Texas COVID-19 cases analysis with major event from March 2020 to March 2021

Abstract:

Coronavirus, an ongoing outbreak of respiratory disease, has been greatest threat to the global health. The transmissible disease spread from one human to another and caused pandemic all around the world. The United States has been an epicenter of its outbreak and constituently the state of Texas among the top four state. In this study, we study the COVID outbreak in Texas, analyzed the effect on lockdown, post lockdown, festive season, political event, and vaccination effect. The result shows that in some point the government lacked the proper decision to control the pandemic. The cases rise by 150% during the July and December 2020. However, the introduction of vaccine lately on the December 2020 shows that the pandemic in Texas is near about to end. The daily cases fall by more than 200% from the January 2021 to March 2021.

Introduction:

World health Organization (WHO) reports that the world has been affected by several infectious diseases over the past two decades. The outbreak of H1N1 (A. Balkhair, 2009) and MERS (A. Balkhair et al., 2013) as novel infectious agent is some examples of past havoc experience in our world. Similarly, the emergence of SARS and MERS are some infectious diseases witnessed by different countries and has been a major challenge to the global health system (A. A. Balkhair, 2020). The latest novel introduction of disease named as COVID 19 is causative agent for novel corona disease.

Respiratory disease named as Corona virus, occurred in the Wuhan city of China. From December 2019, since its occurrence, the disease has been quickly spreading from the city to the other areas of the world. The novel corona virus was discovered which causes acute respiratory failure syndrome (ARDS) (Yuki et al., 2020). Initially it is believing as the zoonotic transmission with the sea food market in Wuhan city, but the human transmission has major role on the outbreak

of Coronavirus (Li et al., 2020). World Health Organization declares global pandemic on all the 200 countries. 23 January 2020, the United States of America reports first case of covid19 who a traveler from Wuhan city of China was(Ghinai et al., 2020). Since then, the U.S has been an epicenter of novel corona virus with more than 31 million cases reported on 31 March 2021 (Morgan Hines, 2020). Since then, other country such as India, Brazil, UK, Russia, France, etc. reports the increasing number of cases.

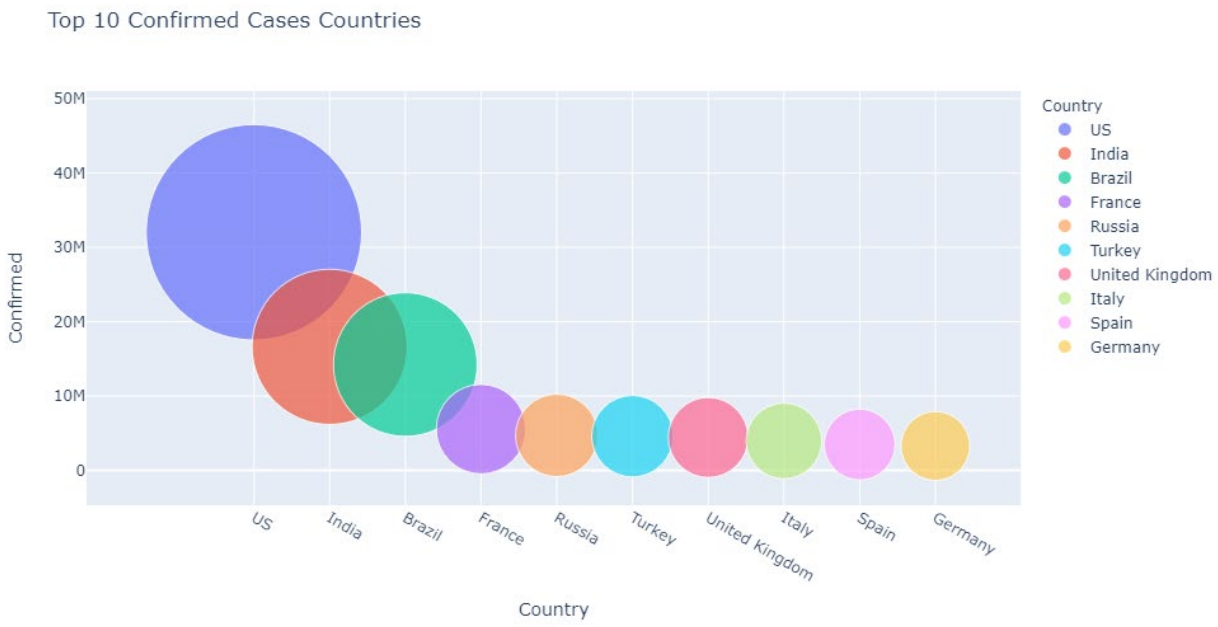

Figure 1: Countries reporting higher number of Corona Cases in bubble plot. The United States has the highest number of cases reported, followed by India, Brazil and so on.

In context of the United States, the infectious disease spread quickly, and many states are immensely affected. California, Texas, Florida, Illinois, New York, Georgia are top states effected by novel corona virus.

