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DATA ARTICLE :

What does COVID-19 Lebanese epidemic dataset predicts? Infected to reach approximately 1490 end of March 1753 on the 1st of April, if no extra measures taken

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Abstract
Coronavirus disease 2019 (COVID-2019) has been recognized as a global threat, and several studies are being conducted using various mathematical models to predict the probable evolution of this epidemic. These mathematical models based on various factors and analyses are subject to potential bias if applied to a country like Lebanon. Here, we propose a simple model that could be useful to predict the spread of COVID-2019. We performed Time Serie model prediction on the data to predict the epidemiological trend of the prevalence and incidence of COVID-2019.

What does COVID-19 Lebanese epidemic dataset predicts?

Prelude

A s this article was released for publication (march13th), the Lebanese government did not take any preventive measures on imposing a curfew to limit the propagation of COVID-19. Coronavirus could be the "black swan" moment of the ailing Lebanese economy. Research has also indicated[1] many companies in frontline countries are facing challenges as a result of the virus outbreak, including:

- Drop in business activity. Some companies have seen their growth rates drop sharply between December and February. Several companies that were on track are now at risk of missing their Q1–2020 plans as the effects of the virus ripple wider.
- Supply chain disruptions. The unprecedented lockdown in China is directly impacting global supply chains. Hardware, direct-to-consumer, and retailing companies may need to find alternative suppliers. Pure software companies are less exposed to supply chain disruptions, but remain at risk due to cascading economic effects.
- Curtailment of travel and canceled meetings. Many companies have banned all "non-essential" travel and some have banned all international travel. While travel companies are directly impacted, all companies that depend on in-person meetings to conduct sales, business development, or partnership discussions are being affected.

The lack of data in Lebanon has always been an issue and moreover the lack of transparency and accountability.

This article stems from a need to create a predictability model to assess COVID 19 outbreak and whether government measures will obtain in the near future.

Problematic

In our estimations, we will use the model used by Tomas Puedo[2] who worked on the average of cases that appeared to have the Corona Virus, taking into consideration the growth rate of each country. We do understand that our analysis might be distorted by a structural break; ie yielding false conclusions in time series pressured by irregularities of "black Swans" phenomena. This issue was popularised by David Hendry, who argued that lack of stability of coefficients frequently caused forecast failure, and therefore we must routinely test for structural stability. Structural stability – i.e., the time-invariance of regression coefficients – is a central issue in all applications of linear regression models.

This paper will be joining current research in modelling a breakout of the virus. This paper aims to highlight the below facts:

- The coronavirus is coming to you.

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[1] https://medium.com/sequoia-capital/coronavirus-the-black-swan-of-2020-7c72bdeb9753
[2] 2 MSc in Engineering. Stanford MBA. Ex-Consultant. Creator of viral applications with >20M users.

What does COVID-19 Lebanese epidemic dataset predicts?

- It's coming at an exponential speed: gradually, and then suddenly.

VIRUS METHODOLOGY

The official data of Lebanon was added to this model since the very first case in Lebanon until the 14th of March of 2020 on a daily basis. Also, the growth rate of the people infected by COVID-19 was calculated on a daily basis. Afterwards, the model forecasts based on the actual number of cases taking into consideration the daily growth rate of infected people within the population.

What do we know so far ?

As of March 13th and according to official figures the COVID-19 situation looks like[3]


Coronavirus COVID-19 Progress in Lebanon
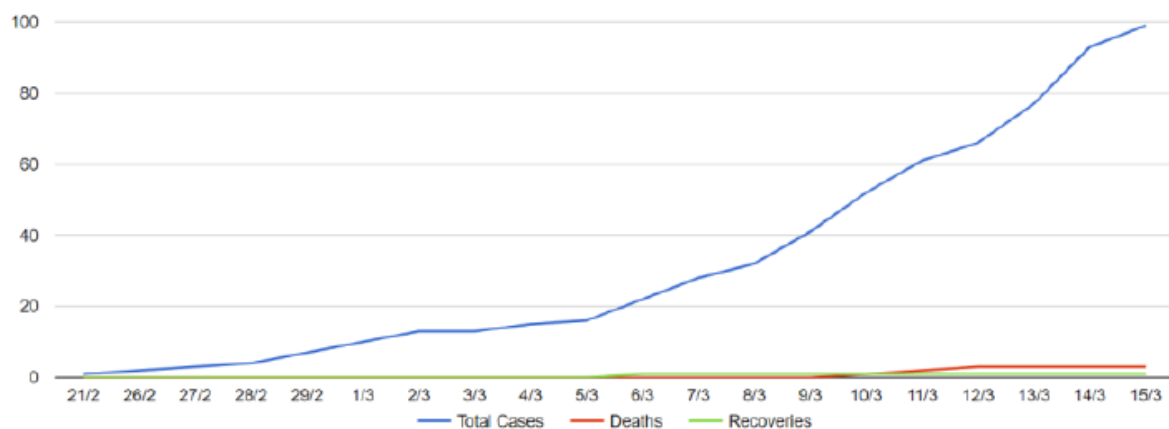
Data	Lebanon	Age	Confirmed	Source	Pct
Total	99	**0-9**	3%	**Travel Related**	38%
New Cases	6	**10 19**	9%	**Contacts of confirmed cases**	59%
Total Deaths	3	**20-29**	28%		
New Deaths	0	**30-39**	17%		
Total Recovered	1	**40-49**	19%	**Under investigation**	4%
Active Cases	95	**50-59**	14%		
Serious Cases	3	**60-69**	5%	**In Community**	0%
Tot Cases/1M pop	14.5	**70-79**	5%		
		80+	0%		

