Lockdowns Efficacy Case Study In Face Of COVID-19, Sweden and UAE comparison.

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Résumé

To better evaluate the efficacy of lockdowns against COVID-19. I took two countries with two different strategies (a country that went through lockdown and a country that didn't) with very close demographics and resources to see which country dealt with COVID-19 better. The countries are Sweden (didn't go through lockdowns) and UAE(went through multiple lockdowns.)

Introduction

The first case of COVID in Sweden was reported on 24 January 2020 while the first case of COVID in UAE was reported 5 days after on 25 January 2020. Before moving forward with COVID-19 comparison let's compare basic properties for the two countries :

— Sweden's population is estimated to be 10.23 million compared to the 9.77 million in the UAE.
— Sweden's GDP per capita is estimated to be 51.6k dollars compared to the 43.1k dollars in the UAE.
— Sweden's median age is 41.1 years old compared to UAE's 32.6 years old. ==> Very close demographics/resources. Therefore comparing both countries evolution in face of covid-19 would provide more or less valid hypothesis.

Methodology

The methodology that's going to be used to evaluate the efficiency of the lockdown is to compare the evolution of new cases and deaths.

Daily Cases Evolution Comparison

Daily New Cases Evolution

First let's take a look at the new cases evolution and total cases evolution curves of both countries :