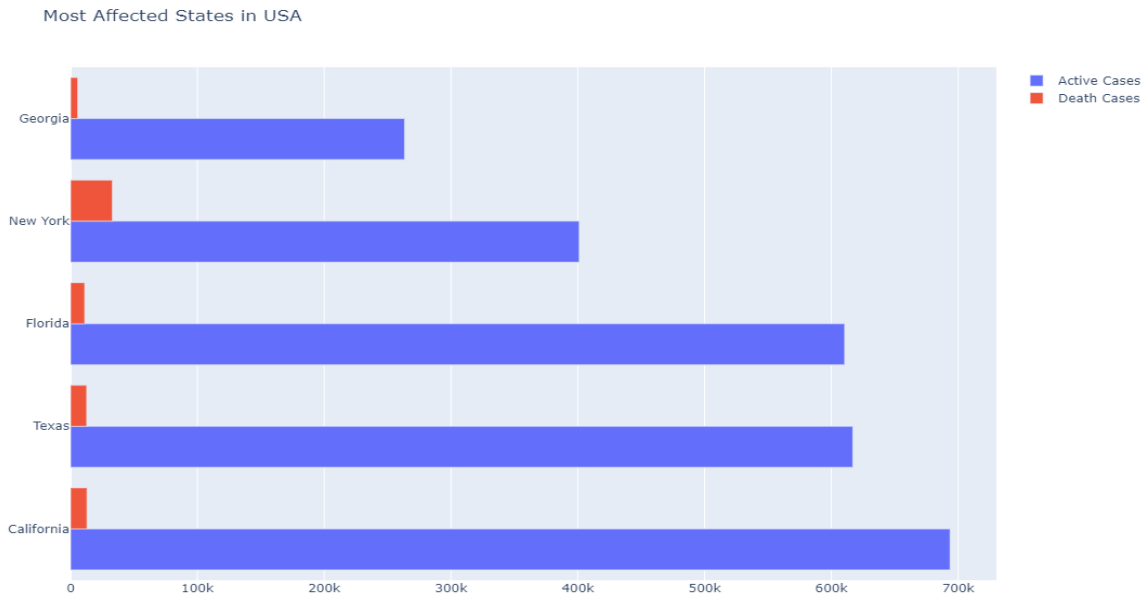

Figure 2: Most affected states in USA (Active cases and Death cases). Source: CDC

Data and Methods:

Central for Disease Control (CDC.gov), Texas Department of State Health Services (dshs.texas.gov), and Office of The Texas Governor (gov.texas.gov) are the major source of our data. The Texas Department of State Health Service (DSHS) provide data of COVID-19 in csv format. Data consists of daily case count from March 2020 to March 2021. Also, the CDC.gov provides the data of on csv format. Additionally, the event of Texas government is tallied from governor official website and Texas Tribune organization.

The initial method was downloading or collecting the data and maintaining it in an appropriate format. After that, the cleaning and processing of data was done, and imported on Jupyter. The data is converted to list, the row and column are transposed for selecting column only. The slicing and indices function is implied (iLoc). For example, for lockdown period of March to April 2020, the data will be stored and analyzed on that period along

with the covid cases in Texas. The plotting of data from matplotlib function provides graphical illustration of increasing number of cases along with the events.

Research Question:

The state of Texas has been second most effected state by coronavirus. There have been several orders and/or decision been made during a period. The people reaction to the orders and social gathering during the festival period and political campaign may impact on covid cases.

1. Is the order effective on controlling the pandemic?
2. The impact of festival season on the number of cases may be correlative because of social gathering.
3. Political events impose higher risk of spreading the disease because of larger number of presence of people. The impact of 2020 election campaign will be studied.

Results:

Late February 2020, the novel corona virus makes news in San Antonio city of Texas for the first time. Beginning of the march the schools and universities of Texas goes online and governor declares the state of emergency on 13th of March 2020.

