

Mexican COVID-19 Analysis

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What is the COVID-19?

- COVID-19 is the infectious disease caused by the coronavirus, SARS-CoV-2, which is a respiratory pathogen. WHO (World Health Organization) first learned of this new virus from cases in Wuhan, People's Republic of China on 31 December 2019.
- The virus was confirmed to have reached Mexico in February 2020. However, the National Council of Science and Technology (CONACYT) reported two cases of COVID-19 in mid-January 2020 in the states of Nayarit and Tabasco, one case per state.
- As of October, there had been near 800,000 confirmed cases of COVID-19 in Mexico and circa 88,000 reported deaths, although the Secretariat of Health, through the "Programa Centinela" (Spanish for "Sentinel Program") estimated in mid July 2020 that there were more than 2,875,734 cases in Mexico, because they were considering the total number of cases confirmed as a statistical sample.

https://en.wikipedia.org/wiki/COVID-19_pandemic_in_Mexico

Extracting the information

- Retrieving the information from the Mexican source system. All the information is public, and anyone can download and interact with it.
- The *database* is in the following link:

http://datosabiertos.salud.gob.mx/gobmx/salud/datos_abiertos/datos_abiertos_covid19.zip

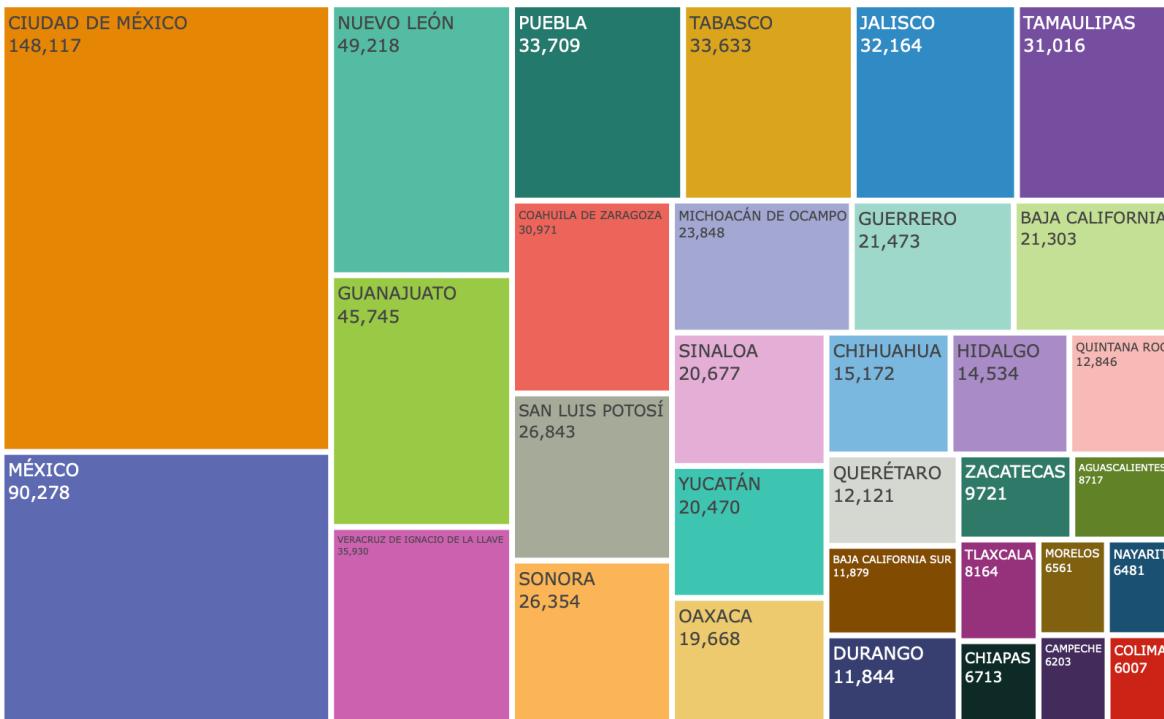
- The principal *descriptors* are in the following link:

http://datosabiertos.salud.gob.mx/gobmx/salud/datos_abiertos/diccionario_datos_covid19.zip

- Both files are needed to understand the information collected by the Mexican Health Ministry. The information was splitted to avoid problems with the size volume.