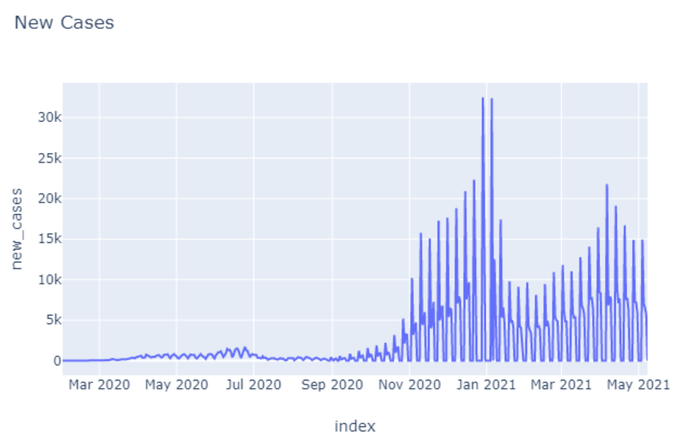

FIGURE 1 – Daily New Cases Sweden

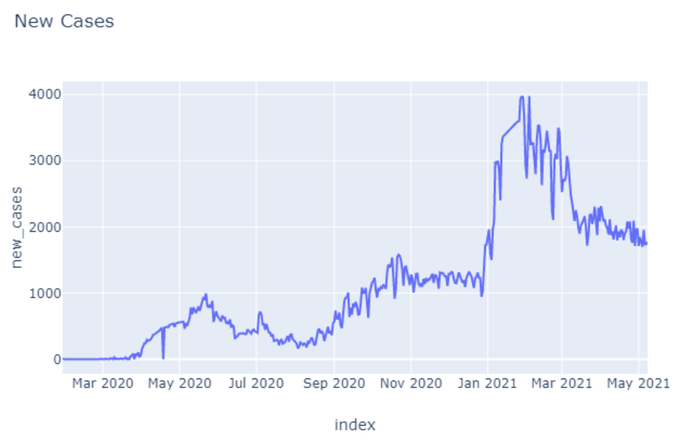

FIGURE 2 – Daily New Cases UAE

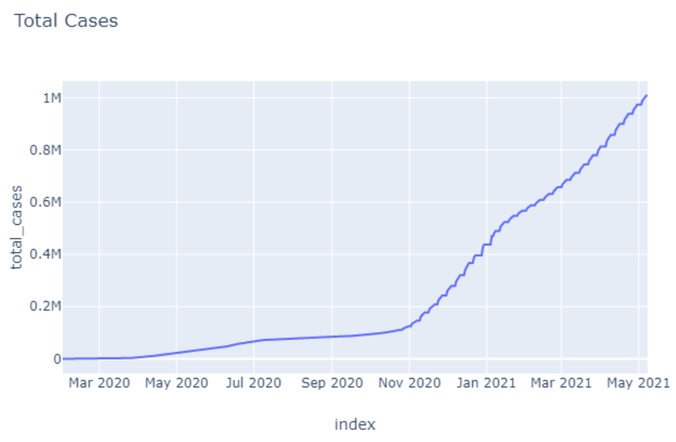

FIGURE 3 – Total Cases Sweden

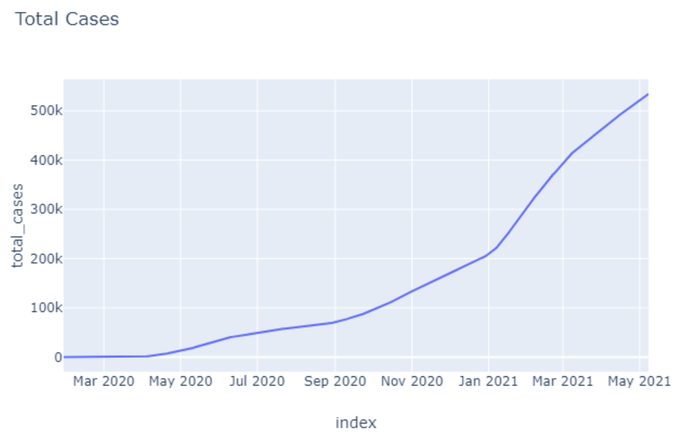

FIGURE 4 – Total Cases UAE

Monthly Cases

With that in mind, let's compare the monthly cases evolution of both countries as showcased by this table :

Average cases per month for Sweden date	
2020-02-29	0.482759
2020-03-31	155.483871
2020-04-30	558.900000
2020-05-31	550.322581
2020-06-30	975.433333
2020-07-31	295.225806
2020-08-31	235.580645
2020-09-30	282.800000
2020-10-31	1015.870968
2020-11-30	3959.133333
2020-12-31	6266.129032
2021-01-31	4179.935484
2021-02-28	3226.857143
2021-03-31	4760.548387
2021-04-30	5623.933333
2021-05-31	3388.178571

Freq: M, Name: new_cases, dtype: float64

Average cases per month for UAE date	
2020-01-31	1.333333
2020-02-29	0.586207
2020-03-31	20.741935
2020-04-30	393.900000
2020-05-31	712.129032
2020-06-30	470.333333
2020-07-31	381.903226
2020-08-31	313.709677
2020-09-30	798.633333
2020-10-31	1239.967742
2020-11-30	1207.700000
2020-12-31	1256.838710
2021-01-31	3089.903226
2021-02-28	3139.821429
2021-03-31	2255.483871
2021-04-30	1959.733333
2021-05-31	1614.821429

Freq: M, Name: new_cases, dtype: float64

FIGURE 5 – Monthly Average Cases (code statistics section)

The plots and the monthly average number of cases in Sweden and UAE leads us to hypothesize that COVID transmission speed is slowed down by lockdowns.

Deaths Evolution Comparison

Daily Deaths Evolution

Moving on to mortality evolution, let's start with the daily deaths and total deaths plots :