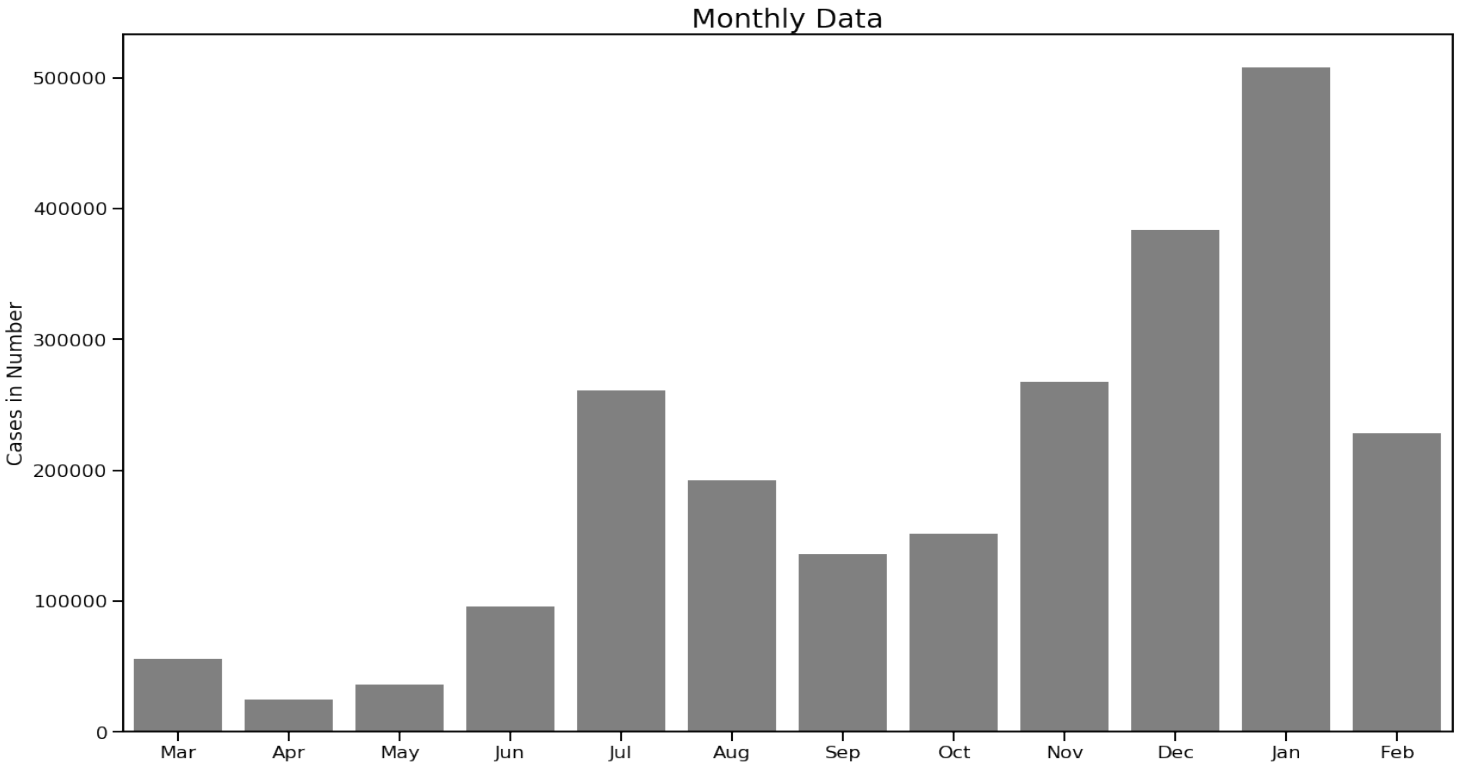

Figure 3: Monthly cases reported by DSHS in Texas.

