China Population at 6000	Wuhan with 6,000,000 people Number of Deaths Expected
0–9	0	0.0	118,574.9	0.000%	0.000	8,065,283	0	39,891,845	0	16	0.00	711,449	0
10–19	1	1.0	115,752.0	0.001%	0.000	7,569,160	316	42,398,071	1,770	23	0.00	694,512	29
20–29	7	6.8	128,634.8	0.005%	0.003	8,630,614	2,269	46,179,065	12,141	347	0.09	771,809	203
30–39	18	17.6	158,984.7	0.011%	0.005	9,203,569	5,034	43,980,069	24,058	428	0.23	953,908	522
40–49	38	37.1	150,148.1	0.025%	0.012	8,624,679	10,546	40,288,440	49,264	334	0.41	900,889	1,102
50–59	130	127.1	154,368.2	0.082%	0.039	9,138,365	37,182	42,557,686	173,159	398	1.62	926,209	3,769
60–69	309	302.1	105,371.6	0.287%	0.135	7,206,475	102,103	37,845,098	536,200	923	13.08	632,230	8,958
70–79	312	305.0	49,672.1	0.614%	0.289	5,673,457	172,176	23,009,234	698,274	1,015	30.80	298,033	9,045
80+	208	203.3	18,493.5	1.099%	0.518	3,418,559	185,768	12,915,409	701,835	216	11.74	110,961	6,030
Sums	1023	1000	1,000,000.0	2.124%	1.0	67,530,161	515,394	329,064,917	2,196,700	3,700	58	6,000,000	29,656

		1000											
Predicted Deaths in US by Ferguson et at 2020 (millions)					2.2								
Assumed Deaths on Diamond Princess					7								
Assumed Wuhan Population 24 Jan to14 Feb 2020 (millions)					6								
Assumed Deaths in Wuhan on 20 March 2020					2,600								

Currrent Scaling Factor					0.10500								

Scaling to match Pedicted US Deaths Ferguson et al 2020					0.10500	67,530,161	515,394	329,064,917	2,196,700	3,700	58	6,000,000	28,020
Scaling Factor to match Diamond Princess Deaths					0.01262	67,530,161	61,959	329,064,917	264,081	3,700	7	6,000,000	3,565
Scaling Factor to match Wuhan Deaths					0.00974	67,530,161	47,825	329,064,917	203,837	3,700	5	6,000,000	2,600

TABLE 1. [B] COVID19 death age-profile released by China CDC on 14 Feb 20 is normalized in [C] to be for 1000 total deaths. [D] Normalizes Chinese population age–ranges per million (FIG. 9 & TABLE 10). [E] is [C]/[D], deaths per million population assuming an arbitrary death rate of 1,000/1,000,000 (0.01%); this rate is arbitrary as scaling is still applied. [F] Normalizes [E] to sum to 1.0. [G], [I], [K] & [N] are the population age profiles for UK, US, Diamond Princes (DP) & Wuhan. [H], [J], [L] & [M] are deaths calculated for each age range as (PFR in [F]) x (Population in [G], [I], [K] & [N], respectively) x (Scaling Value in Cell F21).

We use three different scaling values: Scaling by 0.105 gives the Ferguson et al. 2020 prediction for US & UK (2.2 & 0.5 Million, respectively) but DP and Wuhan are too high at 58 and 28,020. Scaling by 0.1262 give 7 deaths for DP, 3,565 for Wuhan, 61,959 for UK and 264,081 for US. Because we know that infection levels on DP were high (at least 20%), we use this scaling. It incidentally predicts that Wuhan COVID19 death were too low as confirmed by the subsequent 50% increase occurring on 15 Apr 20.

http://weekly.chinacdc.cn/en/article/id/e53946e2-c6c4-41e9-9a9b-fea8db1a8f51

http://www.ourphn.org.au/wp-content/uploads/20200225-Article-COVID-19.pdf

Vital Surveillances

The Epidemiological Characteristics of an Outbreak of 2019 Novel Coronavirus Diseases (COVID-19) — China, 2020

The Novel Coronavirus Pneumonia Emergency Response Epidemiology Team

Abstract

Background: An outbreak of 2019 novel coronavirus diseases (COVID-19) in Wuhan, Hubei Province, China has spread quickly nationwide. Here, we report results of a descriptive, exploratory analysis of all cases diagnosed as of February 11, 2020.

