Predicting the Unpredictable in New York City

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The Lockdown of March 2020

> . . . you know there's certain mathematics to the outbreak of infectious disease. . . – Bruce Aylward, WHO-China Joint Mission on Covid-19 press conference, 24 February 2020.

As we described in *Predicting the Unpredictable*[1], there is, indeed, a certain mathematics to the outbreak of infectious diseases. But that mathematics is not what has driven the response to Covid-19. Instead, wildly inaccurate predictions of severity and misplaced confidence in unprecedented interventions with no scientific basis have led almost every western democracy to follow the same disastrous path.

Guided by data from past epidemics and from Covid-19, our 'Extended Gompertz Function Model', posted to the medRχiv preprint server on 26 Dec 2021[2], shows how to predict the course of Covid-19 waves in real time, with enough accuracy to manage healthcare demand–the most critical aspect of any epidemic.

Never again can there be an excuse for interventions because of fear that hospitals *might* be overwhelmed.

The model also allows us to look at the past. We have used it to show that Covid-19 infections in China had almost certainly peaked before lockdown measures were imposed. The success of the Chinese strategy, recommended by the WHO in that fateful press conference of 24 February 2020, was an *illusion* of control where mathematics now tells us that none existed. The Chinese lockdown–the prototype and inspiration for unprecedented restrictive measures the world over–could not have had the effect that Bruce Aylward thought it did.

The initial Covid-19 outbreak in New York City. The 'Extended Gompertz Function Model' for epidemics tells us that, during an outbreak, cumulative events, be they cases, hospital or ICU admissions or deaths, follow a particular curve called a Gompertz Function. Figure 1 shows this for Covid-19 deaths in New York City in the initial 2020 outbreak. The blue dots are the daily totals and the red curve is the graph of the Gompertz Function[3] that best fits the data. The fit is excellent. That allows us to draw a number of conclusions about the course of the epidemic. In particular it allows us to pinpoint the peak in deaths with a high degree of confidence.

New York City's lockdown. The only possible test of efficacy of a lockdown is whether it caused a decline in infections. If lockdowns (or any other interventions) occurred *after* infections had already peaked they cannot have been the cause of the decline. It follows that they could not have been the cause of a subsequent decline in cases, hospital admissions, deaths and so on.

Simon Wood has combined studies estimating the time from infection to the appearance of symptoms of Covid-19 with studies estimating the time from the onset of symptoms to death in fatal cases. This gives an estimate (as a probability distribution) of the time between infection and death.[4] Once we have a good estimate of the peak in Covid-19 deaths, we can use Wood's work to determine the likely date when infections peaked.

It is a feature of Gompertz Functions that, because Covid-19 deaths follow a Gompertz Function, Covid-19 infections follow one as well. (See Section 3.2 of our paper.) The date at which infections peaked is obtained from the deaths peak by counting back by the number of days between infection and death. This means we can use our model to provide independent confirmation of Wood's conclusions, which we will discuss elsewhere. Our model for infections allows us to refute the WHO's claim that China's lockdown policy was what stopped the initial Covid-19 outbreak. Not surprisingly, the same conclusion holds for New York City.

[1] https://www.omegaanalysis.com/_files/ugd/9406d8_2028566993d54adbac7c564043e44b71.pdf

[2] Ana Cascon and William F. Shadwick 2021 Predicting the course of Covid-19 and other epidemic and endemic disease.https://www.medrxiv.org/content/10.1101/2021.12.26.21268419v1

[3] The Gompertz Function is defined by $Gompertz(t, a, b, N) = Ne^{-e^{-(at+b)}}$.

[4] https://onlinelibrary.wiley.com/doi/10.1111/biom.13462

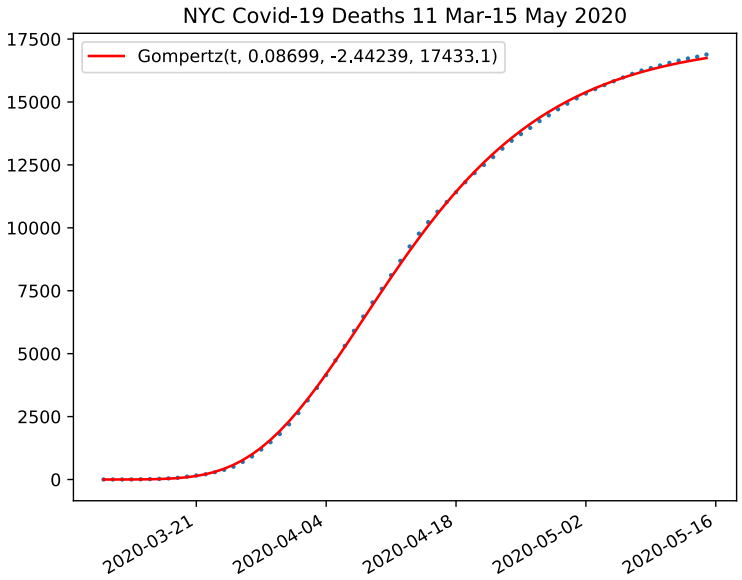

Figure 1: The Gompertz Function fit to Covid-19 Deaths in New York City, 11 March to 15 May 2020.

The lockdown came *after* infections had already peaked. The Gompertz Function fit for Covid-19 deaths in New York City tells us that deaths peaked on 8 April 2020 with a 99% confidence interval from 7 April 2020 to 9 April 2020.[5] It is overwhelmingly likely that the time from infection to death is at least 22 days–so infections peaked no later than 18 March 2020–two days *before* Governor Cuomo announced that the "New York State on PAUSE" executive order would go into effect on 22 March 2020 at 8pm[6].

The lockdown was *not* what caused the subsequent decline in Covid-19 deaths in New York City. The WHO's mistake in China was emulated by Governor Cuomo and others around the world at enormous cost to society.

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[5]The standard errors of the Gompertz Function fit parameters allow us to calculate the confidence interval.
[6]`https://nypost.com/2020/03/20/coronavirus-in-ny-cuomo-orders-lockdown-shuts-down-non-essential-businesses/`