

Analysis of weekly deaths from all causes in Brazil puts into context the headline number of deaths attributed to the Corona Virus.

As in the U.S. and Europe, there is tremendous variability in historic records of deaths from all causes in Brazil. The same regular yearly highs that come with the 'flu season' are quite apparent, 6 months out of phase with the Northern Hemisphere. The highest number of weekly deaths up to the end of 2018 was 28,709. This occurred in June 2016 during the worst influenza-pneumonia season this century. Should this weekly total be surpassed, the average exceedance is predicted to be 31,809. It appears that corona virus deaths are consistent with those of the above average influenza-pneumonia season which should be expected if the 2016 record month is surpassed.

Knowing the context helps

There has recently been a surge in coverage of the Corona Virus outbreak in Brazil, perhaps because it was slower to develop here and the story, like the virus, may be burning itself out elsewhere.

The virus death toll in Brazil at the time of writing is just under 25,000—a large number. But the population of Brazil, a number no journalist inside or outside the country seems either to know or be capable of looking up, is a *very* large number—211 million. So the deaths currently attributed to the virus amount to 0.01% of the population—exactly the same as Germany. In the U.S. virus deaths so far are 0.03% of the population.¹

While there may well be more deaths which ought to have been recorded as due to the Corona Virus, deaths from all causes are reported. And over the past 20 years, the average weekly deaths from all causes is almost 22,000. The first virus deaths were reported 70 days—10 weeks—ago so they should be viewed in context. Figure 1 shows weekly deaths in Brazil for 2001-2018. Using the current IBGE death and birth rates we should see 25,880 deaths in an average week *and* 57,315 births.²

A combination of viewing virus deaths without any context, and a misplaced belief that mathematical models are superior to actual data, has produced a climate of extreme fear.³

It's the above average deaths that matter

For public policy decisions and contingency planning, it's essential to understand what can be expected, not just on average, but when, as in an epidemic, things are much worse than average.

The rational way to deal with this is by using statistics.

The history of above average deaths in a country can be used to understand if the number of deaths cur-

rently being observed is indicative of unprecedented danger or within a range that's consistent with the past.

Given the history of weekly deaths, we analyse the 'empirical distribution' of recorded deaths above the average level. We examine this data without any assumptions.

The critical question to ask is how likely it is that the maximum weekly deaths observed so far will be exceeded and if it is, what the average excess will be.

Only when this information is known can we understand the extent to which the effects of the Corona Virus epidemic differ from what past experience could have prepared us for. This is of the utmost importance in making contingency plans for the future.

The data and a preliminary test

Omega Analysis' technology allows us to make accurate estimates even from short data sets. In the case of Brazil we have daily data from 2001-2018 on deaths from all causes.⁴ We have converted this to weekly data to better compare with the cases we studied previously in Europe, where we have managed to get data including 2019 and 2020.⁵

To verify the accuracy of our tools in the Brazilian data we have done a preliminary test to see if the 2016 peak was predictable in the period from January 2001 to the end of 2015. The worst week in that period was 26,172, in June 2015. Our analysis predicted that the average excess should that level be exceeded was 28,629.

In June 2016 the a new record week was recorded. It was 28,709. In 2016, 2017 and 2018 there were 33 weeks exceeding the previous maximum of 26,172 and the average number of deaths in those weeks was 26,989, consistent with our prediction.

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Estimating average excess deaths

The June 2016 death level of 28,709 was not exceeded by the end of 2018 (the last date for which we have data). In the sample period from 2001 to 2018, the average weekly deaths was 23,886 and there were 447 weeks of above average deaths.

Our fit of the above average data put the frequency of exceeding 28,709 deaths at 1 week in 1.8 years. The average excess, should this level be exceeded, is 31,809.

We also predict that the frequency of exceeding 31,809 should be 1 week in 5.8 years and the average excess on 31,809 should be 36,020. The latter level should only be exceeded 1 time in 18.6 years.