Methods: All COVID-19 cases reported through February 11, 2020 were extracted from China's Infectious Disease Information System. Analyses included the following: 1) summary of patient characteristics; 2) examination of age distributions and sex ratios; 3) calculation of case fatality and mortality rates; 4) geo-temporal analysis of viral spread; 5) epidemiological curve construction; and 6) subgroup

in late December 2019. On December 31, an alert was issued by the Wuhan Municipal Health Commission, a rapid response team was sent to Wuhan by the Chinese Center for Disease Control and Prevention (China CDC), and a notification was made to the World Health Organization (WHO) (1–4). Likely potential causes including influenza, avian influenza, adenovirus, severe acute respiratory syndrome coronavirus (SARS-CoV), and Middle East respiratory syndrome coronavirus (MERS-CoV) were ruled out. Epidemiological investigation implicated Wuhan's Huanan Seafood Wholesale Market, which was shut down and disinfected, and active case finding was initiated and vigorously pursued (2,4–5).

On January 7, 2020, the causative pathogen was

FIG 1. Important paper on Epidemiological Characteristics of COVID-19 released by China CDC on 14-Feb. 2020.

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
Sex					
Male	22,981 (51.4)	653 (63.8)	2.8	342,063	0.019
Female	21,691 (48.6)	370 (36.2)	1.7	319,546	0.012
Occupation					
Service industry	3,449 (7.7)	23 (2.2)	0.7	54,484	0.004
Farmer/laborer	9,811 (22.0)	139 (13.6)	1.4	137,992	0.010
Health worker	1,716 (3.8)	5 (0.5)	0.3	28,069	0.002
Retiree	9,193 (20.6)	472 (46.1)	5.1	137,118	0.034
Other/none	20,503 (45.9)	384 (37.5)	1.9	303,946	0.013

FIG 2. A key table giving the first data on age-range, gender, and occupation of COVID19 cases and deaths observed in Wuhan at the beginning of the COVID19 epidemic.

https://twitter.com/MLevitt_NP2013/status/1265550269213007872?s=20

Here is the evidence showing Google still does not full-text index this essential report. The Guardian @guardian finally gave CCDC @chinacdc age-range death numbers on 1 Mar.
http://weekly.chinacdc.cn/en/article/id/e53946e2-c6c4-41e9-9a9b-fea8db1a8f51...
https://theguardian.com/world/2020/mar/01/li-zehuajournalist-wouldnt-stay-quiet-covid-19-coronavirus... Vulnerability of OLDER people is not even headlined!

"CFR presented here was calculated as number"

Q All   News   Images   Videos   Maps   More   Settings   Tools

4 results (0.35 seconds)

www.ourphn.org.au › 20200225-Article-COVID-19 ▾   PDF
(COVID-19) — China, 2020
Feb 14, 2020 - **CFR presented here was calculated as number** of deaths (numerator) divided by total number of confirmed cases in the row (denominator),.
by V Surveillances - Cited by 84

www.unige.ch › index.php › download_file › view ▾   PDF
Untitled
Feb 14, 2020 - **CFR presented here was calculated as number** of deaths (numerator) divided by total number of confirmed cases in the row. (denominator) ...

www.pref.mie.lg.jp › content ▾   PDF   Translate this page
参考資料
Feb 14, 2020 - **CFR presented here was calculated as number** of deaths (numerator) divided by total number of confirmed cases in the row. (denominator) ...

