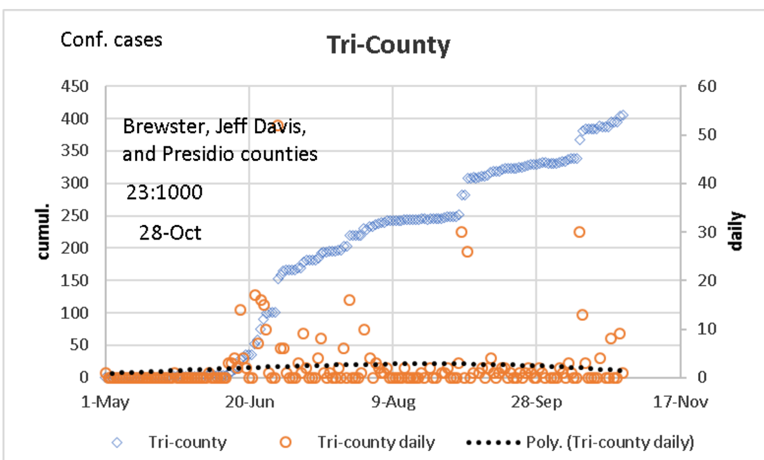
Tri-County (Brewster, Jeff Davis, and Presidio Counties) and the rest of the World, CV19

Please refer to accompanying two pdf files of graphs. The estimated number, and the related incidence relative to population, is based on maximums estimated from curve fits. They are subject to change of course, and should not be taken as precise projections, since there is no such thing. Another way to interpret them is as relative indices, that show a locale's progress relative to the others.[1]

US or Texas projections for confirmed cases scaled to Tri-County population:

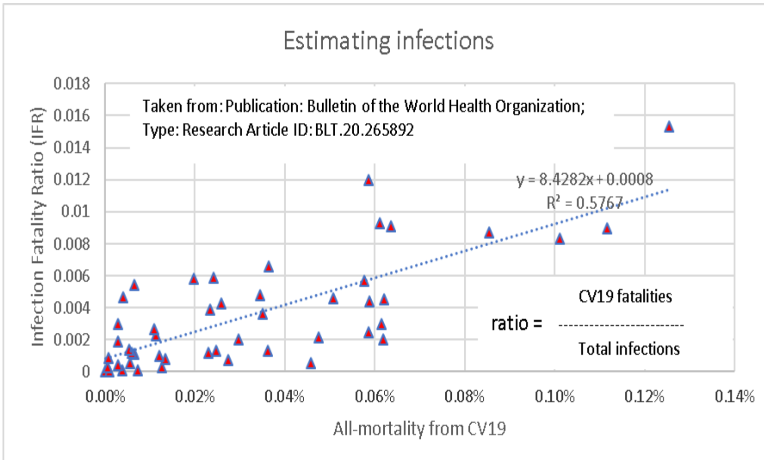
| | | |
|---|---|---|
| max US daily | 98,025 | persons |
| equiv. max Tri-County | 5.3 | persons |
| | | |
| max TX daily | 21,771 | persons |
| scaled to Tri-County | 14.0 | persons |
| | | |
| max US cumulative | 28,366,251 | persons |
| equiv. max Tri-County | 1547 | persons |
| incidence | 86:1000 | |
| | | |
| max TX cumulative | 905,933 | persons |
| scaled to Tri-County | 582 | persons |
| incidence | 32:1000 | |
| | | |
| Tri-County (current) | 23:1000 | 10/28/2020 |




[1] Data all from publicly available Github site: https://github.com/CSSEGISandData/COVID-19

John Ioannidis, a highly respected epidemiologist now at Stanford, recently took a stab at estimating CV19 incident fatality rates; for example, infection fatality rate for deaths > 50:100,000 (e.g. USA) at 0.57%.[2] He is famous for his critique on research statistics released in 2005 which is available for free download on www.plosmedicine.org. I have taken a cross-plot of data he included in the paper cited below, to generate an estimate of the actual incidence of COVID19 in the Tri-County area.