We do not yet have weekly deaths from all causes for 2020 so in particular we do not know if they have exceeded the previous peak of 28,709. However with a total of 25,000 Corona Virus deaths in the past 10 weeks, it seems unlikely that this will have elevated the weekly deaths from all causes beyond the expected level of 31,809 should the previous peak, indeed, have been surpassed.

Influenza and Pneumonia Deaths

During a recent discussion organised by FAPESP, the São Paulo State Research Council³, Michael Levitt remarked that virus deaths may have largely been those who did not succumb to influenza in the previous mild seasons. At least numerically, that comes very close to accounting for the Corona Virus deaths to date in Brazil.

We only have monthly data for deaths due to the combination of influenza and pneumonia in Brazil from 1996 to December 2018. The worst month's death toll Brazil since 1996 was in June 2016 when 8,497 people died. We estimate that if that level is exceeded, the average month of deaths will be 10,713.

So far there have been just 2.4 months since the first recorded Corona Virus death in Brazil. If those months had produced the average excess influenza and pneumonia deaths, there would have been 25,342 victims. But almost 3 months of the average deaths *above* the worst 'flu season' in 25 years is no small thing. And we haven't reached June yet.

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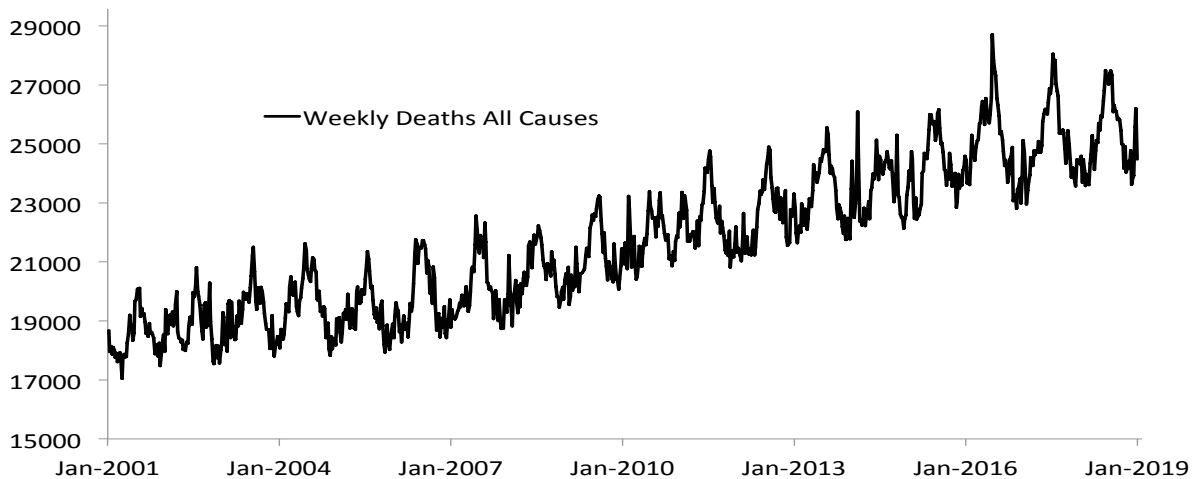


Figure 1. Weekly deaths from all causes in Brazil 2001-2018. The trend follows the population growth rate. The peak in 2016 coincides with the worst month for influenza and pneumonia deaths in this century.

¹ www.Covid-19canada.com provides world data updates with cases and deaths per million people.

² https://www.ibge.gov.br/apps/populacao/projecao/index.html?utm_source=portal&utm_medium=popclock&utm_campaign=novo_popclock

³ FAPESP, Webinar COVID-19, 21 May 2020. https://www.youtube.com/watch?v=_1u_yworTco&feature=youtu.be. See Michael Levitt's presentation and his questions and comments in the discussion session for an antidote to the preference for models over data.

⁴ We are grateful to the Faculty of Medicine, Ribeirão Preto, University of São Paulo and in particular to Rosane Aparecida Monteiro for her generosity and assistance in providing us with data.

⁵ Accidents Waiting to Happen - Corona Virus Edition 28 April 2020, Updated 15 May 2020. www.OmegaAnalysis.com

⁶ We thank IMPA, Rio de Janeiro for hospitality while this research was carried out.