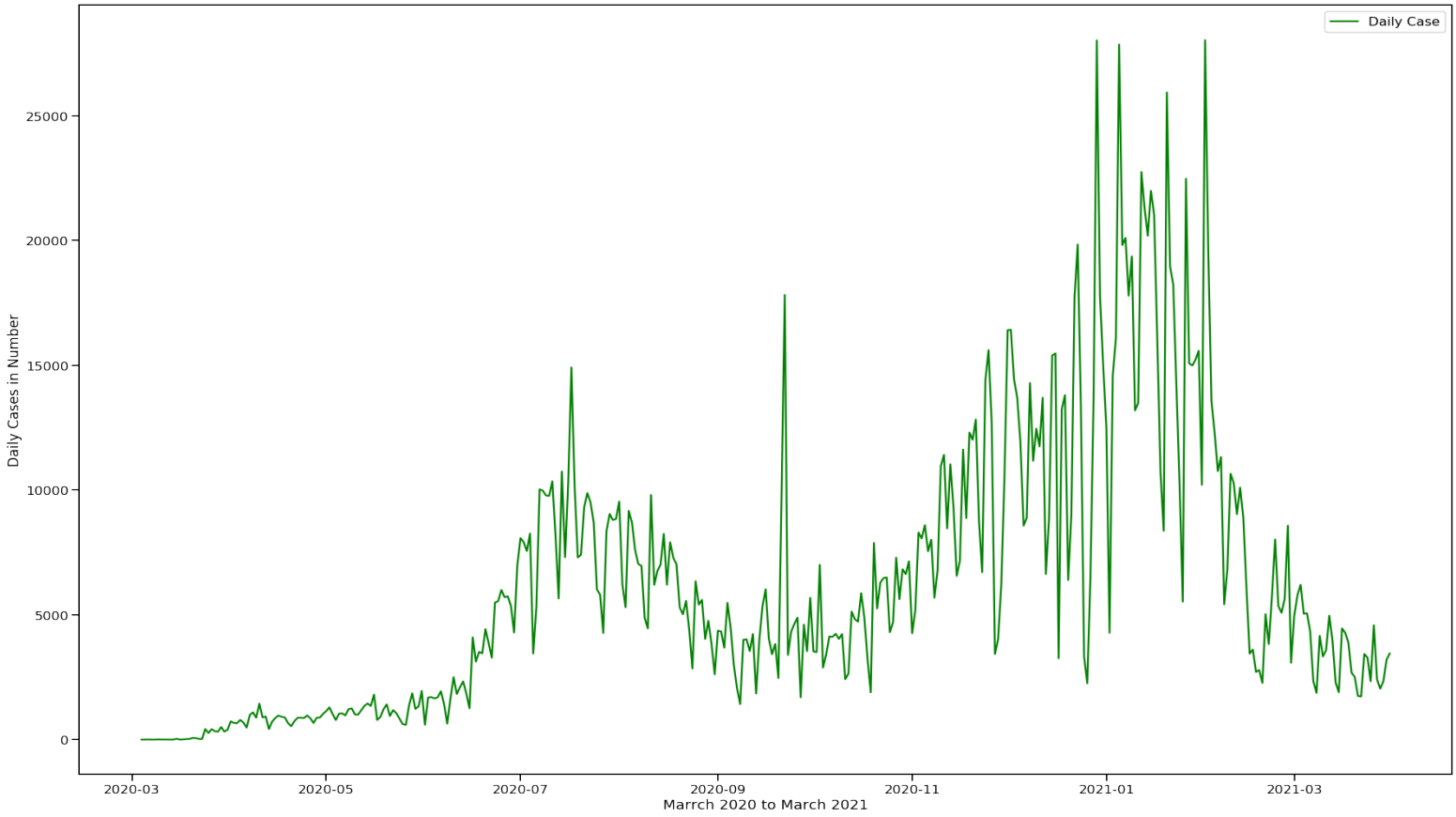

Figure 4: Line plot showing daily cases trend in Texas from March 2020 to March 2021

Additionally, the news making headline of first Texan dying on March 15 of the same year, the major cities Houston and Dallas implies restriction on opening of bars and restaurant. In the meantime, governor Abbot activates Texas National Guard to help minimizing the effect of corona virus. The lockdown order came into effect after Governor Greg Abbot issuing executive order.

Restaurant, bars, gym, Social gathering all were prohibited to minimize the spread of virus. During the pilot phase of lockdown, the reported cases sterilize, the confirmed cases were 30,000 and more. However, the government decision on opening the Texas in different phase results in spike of the case. Figure 3 shows the monthly reported case in Texas and figure 4 shows the daily reported case in line. The cases rise rapidly in July 2020 and December 2020.

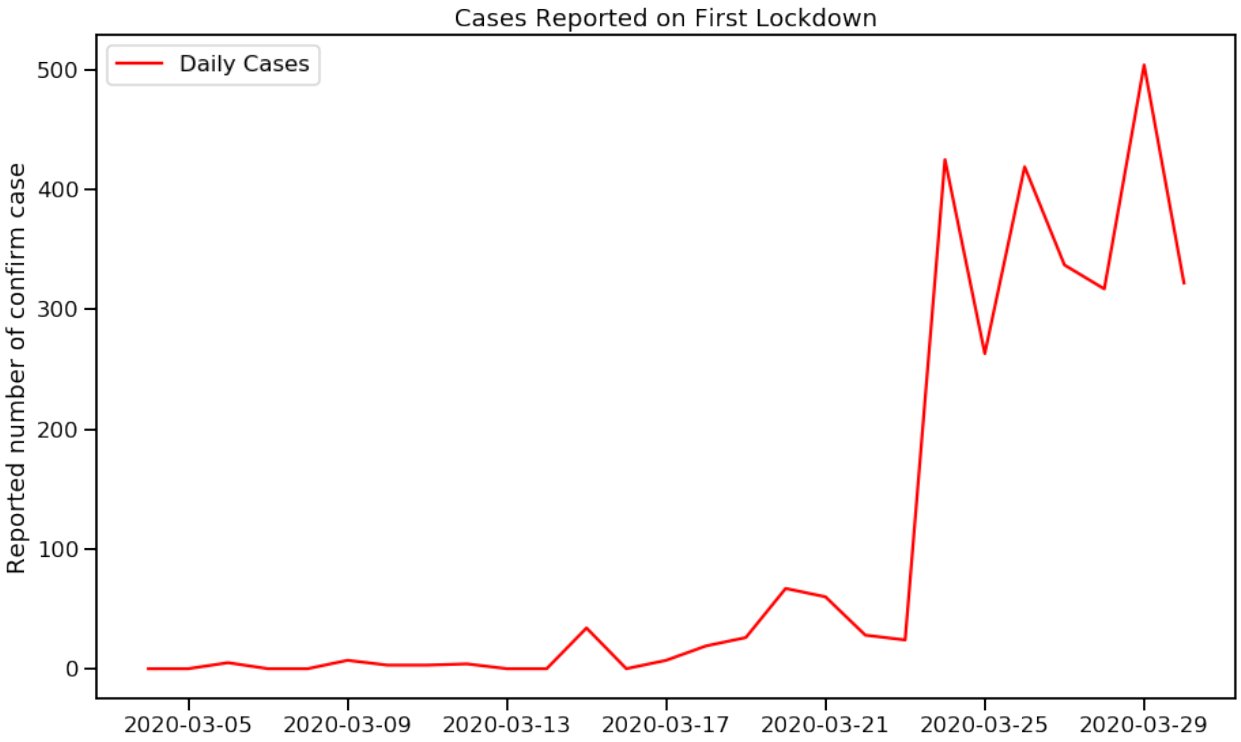

Figure 5: Cases during the first lockdown.