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[3] https://coronalebanon.com/

What does COVID-19 Lebanese epidemic dataset predicts?

Cases, Recoveries & Deaths per day
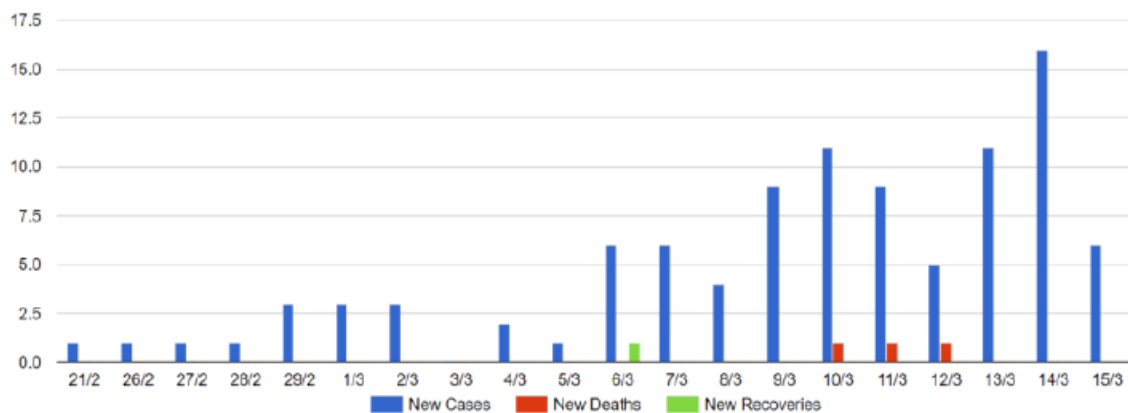
In fact, the first case infected by COVID-19 appeared in Lebanon was on the 23rd of February 2020, and the cases escalated to reach 93 on the 14th of march 2020 as per the official report published by the Lebanese Red Cross.

In fact, the fear is to have the total number of cases growing at an exponential rate as it did worldwide until China contained it and broke the rule. China's ability to overcome this crisis was a hope for the rest of the world. Yet, it leaked outside, and now it is a pandemic that nobody can stop. Based on the largest study to date (n=72,314) from inside China conducted by the China Center for Disease Control, the symptom severity was[4]:

- Mild for 81 percent
- Severe for 14 percent
- Critical for 5 percent (mostly older people).

MODEL

Our statistical model might look like a black swan[3] an unpredictable event that is not usual, rare, unexpected and has severe costs. The model might not obtain as it might yield different results and is related to the government measures. The consequences are expected to be hard on developed countries, even the ones that have premium health care systems (like Italy). On the other hand, the developing countries or countries facing serious economic conditions like Lebanon, will be under the burden of this virus spread. This is why serious prevention is highly needed.

The model might yield a structural break - that is an unexpected change over time in the parameters of regression models, which can lead to change in all the estimated numbers. In order to tackle this

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[4] As of February 19th, China announced via state media that the virus is airborne — it is spread via aerosol, not just droplets. This means that staying a few feet from folks who are coughing helps but does not prevent you from getting sick. An aerosolized virus can stay airborne for hours and spread through air circulation systems like ships, trains, airplanes, and buildings.

**What does COVID-19 Lebanese epidemic dataset predicts?**

problem, the data should be updated on daily based on the actual data versus the estimated ones in order to track the growth rate of the spread of COVID-19.