COVID-19 Distribution across Mexican States

Number of Confirmed Cases

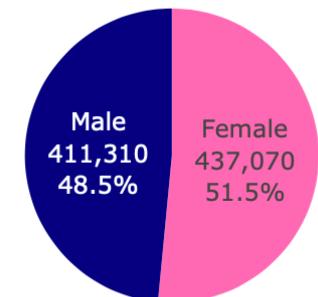
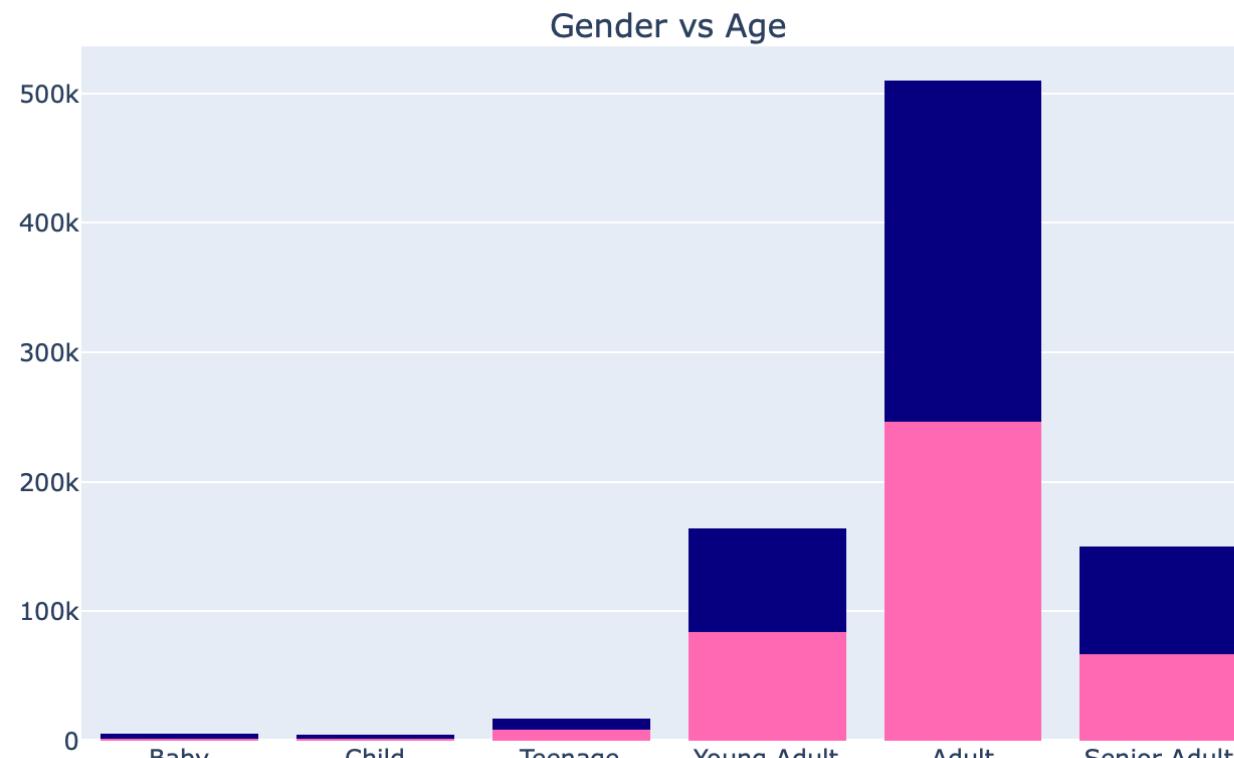


The treemap on the left illustrates the COVID-19 distribution. The information represents the confirmed cases displaying the most affected in a big square and the less affected into a small square.