The idea is to use the following regression on his data, since from the known all-mortality values one could generate an estimated IFR.




For example, all-mortality for Tri-County as of 25 Oct 2020 is 0.000660 deaths per capita (12 out of 18,000 people). That predicts an IFR of 0.64% ± 0.45% (based on two standard deviation of scatter in this plot). The IFR is defined as:

$$IFR \equiv \frac{Fatality}{Infections}$$

Likewise, the CFR is defined as

$$CFR \equiv \frac{Fatality}{Cases}$$

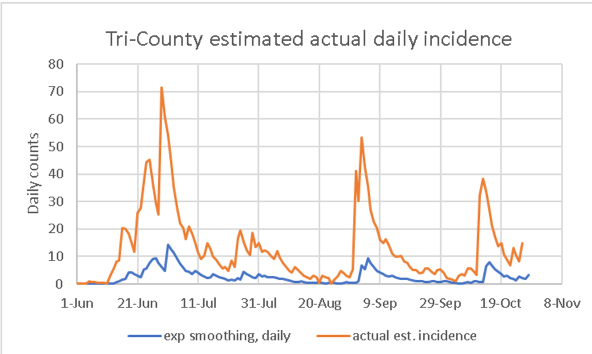
where *Cases* is the number of confirmed cases, known, always something less than the actual number of *Infections*, unknown. The ratio of *CFR*/*IFR* is the same as the ratio of *Infections* to *Cases*, *Fatality* cancels:

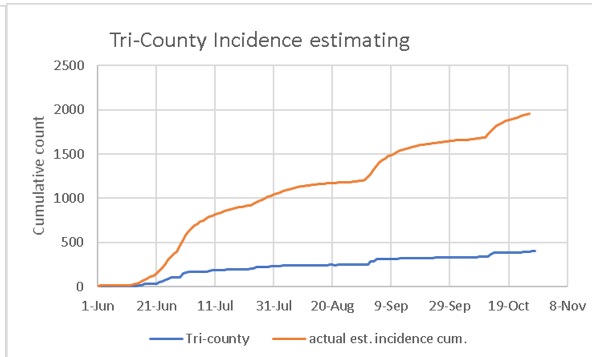
$$\frac{CFR}{IFR} = \frac{\frac{Fatality}{Cases}}{\frac{Fatality}{Infections}} = \frac{Infections}{Cases}$$

If you take the known average *daily* case incidence and apply the curve fit, it results in an estimate for actual number of infections. In this case, it's estimated at around five times the case incidence.

[2] https://www.who.int/bulletin/online_first/BLT.20.265892.pdf (Notice Tri-County All-Mortality is 66:100,000)

This is very speculative, but an example of what things have to be done to find what the actual infection rate is, approximately. Cumulative is summed off the daily data:



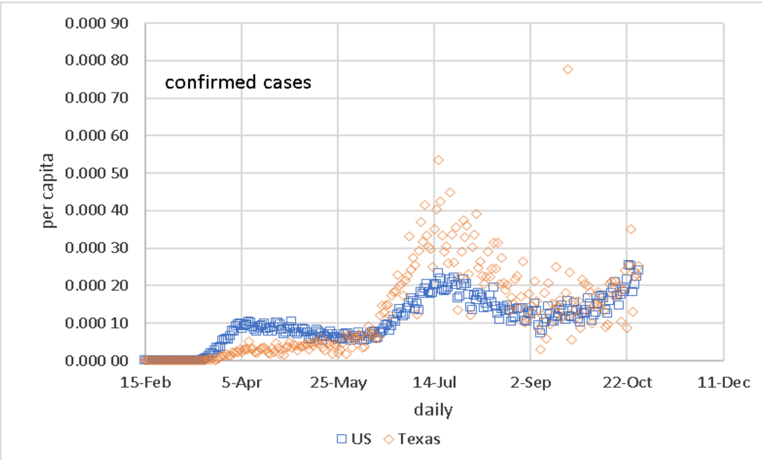




This is just an estimate, obviously, and the original source lists a whole bunch of caveats that go with it. But as you can see, having some idea of what the actual infection incidence is, when it can't be directly measured, has a whole lot of uses. For example this could form the basis of estimating actual prevalence.[3] Read discussion in "*Details on $R_o$ you may or may not be interested in*" document on this site on the effect of the actual prevalence on false positives for CV19 testing, for example. Another valuable use is correctly assessing risk, so that stupid things aren't done.