www.scribd.com › document › COVID-19 ▾
COVID-19 - Scribd
Feb 21, 2020 - **CFR presented here was calculated as number** of deaths (numerator) divided by total number of confirmed cases in the row (denominator) ...
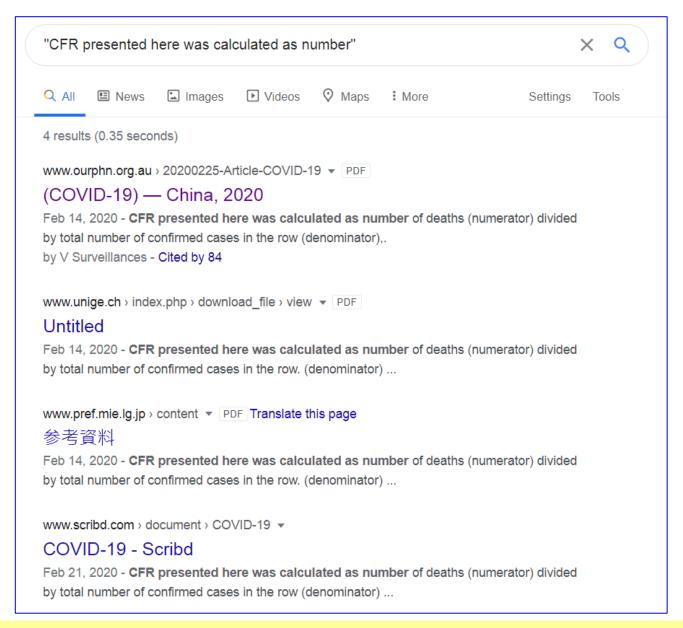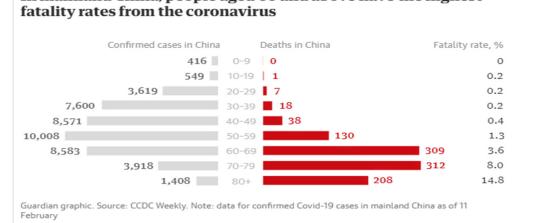
FIG 3. This essential report was not full-text indexed by Google at the China CDC website when it was released on 14 Feb, and even today, 15 weeks later, the CCDC report, can only be located at places outside of China (.au, .ch, .jp). Could this have slowed Western appreciation of the dangers?
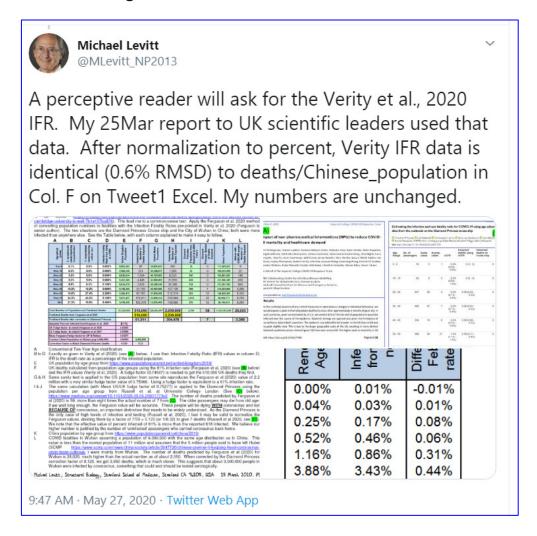
FIG 4, 5. The age group death was first released by the Guardian two weeks after its release in China. This was done in an article that did not emphasize the age profile of COVID19 and the elevated risk to the elderly. Could general awareness of this critical epidemiological data have saved lives?

In mainland China, people aged 60 and above have the highest fatality rates from the coronavirus

Confirmed cases in China	Age	Deaths in China	Fatality rate, %
416	0-9	0	0
549	10-19	1	0.2
3,619	20-29	7	0.2
7,600	30-39	18	0.2
8,571	40-49	38	0.4
10,008	50-59	130	1.3
8,583	60-69	309	3.6
3,918	70-79	312	8.0
1,408	80+	208	14.8

Guardian graphic. Source: CCDC Weekly. Note: data for confirmed Covid-19 cases in mainland China as of 11 February

https://twitter.com/MLevitt_NP2013/status/1265550272325132288?s=20

A perceptive reader will ask for the Verity et al., 2020 IFR. My 25Mar report to UK scientific leaders used that data. After normalization to percent, Verity IFR data is identical (0.6% RMSD) to deaths/Chinese_population in Col. F on Tweet1 Excel. My numbers are unchanged.

Michael Levitt
@MLevitt_NP2013

A perceptive reader will ask for the Verity et al., 2020 IFR. My 25Mar report to UK scientific leaders used that data. After normalization to percent, Verity IFR data is identical (0.6% RMSD) to deaths/Chinese_population in Col. F on Tweet1 Excel. My numbers are unchanged.

9:47 AM · May 27, 2020 · Twitter Web App

How Accurate are the Number of UK and US Deaths Predicted by Ferguson et al. (2020)?