COVID-19 In the mexican population

Age	Classification
0 - 4	Baby
5 - 8	Child
9 - 17	Teenage
18 - 30	Young Adult
31 - 60	Adult
Greater than 60	Senior Adults

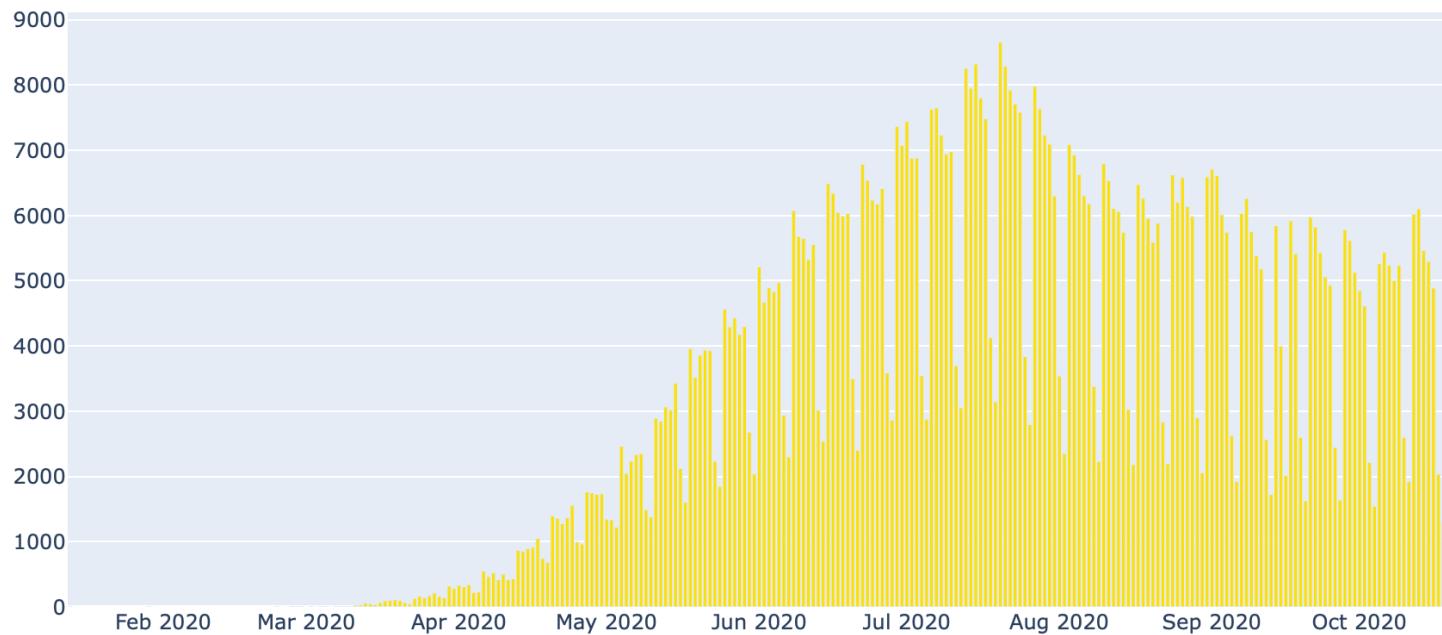
The age classification was done using the Mexican Age groups. This can be different by each country.



Women are the most affected and also the adults age range.