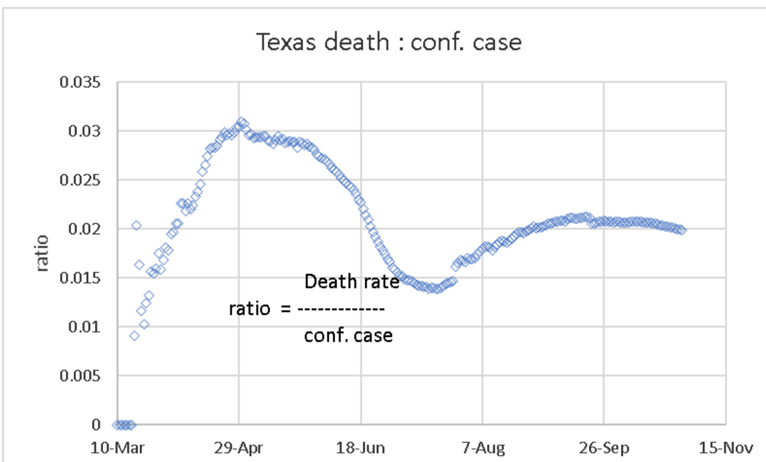
[3] Defined by National Institute of Health as the number of people with a certain characteristic divided by the total. It's usually done by sampling. As a crude estimate for example, you might say prevalence of people with CV19 is the actual number of infections at any given instance, times the average duration of an infection.

## Comments

If Texas and the USA confirmed cases are plotted as daily data concurrently, on a per capita basis, here is what you see, along with the apparent *third* wave in US confirmed cases:




Mortality seems to have stabilized. This is an example of the confirmed case fatality ratio (CFR):




What's to be done? Your mom taught you to cover your mouth when you coughed as a act of consideration for others so you wouldn't spread germs. That is all wearing a mask does, except more effectively, since this virus is stronger than the usual germs. What is so hard to understand about that? Certainly fits within the realm of being courteous to others, to say the least.

Another good thing to do is avoid enclosed areas with low or no ventilation where there are lots of people. This would include most restaurants and bars, and probably schools, too. Or step up the air changes in such places. Alpine has done some nice work on granting special use rules so restaurants can serve food outside on tables on the sidewalk. But unfortunately, we gripe about the government telling us what to do, or criticize it for not doing anything, not sure which is more irritating. For better or for worse, Germany is now taking action on fresh air in buildings.[4]

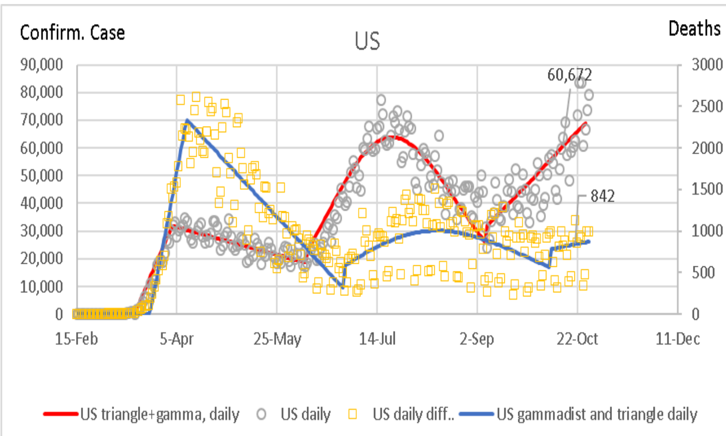
[4] https://www.bbc.co.uk/news/world-europe-54599593