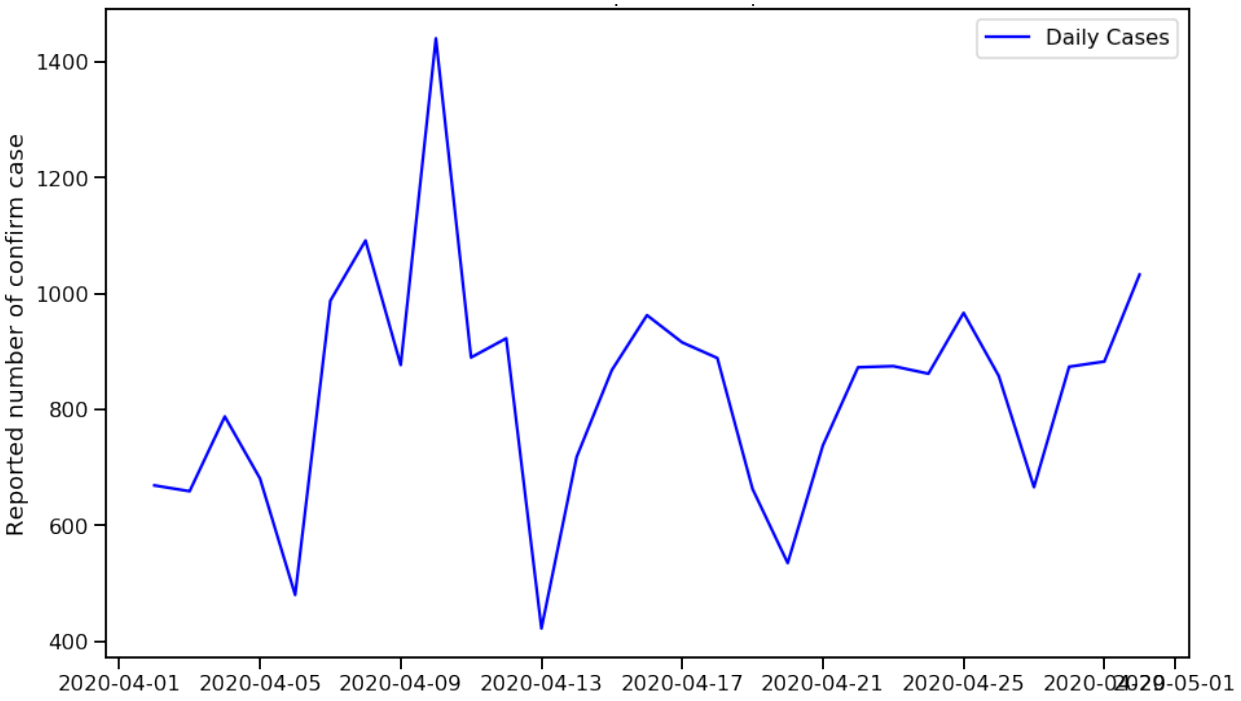

Figure 6: Covid trend in April 2020

Figure 5 illustrates the pattern of case after governor Abbot issued executive order of lockdown. The curve remains flat and initiates to spike on late March. In April 2020, the cases rise more than previous month despite of stay home order. Figure 6 shows the initial upsurge of covid case and the flat pattern of curve in late April. The trend implies government to initiate reopening the Texas in different phases. Figure 7 show the trend of case with the decision of government. During the phase I of reopening Texas, the curve remains flat till mid of June 2020. The decision of opening small business, gym, bars emphasize the increment in cases of 10,000 to 12,000 per day.