Daily Confirmed COVID-19 Cases in Mexico

Confirmed



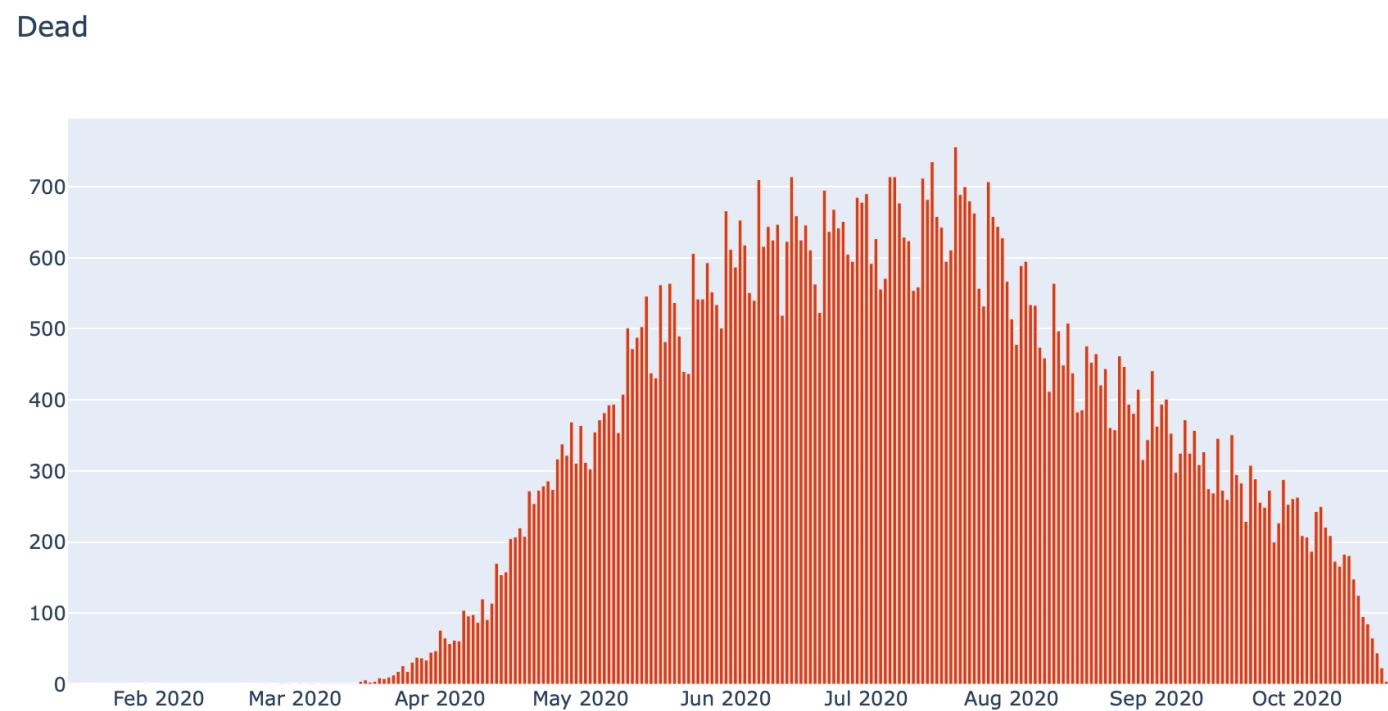
The graphic in the left respresents the confirmed COVID-19 cases reported by the Sentinel Program.

Mexican government implement the Sentinel Program to easily detect and report the possible infected people. Unfortunately, this program doesn't work well on weekends.c