## COVID-19 deaths

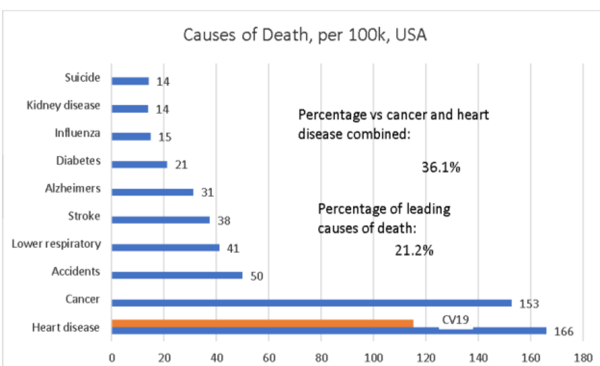
A point of comparison:

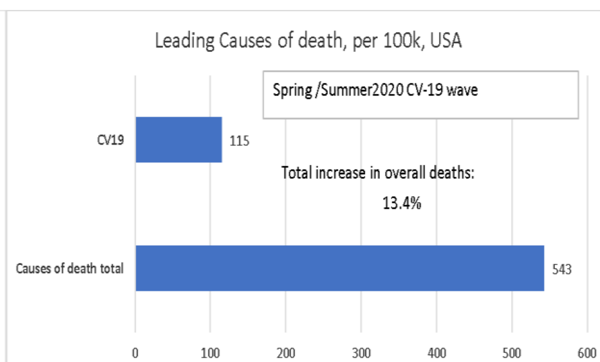
Around 1920, the population of the US was 105 million. It is estimated that 500,000 people in the US died from the Spanish Flu epidemic in those years. This is a death rate of around 480 per 100k. Most deaths occurred during the Fall of 1918.

The USA CV-19 death statistic is based on a triangular distribution, combined with a later gamma distribution curve fit of US deaths that generates a cumulative maximum for the two combined (minus their overlap). See "Experimental Page" for a look at ratios of the curve fits, rather than the data itself:




A few months ago the Wall Street Journal published data on annual causes of death which is plotted with the USA CV-19 death statistics. The possible death value is plotted as deaths per 100,000 with WSJ data of annual averages of leading causes:

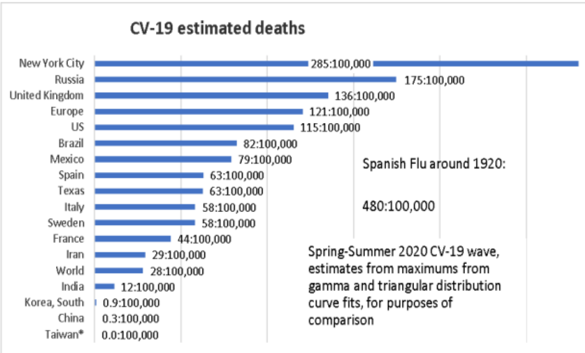


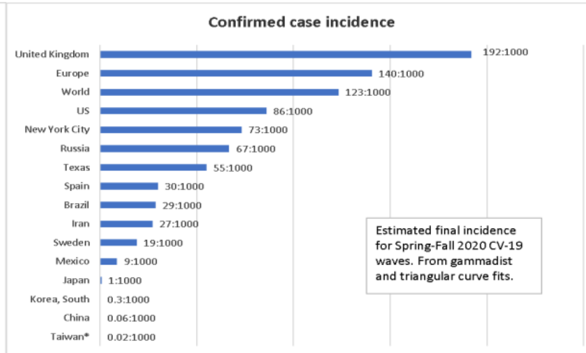




It's right up there with the major killers, although it's known many who died from CV-19 already had these potentially fatal issues.[5] It's not clear where dying from old age fits here, either. (It's strange how nobody dies of old age anymore—it's always some other cause.) It's interesting to read off the mortality table the IRS uses that the expected age of death is 77.3 yrs (median is 80.3). The probability of dying within age bin 77 to 78 is 0.026, and the 77 to 78 age bin proportion of population is 2.7%, so fraction dying is 15:100,000. Similarly, the probability of dying in each year age, from 77 on up, is 62%, with population proportion 29.9%, so fraction dying in that group is 257:100,000. Total deaths are around 860:100,000 every year, so old people are a significant chunk of that, not surprisingly. See table towards end of this document.*

[5] On the right chart above, about 13% increase in total annual deaths is attributed to CV19. Or, put another way, a 13% decrease in all the deaths for the year would completely cancel this year's projected CV19 deaths. Or, a 36% decrease in cancer and heart disease deaths cancels all CV19 for the year. But, estimates continue to climb.

