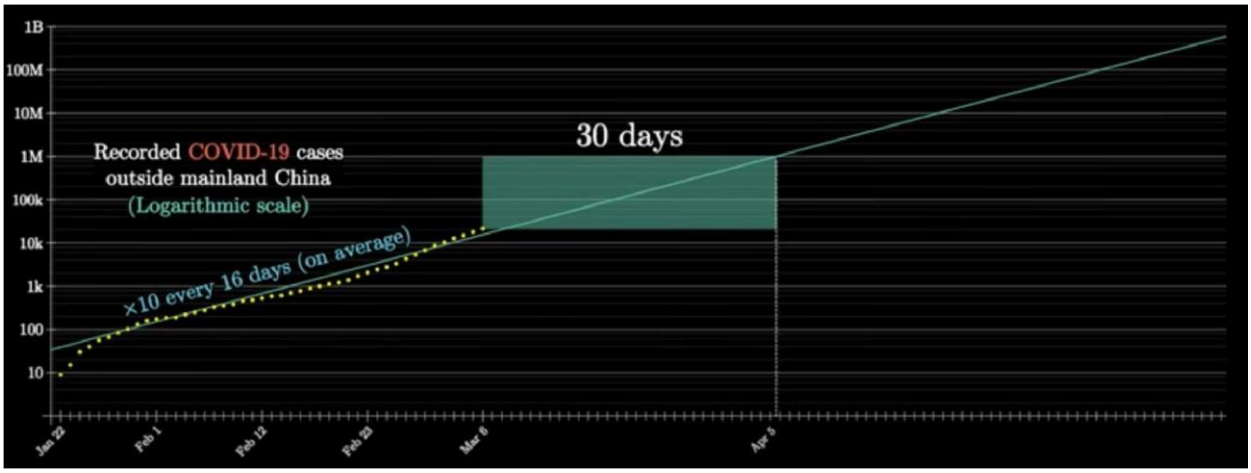
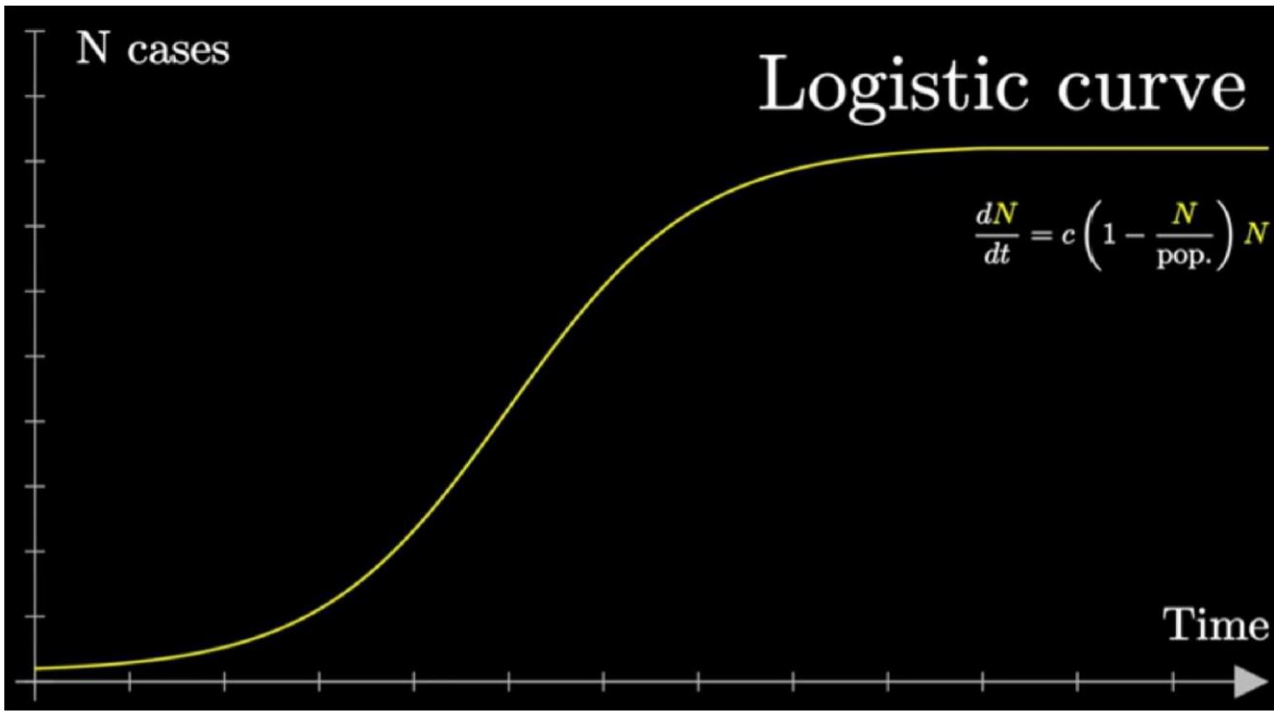
COVID-19: An Overview.

SARS-CoV-2, the virus that causes the contagious disease COVID-19, is said to have originated from the wet markets of Wuhan, China. The disease has evolved into a pandemic now and has forced systemic global lockdown. As a result, it has ceased the activities of everyday life, leaving humanity in uncertainty and confusion. This article is a general overview of the pestilence.

How severe is COVID-19? As shown in the graph below (log[Recorded Cases] vs. time), it looks like the number of cases becomes ten times in a mere 16 days (or approximately doubles every five days). The plotted points are only until March 6 (With about 10,000 cases). Using a straight-line fit to extrapolate the graph, this model predicts a million recorded COVID-19 cases in 30 days (Excluding the count from China). The real value is stunningly close, with the total documented cases as per WHO data is 10,50,828(Again Excluding China's Count).