The preprint (https://www.imperial.ac.uk/media/imperial-college/medicine/sph/ide/gida-fellowships/Imperial-College-COVID19-NPI-modelling-16-03-2020.pdf) by the renowned team at Imperial College received international attention by claiming that left untreated coronavirus would infect 81% of the population and lead to 510,000 deaths in the UK and 2,200,000 deaths in the US. Although the Medium post by Sir David Spiegelhalter (https://medium.com/wintoncentre/how-much-normal-risk-does-covid-represent-4539118e1196) at the Winton Center in Cambridge converted these numbers to being no more than one year of normal risk of death in each country, they still seemed high to me as pointed out in my reply to Sir David (https://medium.com/@michael.levitt/the-medium-post-by-david-spiegelhalter-from-the-winton-center-at-cambridge-university-is-well-7b1e157ba876). This lead me to a common-sense test: Apply the Ferguson et al. 2020 method of converting population numbers to fatalities using the Infection Fatality Rates pre-printed in Verity et al. 2020 (Ferguson is senior author). The two situations are the Diamond Princess Cruise ship and the City of Wuhan in China; both were more infected than anywhere else. See the Table below, with each column explained to make it easy to follow.
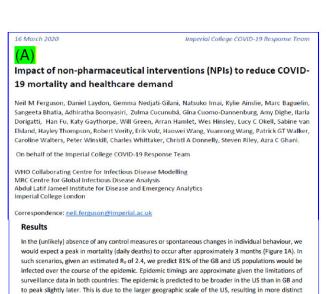
	A	B	C	D	E	F	G	H	I	J	K	L
	Age-group (years)	% symptomatic cases requiring hospitalisation	% hospitalised cases requiring critical care	Infection Fatality Ratio from Verity et al 2020	United Kingdom Population	United Kingdom: Number of Deaths Expected	United States Population	United States Number of Deaths Expected	Diamond Princess: Population from Russell et al 2020 Table 2	Diamond Princess: Number of Deaths Expected	China Population	Wuhan with 6,000,000 people Number of Deaths Expected
	0 to 9	0.1%	5.0%	0.002%	8,065,283	97	39,891,845	491	16	0	171,585,833	9
	10 to 19	0.3%	5.0%	0.006%	7,569,160	274	42,398,071	1,565	23	0	166,513,709	25
	20 to 29	1.2%	5.0%	0.030%	8,630,614	1,564	46,179,065	8,525	347	0	192,891,037	148
	30 to 39	3.2%	5.0%	0.080%	9,203,569	4,448	43,980,069	21,650	428	0	223,506,345	456
	40 to 49	4.9%	6.3%	0.150%	8,624,679	7,816	40,288,440	37,186	334	0	223,201,182	854
	50 to 59	10.2%	12.2%	0.600%	9,138,365	33,126	42,557,686	157,120	398	1	214,623,812	3,286
	60 to 69	16.6%	27.4%	2.200%	7,206,475	95,785	37,845,098	512,314	923	12	148,420,591	8,332
	70 to 79	24.3%	43.2%	5.100%	5,673,457	174,811	23,009,234	722,064	1,015	32	66,894,771	8,705
	80+	27.3%	70.9%	9.300%	3,418,559	192,078	12,915,409	739,085	216	12	26,146,412	6,205

	E	F	G	H	I	J	K	L
Total Number of Population and Predicted Deaths	67,530,161	510,000	329,064,917	2,200,000	3,700	58	1,433,783,692	28,020
Predicted Deaths from Ferguson et al 2020		510,000		2,200,000				
Predicted Deaths after correction to Diamond Princess		61,311		264,478		7		3,368
Assumed Percent Infected from Ferguson et al. 2020	81%							
UK Fudge factor to match Ferguson et al 2020	0.74587							
US Fudge factor to match Ferguson et al 2021	0.75966							
Mean Ferguson Fudge factor for DP & Wuhan	0.75277							
Fraction China Population in Wuhan (pop 6,000,000)	0.00418	6,000,000						
Correction Factor to Match Diamond Princess Deaths	0.120	8.32						

A   Conventional Ten-Year Age stratification.

B to D   Exactly as given in Verity et al (2020) (see (A) below. I use their Infection Fatality Ratio (IFR) values in column D; IFR is the death rate as a percentage of the infected population.