What follows are some comparative tabulations of these estimates. As you can see, NYC had about half the death rate as the Spanish Flu disaster in the 1920s. But that doesn't make the current situation good. "World" and "US" data shows a sudden spike as they both enter their third waves, so now have unstable values for combined case and death incidence, respectively, at least until more data becomes available.




It's also worth reminding yourself of basic arithmetic—a confirmed case incidence of 32:1000 is big on this ranking, but still is only 3.2% of the population! Most of those are now recovered.

Recently, a lot of discussion has centered around excess deaths. The CDC has taken a stab at this, while recognizing the difficulties of getting accurate death certificate information (e.g. did this person die *from* CV-19, or die while *having* CV-19, etc.). They took weighted data from the previous three years and averaged it. They also created a threshold above the average (I didn't quite understand that, so just took the simple three year average as a basis of comparison here). It's also weighted, presumably against change in population over the three year period. Those are points you can check out on your own, as they're not that relevant to this discussion. Here are the results:

**USA Excess Deaths (from CDC data):** [6]

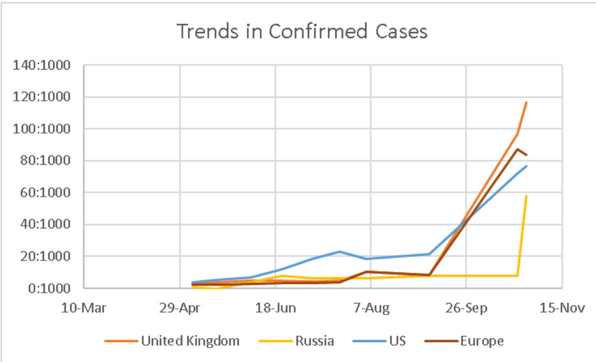
| Annualized on 42 weeks | | | |
|---|---|---|---|
| | All Cause | All Cause, excl. CV19 | CV19 |
| 3 yr average before 2020 | 834:100,000 | 854:100,000 | - |
| 2020 | 976:100,000 | 895:100,000 | - |
| Diff. | 141:100,000 | 40:100,000 | 101:100,000 |

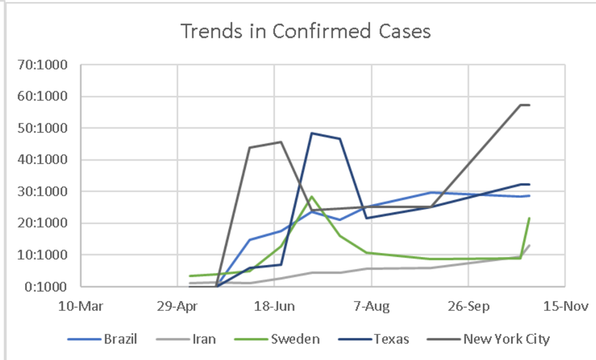
| 3 yr average |
|---|
| 859:100,000 |

28% of total excess is non-CV19!