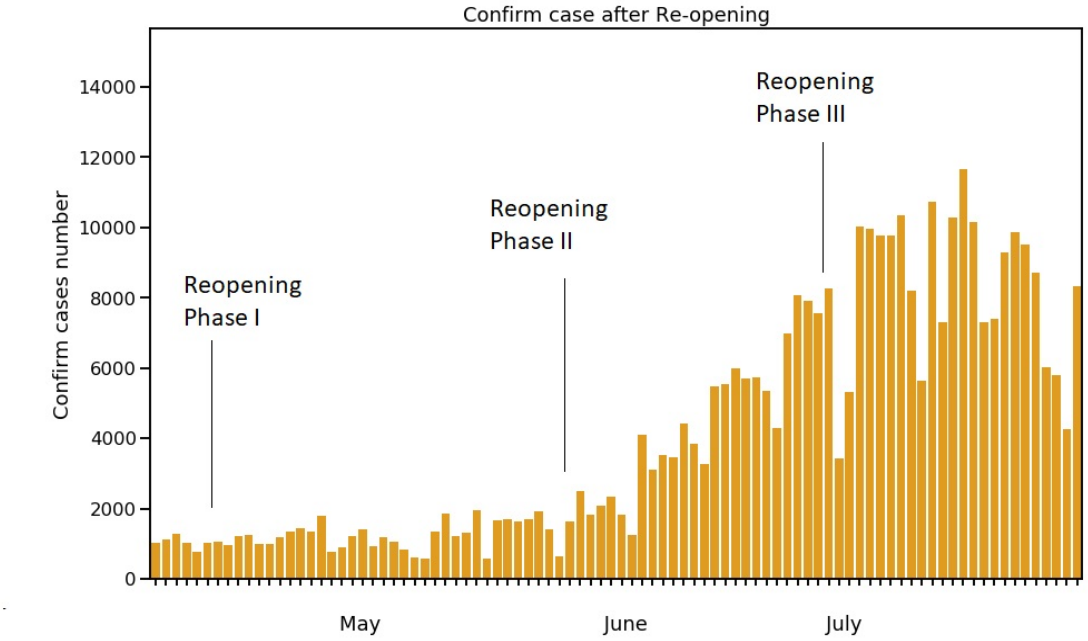

Figure 7: Phases of reopening Texas and trend of COVID-19 spread.

Furthermore, the election campaign during October, the opening of Texas decision on November 18 by government and the festival season during late December 2020 and early 2021 also supports the increment of cases in Texas. The per day reported case spiked by 100% before the election and by 150% after the election. Additionally, the case surpassed a record of 25000 per day during December 2020 and January 2021 which caused a serious disaster in hospitalization and pressurize on vaccination to the citizens.

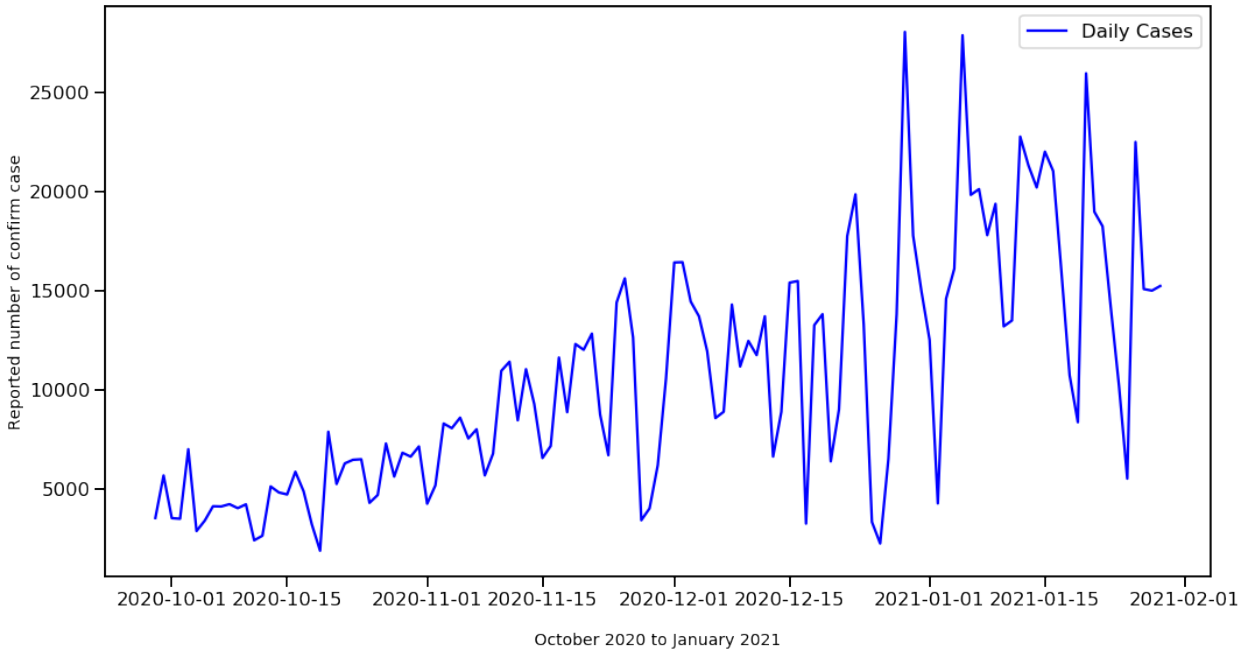

Figure 8: October Pre-Election, November Post election trend, December Festive season trend of reported COVID 19 cases.