E   UK population by age group from https://www.populationpyramid.net/united-kingdom/2019/

F   UK deaths calculated from population age groups using the 81% infection rate (Ferguson et al. 2020) (see (B) below) and the IFR values (Verity et al. 2020). A fudge factor (0.74587) is needed to get the 510,000 UK deaths they find.

G & H   Same sanity test is applied to the US population from same site reproduces the Ferguson et al (2020) value of 2.2 million with a very similar fudge factor value of 0.75966. Using a fudge factor is equivalent to a 61% infection rate.

I & J   The same calculation (with Mean US/UK fudge factor of 0.75277) is applied to the Diamond Princess using the population per age group from Russell et al. at University College London (See (C) below). https://www.medrxiv.org/content/10.1101/2020.03.05.20031773v2. The number of deaths predicted by Ferguson et al (2020) is 59, more than eight times the actual number of 7 from (C). The older passengers may die from old age: if we wait long enough, the Ferguson value will be accurate. These people will be dying **WITH** coronavirus and not **BECAUSE OF** coronavirus, an important distinction that needs to be widely understood. As the Diamond Princess is the only case of high levels of infection and testing (Russell et al. 2020), I feel it may be valid to normalize the Ferguson values, dividing them by a factor of 7/59 = 0.120 (or 1/8.32) to give 7 deaths (Russell et al 2020, see (C)). We note that the effective value of percent infected of 61% is more than the reported 618 infected. We believe our higher number is justified by the number of 'uninfected' passengers who carried coronavirus back home.

K   China population by age group from https://www.populationpyramid.net/china/2019/

L   COVID fatalities in Wuhan assuming a population of 6,000,000 with the same age distribution as in China. This value is less than the normal population of 11 million and assumes that the 5 million people said to have left Hubei (SCMP https://www.scmp.com/news/china/society/article/3047720/chinese-premier-li-keqiang-head-coronavirus-crisis-team-outbreak) were mainly from Wuhan. The number of deaths predicted by Ferguson et al (2020) for Wuhan is 28,020, much higher than the actual number as of about 2,550. When corrected by the Diamond Princess correction factor of 0.120, we get 3,850 deaths, which is much closer. This suggests that about 3,000,000 people in Wuhan were infected by coronavirus, something that could and should be tested serologically.

Michael Levitt, Structural Biology, Stanford School of Medicine, Stanford CA 94305, USA   25 March 2020. P1

(A)

Impact of non-pharmaceutical interventions (NPIs) to reduce COVID-19 mortality and healthcare demand

Neil M Ferguson, Daniel Laydon, Gemma Nedjati-Gilani, Natsuko Imai, Kylie Ainslie, Marc Baguelin, Sangeeta Bhatia, Adhiratha Boonyasiri, Zulma Cucunubá, Gina Cuomo-Dannenburg, Amy Dighe, Ilaria Dorigatti, Han Fu, Katy Gaythorpe, Will Green, Arran Hamlet, Wes Hinsley, Lucy C Okell, Sabine van Elsland, Hayley Thompson, Robert Verity, Erik Volz, Haowei Wang, Yuanrong Wang, Patrick GT Walker, Caroline Walters, Peter Winskill, Charles Whittaker, Christl A Donnelly, Steven Riley, Azra C Ghani.

On behalf of the Imperial College COVID-19 Response Team

WHO Collaborating Centre for Infectious Disease Modelling
MRC Centre for Global Infectious Disease Analysis
Abdul Latif Jameel Institute for Disease and Emergency Analytics
Imperial College London

Correspondence: neil.ferguson@imperial.ac.uk

Results

In the (unlikely) absence of any control measures or spontaneous changes in individual behaviour, we would expect a peak in mortality (daily deaths) to occur after approximately 3 months (Figure 1A). In such scenarios, given an estimated R_0 of 2.4, we predict 81% of the GB and US populations would be infected over the course of the epidemic. Epidemic timings are approximate given the limitations of surveillance data in both countries: The epidemic is predicted to be broader in the US than in GB and to peak slightly later. This is due to the larger geographic scale of the US, resulting in more distinct localised epidemics across states (Figure 1B) than seen across GB. The higher peak in mortality in GB

is due to the smaller size of the country and its older population compared with the US. In total, in an unmitigated epidemic, we would predict approximately 510,000 deaths in GB and 2.2 million in the US, not accounting for the potential negative effects of health systems being overwhelmed on mortality.