ASSUMPTION AND RESULTS

In our model of forecasting, we used few assumptions. We assume that no curfew was made. Also, no new measures were taken by the Lebanese Government. In addition to the reaction of the Lebanese population remaining constant. And lastly, we project the growth rate based on the last actual growth rate (not the average of growth rates)

The number of infected people will reach approximately 1490 case on the 31st of March. Moreover, this number will increase to 1753 on the 1st of April, which is the very next day. In other words, the increase will be about 263 new cases per day. Noting that in this specific virus, the more the infected people per day, the higher the outcome of more cases the next day will be as long as people are still getting in contact with each other.

The Lebanese population were not taking the COVID-19 seriously – not=r the public sector - this explain its high growth rate at the first stages. Luckily enough, people began to understand the seriousness of this virus and its spread, not to forget to mention the impact of media and the awareness that was done.
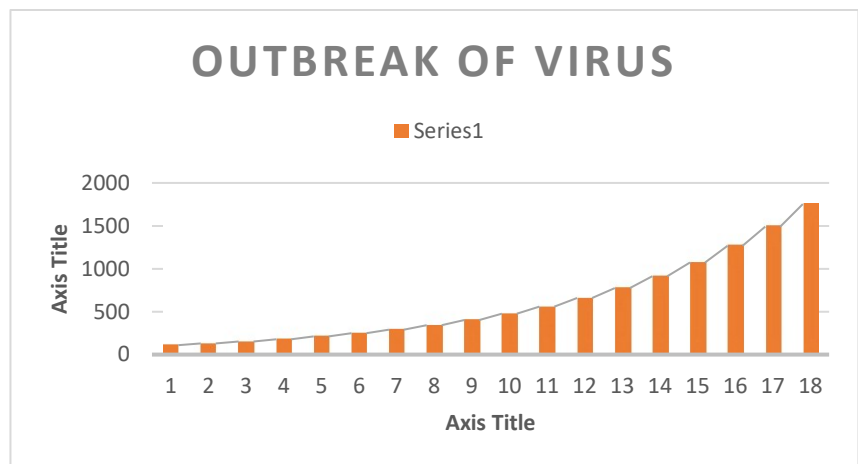
If we neglect people's adaptation and response rate, the estimated number of people infected would be much higher.

Taking the average of people's response from the date one when the first infected case appeared until the date of this article (13th of march), the number of people infected would be expected to be around 5037 on the 31st of march and the number will massively to 6370 infected person on the 1st of April. In other words, the number of increase within one day would be around 1333 newly infected person in only 24 hours. This explains the need and high importance of an awareness and measures to be imposed by the government.

What does it mean that the outbreak will take an exponential rate??

In a matter of days. Maybe a week or two.

- When it does, our healthcare system will be overwhelmed.
- Our fellow citizens will be treated in the hallways.
- Exhausted healthcare workers will break down. Some will die.

What does COVID-19 Lebanese epidemic dataset predicts?

- They will have to decide which patient gets the oxygen and which one dies.
- The only way to prevent this is social distancing today. Not tomorrow but today.
- That means keeping as many people home as possible, starting now.

There are dozens of countries with exponential growth rates. As of today, most of them are Western.

1. China :81021 cases
2. Italy :17660 cases
3. Iran (Islamic Republic of) :11364 cases
4. Republic of Korea :8086 cases
5. Spain :4231 cases
6. France :3640 cases
7. Germany :3062 cases
8. United States of America :1678 cases
9. Switzerland :1125 cases
10. Netherlands :804 cases
11. United Kingdom :802 cases
12. Denmark :801 cases
13. Sweden :775 cases
14. Norway :750 cases
15. Japan :716 cases
16. International conveyance (Diamond Princess) :697 cases
17. Belgium :599 cases
18. Austria :504 cases
19. Qatar :262 cases
20. Bahrain :210 cases

Asking ourselves what will happen next ? how should we prevent the catastrophe to come? Then cases like China, Eastern countries(with SARS experience) and Italy can be good examples for explanation. In fact, if no serious measures were taken, catastrophic impacts will appear. At the end, this study was based on official numbers, yet many limitations exists such as the presence of the refugees camps (where we do not have access and no official numbers are provided). Also, there are people who are wanted for justice and those cannot go to hospitals because of the fear to be caught and put in jail. And most importantly, the poverty range in Lebanon and the economic status highly influence the ability of citizens to pay for the corona test, and this increase the probability of people being infected and not knowing and spreading the virus more. Finally, it is important to mention that we do live in interesting times and we are looking forward for more answers from behavioral economics.

Conflict of Interest

What does COVID-19 Lebanese epidemic dataset predicts?

NCEILEB and The author declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

Appendix A. Supplementary data

Supplementary data to this article can be found online at

References:

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