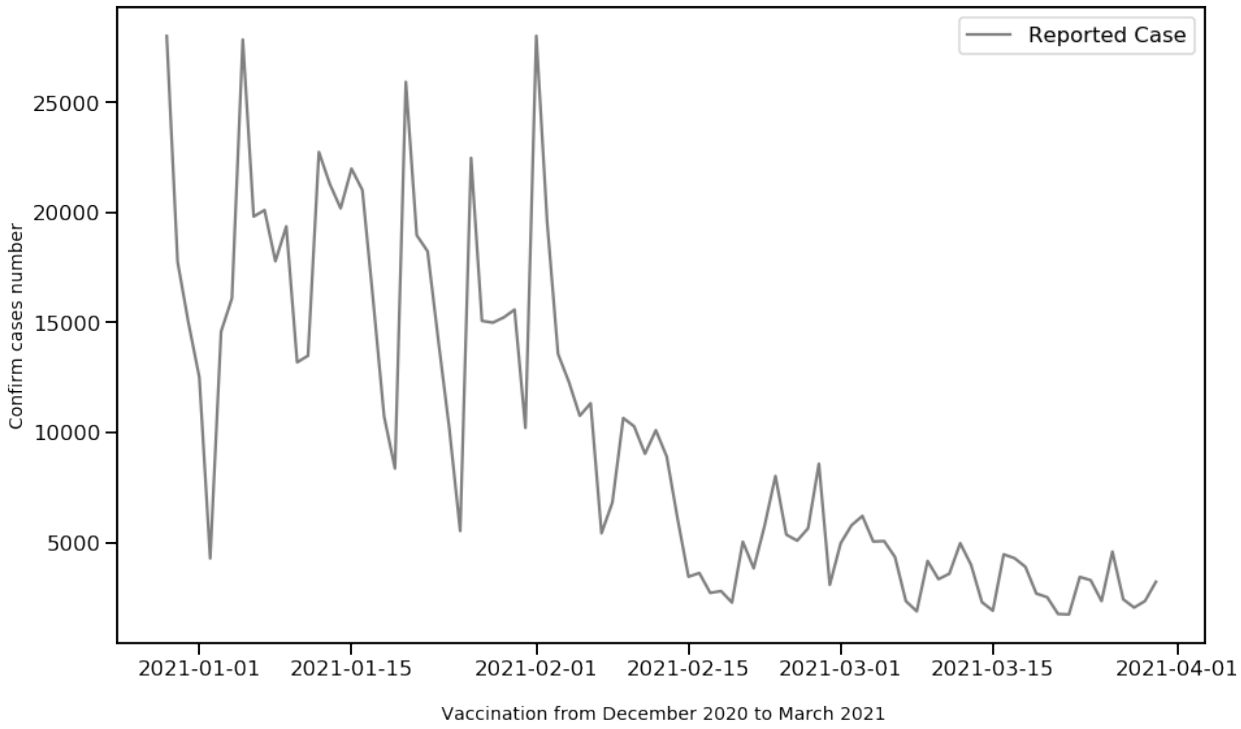

Figure 9: Cases trend after vaccine

With the introduction of vaccine, the cases trend to decrease in larger number. The result shows the reported case decrease by more than 150% from January month to February 2021 and more largely in March. The per day reported cases are below 5000 and the government official lifts the mask mandate order on 10th of March 2021.

Conclusion:

Texas reported many novel corona cases and this study emphasize the role of policy makers and citizens. The government decision is not only vital for handling the covid case in a larger state or country. The relation with citizen, the linkage with local body is also influencing to control the threats. The festive season, the political event is also responsible for spiking of diseases. For example, the recent spike of cases in India is believed because of political rallies, religious observance, and lack of vaccine coverage (Uma, 2021). An early monitoring system is required which allows prompt detection of disease threat, epicenter, track, or clear threats. Effective communication system, information circulation and prompt execution of order by organization or government, may help on reducing the threat of pandemic. The horrible impact of this infectious disease will always remain in the history of our world.

References:

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Uma, K. (2021, April 30). . "4 Reasons Why India's COVID Crisis Will Derail the World Economy." *U.S. News & World Report*. www.usnews.com/news/best-countries/articles/2021-04-30/4-reasons-why-indias-covid-crisis-will-derail-the-world-economy.

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Coding:

```
data['Last Update'] = data['Last Update'].apply(convert_time)
```

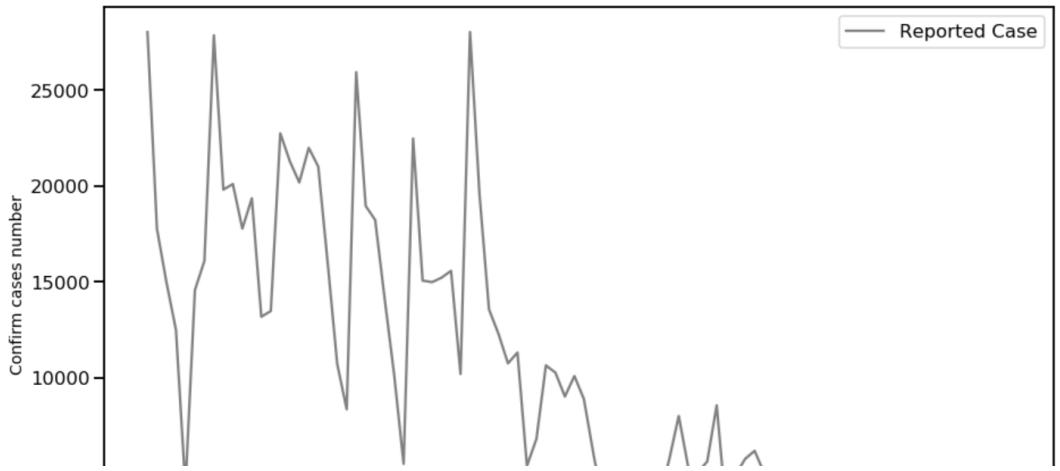
In [7]:
```
# Top 10 confirmed countries (Bubble plot)

top10_confirmed = pd.DataFrame(data.groupby('Country')['Confirmed'].sum().nlargest(20).sort_values(ascending = False))
fig1 = px.scatter(top10_confirmed, x = top10_confirmed.index, y = 'Confirmed', size = 'Confirmed', size_max = 150,
                  color = top10_confirmed.index, title = '20 Confirmed Cases Countries')
fig1.show()
```