(B)

Verity R, Okell LC, Dorigatti I, et al. Estimates of the severity of COVID-19 disease. medRxiv 2020; Available from https://www.medrxiv.org/content/10.1101/2020.03.09.20033357v1.

Table 1: Current estimates of the severity of cases. The IFR estimates from Verity et al.[12] have been adjusted to account for a non-uniform attack rate giving an overall IFR of 0.9% (95% credible interval 0.4%-1.4%). Hospitalisation estimates from Verity et al.[12] were also adjusted in this way and scaled to match expected rates in the oldest age-group (80+ years) in a GB/US context. These estimates will be updated as more data accrue.

Age-group (years)	% symptomatic cases requiring hospitalisation	% hospitalised cases requiring critical care	Infection Fatality Ratio
0 to 9	0.1%	5.0%	0.002%
10 to 19	0.3%	5.0%	0.006%
20 to 29	1.2%	5.0%	0.03%
30 to 39	3.2%	5.0%	0.08%
40 to 49	4.9%	6.3%	0.15%
50 to 59	10.2%	12.2%	0.60%
60 to 69	16.6%	27.4%	2.2%
70 to 79	24.3%	43.2%	5.1%
80+	27.3%	70.9%	9.3%

(C)

Estimating the infection and case fatality ratio for COVID-19 using age-adjusted data from the outbreak on the Diamond Princess cruise ship

Timothy W Russell, Joel Hellewell, Christopher I Jarvis, Kevin van-Zandvoort, Sam Abbott, Ruwan Ratnayake, CMMID nCov working group, Stefan Flasche, Rosalind M Eggo, Adam J Kucharski

Age Range	No. of passengers	Symp. cases	Asymp. cases	nCFR	Expected deaths using nCFR	Observed deaths on cruise ship
0 - 9	16	0	1	0.0% (0.0% - 0.9%)	0 (0 - 0)	0
10 - 19	23	2	3	0.2% (0.0% - 1.0%)	0 (0 - 0)	0
20 - 29	347	25	3	0.2% (0.1% - 0.4%)	0.05 (0.02 - 0.10)	0
30 - 39	428	27	7	0.2% (0.1% - 0.4%)	0.06 (0.04 - 0.10)	0
40 - 49	334	19	8	0.4% (0.3% - 0.6%)	0.08 (0.06 - 0.12)	0
50 - 59	398	28	31	1.3% (1.1% - 1.5%)	0.36 (0.31 - 0.43)	0
60 - 69	923	76	101	3.6% (3.2% - 4.0%)	2.74 (2.5 - 3.1)	0
70 - 79	1015	95	139	8.0% (7.2% - 8.9%)	7.6 (6.8 - 8.4)	6
80 - 89	216	29	25	14.8% (13.0% - 16.7%)	4.28 (3.8 - 4.9)	1
Totals	3711	301	318		15.15 (13.5 - 17.1)	7

Table 2: Age stratified data of symptomatic (symp.) and asymptomatic (asymp.) cases on-board the Diamond Princess [2], [3], along with the nCFR estimates given in [7], the expected number

Fig. 7, the references for **TABLE 6**, were also were broadly distributed by email on 25 March and reached prominent UK epidemiologists who felt it was wrong for reasons that I did not agree with. On 28 March I gave up.

TABLE 8. On normalization to add to 100%, the Infection Fatality Ratio (IFR) from Verity et al. 2020 is essentially identical to the Population Fatality Ratio calculated in TABLE 1 (p.3). This is why the results in TABLE 1 (p.3) and TABLE 6 (p.10) are so similar.

Renormalize to Relative Age-Group PFR x100	Infection Fatality Ratio from Verity et al 2020 normalized to 100	Difference between 14 Feb 20 Wuhan death rate & Verity et al 2020
0.00%	0.01%	-0.01%
0.04%	0.03%	0.01%
0.25%	0.17%	0.08%
0.52%	0.46%	0.06%
1.16%	0.86%	0.31%
3.88%	3.43%	0.44%
13.49%	12.59%	0.90%
28.90%	29.20%	-0.29%
51.75%	53.24%	-1.49%
100%	100%	0.615%