However, this above model works only in the earlier stages of the virus. A better way of modeling the spread of infections within a specific community is through a logistic curve, as this accounts for the finiteness of the population. As we can see, the curve has an inflection point, post which the rate of increase of new cases decreases. Reaching the inflection point would mean that the pestilence is under relative control. The key to reducing the impact and spread of the disease is by getting to the inflection point while minimizing the number of cases by flattening the curve (To be discussed soon).



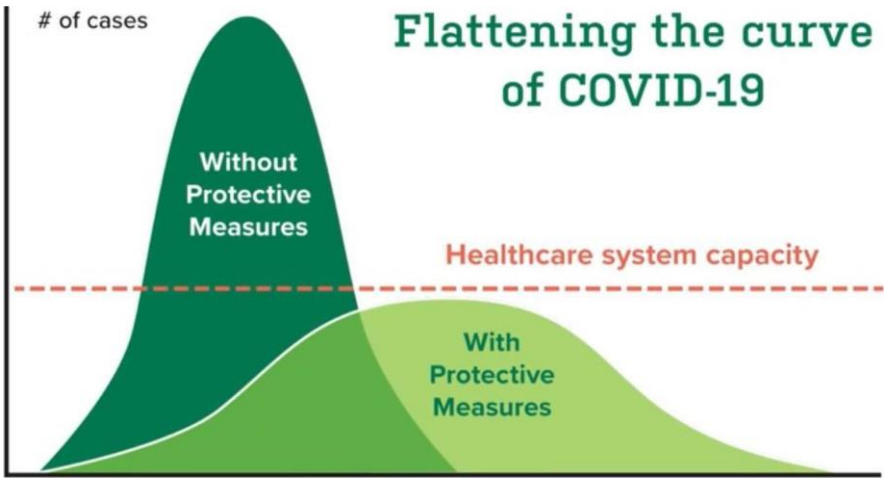
So, how did this virus spread to rattle human existence? The virus has a much higher fatality rate compared to that of the flu, causing deaths. The primary reason for deaths due to COVID-19 cases seems to be because it shows up as ARDS (Acute Respiratory Distress Syndrome). Unlike pneumonia, where the alveoli are affected locally, ARDS affects all of the alveoli across the lungs. As a result, a liquid fills the alveoli sacks, which acts as an impediment for sufficient oxygen intake. In this case, the patients will need ventilation, which can last for up to two weeks.

Also, the incubation time is high (a median of 5-6 days), which leads to Asymptomatic transmission of diseases. Due to the long incubation period, some experts conclude that this is one of the primary reasons for the exponential growth of the number of COVID-19 cases. However, this is debatable; Without one of the primary symptoms of COVID-19 (Dry cough), the primary medium of transmission (through the air) will not take effect. As a result, COVID-19 primarily spreads through those people who are already exhibiting symptoms.

As the virus can live on surfaces for long durations, it is imperative to wash hands with soap and water regularly (Soap and water are more effective than hand sanitizer, as it removes the grime as well). This method works very well because, on the application of soap, the lipid membrane of the virus is effectively broken down, killing the virus.

Social distancing and shutdown, though very expensive, seems to be an effective way to curb the proliferation of COVID-19. It's important to flatten the curve (Accompanying graph below), as it bides us time to find more effective ways to treat new and existing cases, and reduces the stress on the limited medical facilities available. It is notable that The USA, even though they are a developed country, lacks enough medical facilities (Both in quantity and accessibility:

Healthcare is ridiculously expensive in the USA, and is barely subsidized by the government).



Source: COC Time since first case

Two crucial variables that seem to predict whether we are close to a slowdown of the exponential spread is the Ro (R-nought) factor. It denotes the average number of people who will catch the disease from an infected person. The predicted Ro (R-nought) value for COVID-19 is 1.5 to 3.5. The outbreak is said to be under control if the Ro value is below 1.

Vaccines take time to develop because they have to go through various steps before it is introduced to the general population. The WHO Executive Director for health emergencies, Dr. Mike Ryan, states that the vaccine for COVID-19 is at least a year away. The best minds in the world are already grinding it out to get there as soon as possible, though; Some have taken desperate measures such as directly performing human trials (with volunteers) without conducting animal trials. While this could be dangerous, some scientists feel like the benefits outweigh the risk of going at a slower pace and delaying the creation of a vaccine.

As far as curing COVID-19 with drugs is concerned, Chloroquine (particularly the less toxic Hydroxychloroquine) is showing a lot of promise as it is both a cheap and safe option. It has a long track record in medicine, starting in the early 1940s. Now, it is recommended to Patients and to people who are at a high risk of contracting the disease, such as health workers and the patients' immediate family members. It is also worth noting that while Zinc prevents the proliferation of RNA inside of the affected cell, Zinc tablets won't help because the penetration of Zinc content in the pill inside of the affected cell is effectively zero. However,
Hydroxychloroquine has ionophores along with the Zinc, and the ionophore can increase Zinc concentration levels in the cell.

It is inspiring to see health workers putting their lives at stake to help fight the pestilence. They indeed are the soldiers in the war against COVID-19. So, we must do the least to help ourselves and honor their efforts by practicing hygiene and being quarantined. I genuinely believe that if we get through this pandemic, human connections become stronger as "What does not break us, makes us stronger."

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