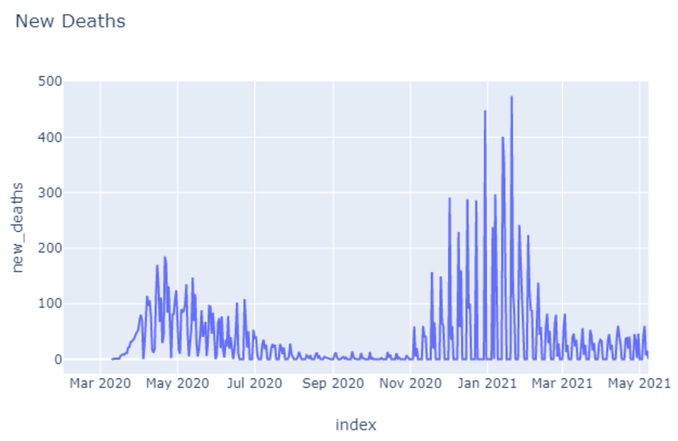

FIGURE 6 – Daily Deaths Sweden

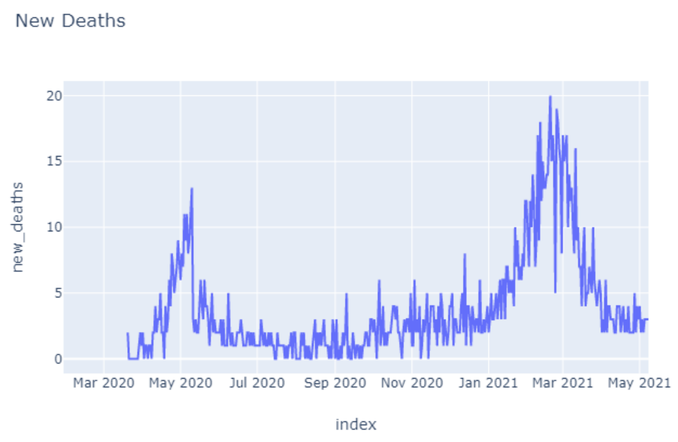

FIGURE 7 – Daily Deaths UAE

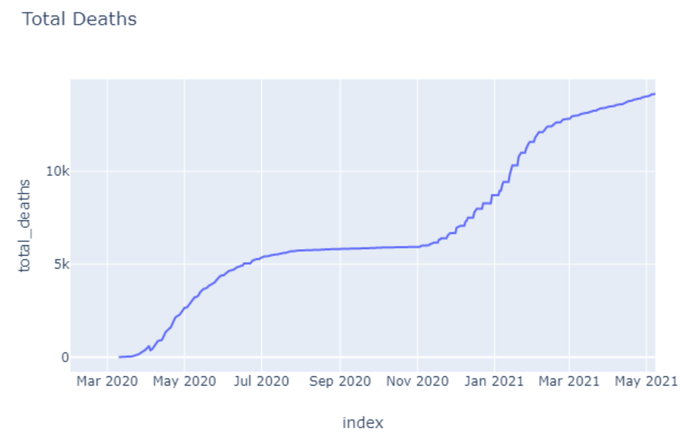

FIGURE 8 – Total Deaths Sweden

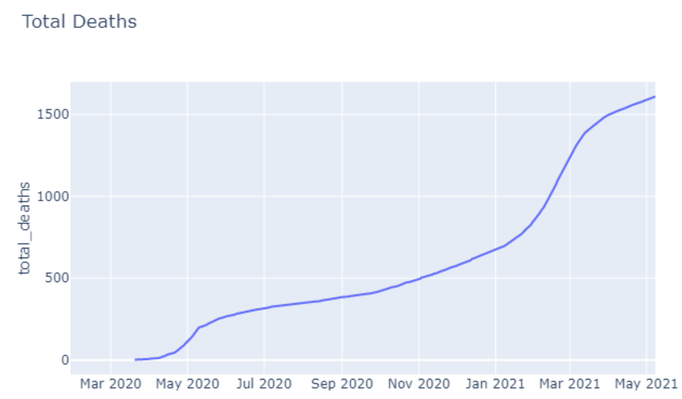

FIGURE 9 – Total Deaths UAE

Monthly Cases

Similarly to the cases section, let's compare the monthly deaths evolution of both countries :

Average deaths per month for Sweden : date	
2020-02-29	NaN
2020-03-31	17.500000
2020-04-30	81.100000
2020-05-31	58.354839
2020-06-30	31.266667
2020-07-31	13.225806
2020-08-31	2.612903
2020-09-30	2.666667
2020-10-31	1.741935
2020-11-30	24.766667
2020-12-31	66.000000
2021-01-31	92.387097
2021-02-28	44.107143
2021-03-31	20.612903
2021-04-30	19.433333
2021-05-31	14.392857

Freq: M, Name: new_deaths, dtype: float64

Average deaths per month for UAE date	
2020-01-31	NaN
2020-02-29	NaN
2020-03-31	0.500000
2020-04-30	3.300000
2020-05-31	5.129032
2020-06-30	1.700000
2020-07-31	1.161290
2020-08-31	1.064516
2020-09-30	1.166667
2020-10-31	2.451613
2020-11-30	2.566667
2020-12-31	3.129032
2021-01-31	5.838710
2021-02-28	13.250000
2021-03-31	8.903226
2021-04-30	3.000000
2021-05-31	2.892857

FIGURE 10 – Monthly Average Deaths (code statistics section)

COVID deaths in Sweden are a lot more bigger than that of UAE and given that Sweden's population density is 5 time less than that of UAE. We are led to believe that lockdowns also reduce the number of deaths.

Relevant numbers :

Sweden

— **total cases :** 1 068 473
— **total deaths :** 14 451
— **Maximum Cases recorded in one day :** 324 850
— **Maximum Deaths recorded in one day :** 474

UAE

— **total cases :** 565 451
— **total deaths :** 1 668
— **Maximum Cases recorded in one day :** 3977
— **Maximum Deaths recorded in one day :** 20

Conclusions

Given that the two countries have more or less the same resources and demographics it's safe to make these empirical purely epidemiology conclusions

— Lockdowns are effective in reducing the transmission speed of the virus (figures 1, 2 and 5) and the total number of cases (figures 3 and 4)
— Lockdowns are effective in reducing the daily/monthly number of deaths (figure 6 , 7 and 10) and the total number of deaths (figures 8 and 9).

references

https ://ourworldindata.org/coronavirus-source-data https ://community.plotly.com/