TWEET 4/4

This analysis has been extraordinarily interesting. I will write it up as a PDF report with the Excel and also make a video today. Just shows that we can learn from every question and critique.
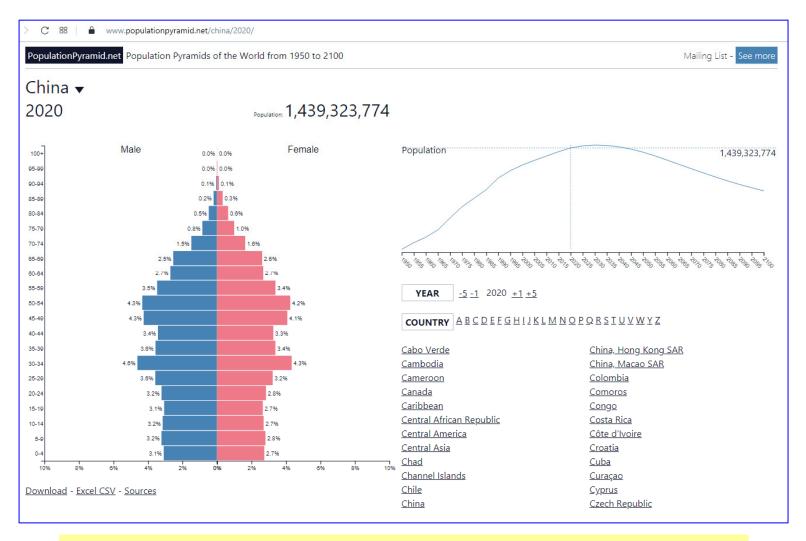
https://www.populationpyramid.net/china/2020/

FIGURE 9. Chinese population pyramid used to normalize Wuhan COVID19 deaths.

Age	M	F		Age	Male	Female		Age	Add Male & Female to get M & F		Age	M & F	Normalize M&F/mil population
0-4	44456332	39476105		0-4	44,456,332	39,476,105		0-4	83,932,437				
9-May	46320144	40415039		5-9	46,320,144	40,415,039		5-9	86,735,183		0-9	170,667,620	118,575
14-Oct	45349923	38912828		10-14	45,349,923	38,912,828		10-14	84,262,751				
15-19	44103122	38238737		15-19	44,103,122	38,238,737		15-19	82,341,859		10-19	166,604,610	115,752
20-24	46273865	40884302		20-24	46,273,865	40,884,302		20-24	87,158,167				
25-29	51522843	46466160		25-29	51,522,843	46,466,160		25-29	97,989,003		20-29	185,147,170	128,635
30-34	66443228	62295742		30-34	66,443,228	62,295,742		30-34	128,738,970				
35-39	51345507	48745948		35-39	51,345,507	48,745,948		35-39	100,091,455		30-39	228,830,425	158,985
40-44	49289359	46984787		40-44	49,289,359	46,984,787		40-44	96,274,146				
45-49	61173349	58664268		45-49	61,173,349	58,664,268		45-49	119,837,617		40-49	216,111,763	150,148
50-54	62348020	61097362		50-54	62,348,020	61,097,362		50-54	123,445,382				
55-59	49958045	48782446		55-59	49,958,045	48,782,446		55-59	98,740,491		50-59	222,185,873	154,368
60-64	38917285	38596854		60-64	38,917,285	38,596,854		60-64	77,514,139				
65-69	36526788	37622978		65-69	36,526,788	37,622,978		65-69	74,149,766		60-69	151,663,905	105,372
70-74	21425163	23524526		70-74	21,425,163	23,524,526		70-74	44,949,689				
75-79	12207276	14337340		75-79	12,207,276	14,337,340		75-79	26,544,616		70-79	71,494,305	49,672
80-84	6883629	9297788		80-84	6,883,629	9,297,788		80-84	16,181,417				
85-89	2843084	4738693		85-89	2,843,084	4,738,693		85-89	7,581,777		80+	26,618,103	18,493
90-94	731228	1573796		90-94	731,228	1,573,796		90-94	2,305,024				
95-99	116377	358816		95-99	116,377	358,816		95-99	475,193				
100+	12773	61919		100+	12,773	61,919		100+	74,692				
	1439323774				1,439,323,774				1,439,323,774			1,439,323,774	1,000,000
													1,000,000

TABLE 10. Showing the Excel table that converts the population data to ten-year age ranges.