*Trends in Confirmed Case Estimates*

The confirmed case estimates are based on the maximum value parameter of a curve fit for a *completed* epidemic wave. A way to look at this is this estimate is what it *would* be, if the data followed a gamma (or other distribution). Historically that's what they tend to do, but you can see plenty of examples here where the data suddenly diverges (e.g. US, World, Texas, etc.). Still, it's a useful way to characterize it. The curve fit has been based on data that was in the process of being completed for the Spring/Summer 2020 CV-19 wave, so it's to be expected that the estimates might change. Here are confirmed case trends for a few select countries; UK, US, and Europe look particularly bad:




*This is an approximation of deaths by age out of 100k, normalized to an average 860:100,000 each year:

| Age range | Probability of dying in age range (IRS tables) | Fraction of US population | Fraction dying |
|---|---|---|---|
| 0 - 5 | 0.01474 | 6.62% | 11:100,000 |
| 5 - 10 | 0.00079 | 6.38% | 2:100,000 |
| 10 - 15 | 0.00099 | 6.37% | 2:100,000 |
| 15 - 20 | 0.00334 | 6.48% | 7:100,000 |
| 20 - 25 | 0.00462 | 6.86% | 10:100,000 |
| 25 - 30 | 0.00452 | 7.14% | 10:100,000 |
| 30 - 35 | 0.00551 | 6.77% | 11:100,000 |
| 35 - 40 | 0.0078 | 6.46% | 15:100,000 |
| 40 - 45 | 0.01151 | 6.11% | 22:100,000 |
| 45 - 50 | 0.01677 | 6.34% | 33:100,000 |
| 50 - 55 | 0.0238 | 6.48% | 48:100,000 |
| 55 - 60 | 0.03616 | 6.65% | 74:100,000 |
| 60 - 65 | 0.05371 | 6.07% | 100:100,000 |
| 65 - 70 | 0.0743 | 5.05% | 115:100,000 |
| 70 - 75 | 0.10233 | 3.87% | 121:100,000 |
| 75 - 80 | 0.13742 | 2.67% | 112:100,000 |
| 80 - 85 | 0.16348 | 1.77% | 89:100,000 |
| 85 - 90 | 0.15999 | 1.11% | 55:100,000 |
| 90 - 95 | 0.11601 | 0.56% | 21:100,000 |
| 95 - 100 | 0.05394 | 0.18% | 3:100,000 |
| 100+ | 0.00827 | 0.03% | 0:100,000 |
| Total | 1 | 100.00% | 860:100,000 |

[6] https://data.cdc.gov/NCHS/Excess-Deaths-Associated-with-COVID-19/xkkf-xrst/data

**Explanation of statistic used for comparative purposes:**

Often the generation of confirmed cases or deaths tend to be in a gamma distribution, which is a slightly skewed bell-shaped curve. Other times a triangular distribution better describes what's happening. A least squares procedure is used to get the closest fit to the data. Generally, the data is provided in a *cumulative* format, so the number increases each day, until the wave is over, at which point it is at its maximum and no longer changes. This can be converted to a daily format just by finding the difference between each pair of successive days. In mathematical terms, the daily format is the time derivative of the cumulative format. In any case, the area under the daily curve is identical to the last, largest and unchanging value in the cumulative format. This is the value that is used here as a comparative statistic, on a per capita basis, for a completed curve. Each locale's "wave" has a different beginning, develops at a different rate, so comparison of values on a particular date among any given datasets doesn't tell you anything, but nonetheless that is how most of this data is usually presented to the public.

Cases are described here as incidents per thousandths; deaths are described as incidents per hundred thousandths. In this way, one can get a better feel for the relative performance of locales, as long as the current population figure is available. It's also a way to gauge one's own personal risk. Keep in mind this statistic can and will change over time, not as a direct result of increasing cases or deaths, but because of the possible change in shape of the distribution. In some cases, particularly with the US, the distribution was changed from a gamma to a triangular because it fit better (at least the first section), which also changed the comparative statistic. It should be thought a qualitative measure, since it's impossible to put error bounds on it, at least in its earlier stages before the inflection point.

***$R_o$***

Basic Reproduction Rate (said as R-sub-0, or just R-0). $R_o$ is a measure of transmissibility: $R_o < 1$, disease disappears; $R_o = 1$, it's endemic; $R_o > 1$, epidemic. $R_o$ is mentioned a lot during this epidemic, along with flattening of curves, with not a lot of understanding or relevance. The real trick is figuring out the *effective* reproduction rate, $R_e$. More on that in the "*Details on $R_o$ you may or may not be interested in.doc*" found elsewhere on this site.