In [183]:
```
plt.figure(figsize=(15,9))
sns.lineplot(x="Date",y="Perday",
             label="Reported Case", data=vaccination,
             ci=None, color= 'gray')

plt.title('')
plt.ylabel('Confirm cases number', size = 14)
plt.xlabel('\n Vaccination from December 2020 to March 2021', size = 14)
```

Out[183]:
```
Text(0.5, 0, '\n Vaccination from December 2020 to March 2021')
```



In [121]:
```
df = pd.read_excel(r'G:\texas_tr.xlsx')
```

In [122]:
```
df.head()
```

Out[122]:

	County Name	Anderson	Andrews	Angelina	Aransas	Archer	Armstrong	Atascosa	Austin	Bailey	...	Young	Zapata	Zavala	Total	Perday	SN	Date	
0	Cases 03-04-2020	0	0	0	0	0	0	0	0	0	...	0	0	0	0	0	1	2020-03-04	
1	Cases 03-05-2020	0	0	0	0	0	0	0	0	0	...	0	0	0	0	0	2	2020-03-05	
2	Cases 03-06-2020	0	0	0	0	0	0	0	0	0	...	0	0	0	5	5	3	2020-03-06	
3	Cases 03-07-2020	0	0	0	0	0	0	0	0	0	...	0	0	0	0	0	0	2020-03-07	1.66
4	Cases 03-08-2020	0	0	0	0	0	0	0	0	0	...	0	0	0	0	0	0	2020-03-08	1.66

5 rows × 262 columns

In [123]:
```
df1 = pd.DataFrame(df,
                   columns =['Total',
                             'Perday', 'SN','Date','MA','Month','CaseM'])
```

In [124]:
```
df1.head()
```

Out[124]:

	Total	Perday	SN	Date	MA	Month	CaseM
0	0	0	1	2020-03-04	NaN	Mar	3266.0
1	0	0	2	2020-03-05	NaN	Apr	24821.0

In [40]:
```
df1['cases_7day_ave'] = df1.Total.rolling(7).mean().shift(-3)
df1[['Date', 'Total','cases_7day_ave']].head()
```

Out[40]:

	Date	Total	cases_7day_ave
0	2020-03-04	0	NaN
1	2020-03-05	0	NaN
2	2020-03-06	5	NaN
3	2020-03-07	0	4.571429
4	2020-03-08	0	7.142857

#Bubble plot-Top countries with reported cases

```
Confirmed_cases =
pd.DataFrame(data.groupby('Country')['Confirmed'].sum().nlargest(20).sort_values(ascending =
False))
fig1 = px.scatter(top10_confirmed, x = top10_confirmed.index, y = 'Confirmed', size =
'Confirmed', size_max = 150,
            color = Confirmed_cases.index, title = '20 Confirmed Cases Countries')
#size_max regulates the plot size
fig1.show()


#plotting the most affected states of  the USA.

topstates_us = data['Country'] == 'US'
topstates_us = data[topstates_us].nlargest(5, 'Confirmed')

df = pd.read_excel(r'G:\texas_tr.xlsx')
df.head()

df1 = pd.DataFrame(df,
            columns =['Total',
                  'Perday', 'SN','Date','MA','Month','CaseM'])

#df1.plot(x='Date', y=['Perday'])
plt.figure(figsize=(30,19))


sns.lineplot(x='Date', y="MA",
          label="7 Day Moving Average", data=df1,
          ci=None, color= 'orange')
#sns.lineplot(x="date",y="cases_7day_ave",
#            label="7 day MA",
 #           data=cor_tx
  #          ci=None, color = 'orange')

plt.xlabel('March 2020 to March 2021')
plt.ylabel('Daily Cases in Number')

plt.show()

#indices
```

```
march = df1.iloc[0:27]
plt.figure(figsize=(30,19))
march.plot(x="Date", y=["Perday", "Total"])
plt.ylabel('Daily Cases')

plt.show()

#April data
april = df1.iloc[29:58]
print(April)
plt.figure(figsize=(30,19))
sns.lineplot(x="Date",y="Perday",
             label="Daily Cases", data=april,
             ci=None, color= 'b')
plt.title('Cases Reported on April')
plt.ylabel('Reported number of confirm case')
plt.xlabel('April 2020 ')
```