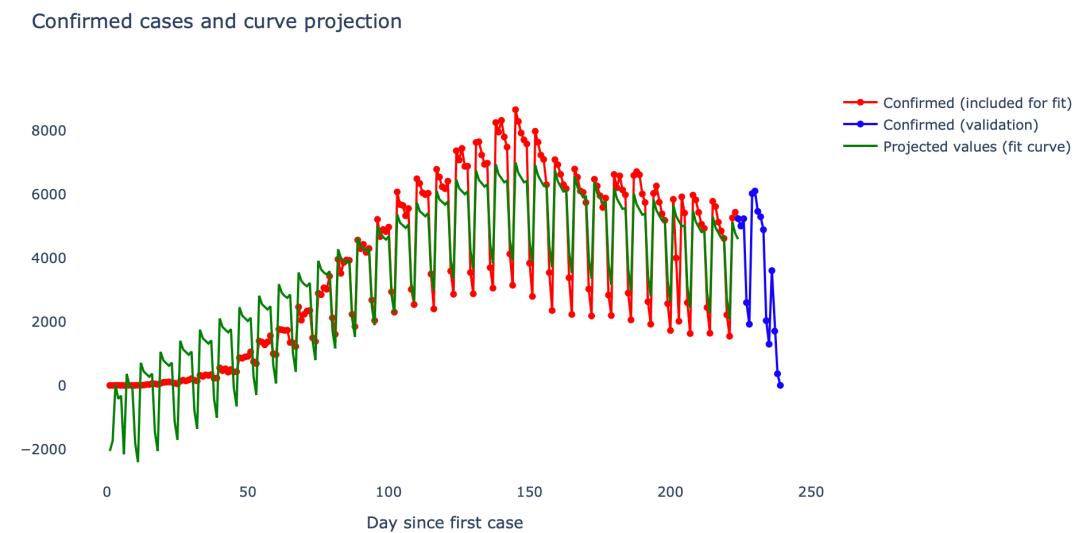
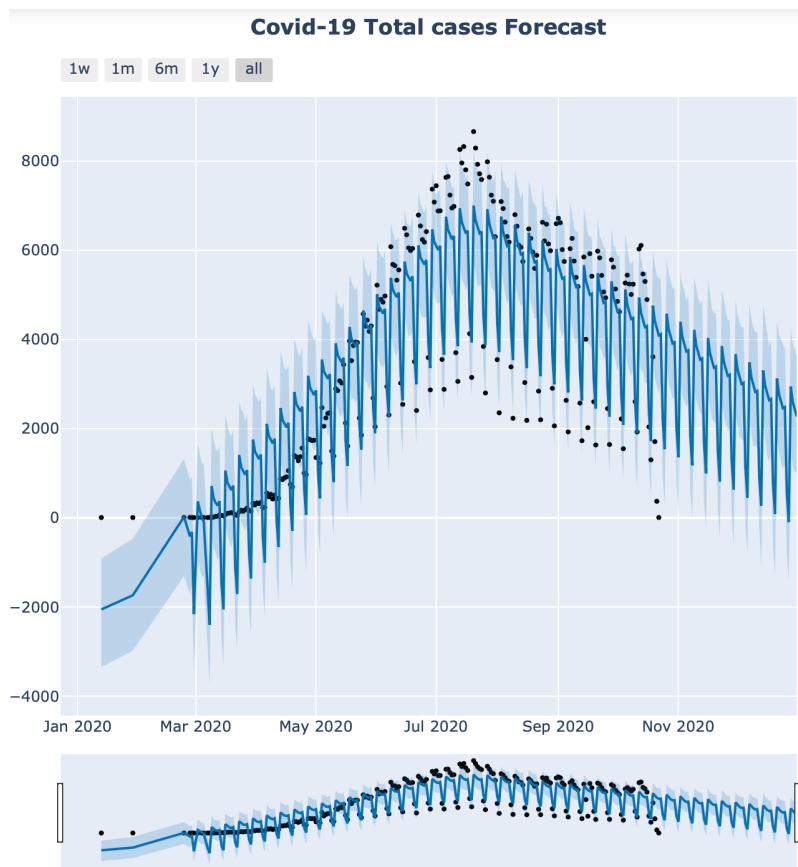
Daily Deceased COVID-19 cases reported in Mexico

The graphic on the right illustrates the deceased people in the country.

Such as in the previous chart, the numbers are reported using the Sentinel Program.



Forecasting Using Time Series



The forecasting was performed using the Facebook Prophet library. The graphic on the left represents the forecast for the rest of the year considering only the confirmed cases. The plot above shows the confirmed cases with its forecast and the projected values using the fit curve.

SARIMAX Time Series Model

SARIMAX Results						
Dep. Variable:	SARIMAX(2, 1, 2)x(0, 2, 2, 4)	Confirmed	No. Observations:	239 <th data-cs="2" data-kind="parent"></th> <th data-kind="ghost"></th>		
Model:		Log Likelihood	-1899.130			
Date:	Tue, 27 Oct 2020	AIC	3812.260			
Time:	22:54:29	BIC	3835.983			
Sample:	0 - 239	HQIC	3821.841			
Covariance Type:	opg					
	coef	std err	z	P> z	[0.025	0.975]
ar.L1	1.2364	0.018	69.920	0.000	1.202	1.271
ar.L2	-0.9509	0.020	-47.315	0.000	-0.990	-0.912
ma.L1	-1.7770	0.042	-42.450	0.000	-1.859	-1.695
ma.L2	0.8182	0.041	19.749	0.000	0.737	0.899
ma.S.L4	0.6114	0.334	1.831	0.067	-0.043	1.266
ma.S.L8	-1.6182	0.221	-7.307	0.000	-2.052	-1.184
sigma2	7.378e+05	8.25e-07	8.94e+11	0.000	7.38e+05	7.38e+05
Ljung-Box (L1) (Q):	17.68	Jarque-Bera (JB):	8.68			
Prob(Q):	0.00	Prob(JB):	0.01			
Heteroskedasticity (H):	11.75	Skew:	-0.40			
Prob(H) (two-sided):	0.00	Kurtosis:	3.55			

