

# **The Pandemic's Effect on Crime in USA's Largest Cities**

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## **1.0 Introduction**

COVID-19 has had a major impact on every aspect of our lives. Governments around the world have resorted to lockdowns and curbing all forms of social interaction in hopes of slowing the spread (A timeline of covid-19 developments in 2020). Lockdowns, fear of the virus, and conspiracy theories had their respective impacts socially, economically, and even racially. This resulted in many of the major issues being evaluated in pre and post covid lens. Crime rate is one of the metrics that can be greatly affected by the pandemic and its social and economical impacts. Early news and reports have suggested that the pandemic have resulted in a downward trend in crime rates. However, some reports later on have come to suggest otherwise (Nivette, Amy E., et al.).

The mental and psychological impact of the virus, as well as the economic downturn and general sense of uncertainty may have fueled crime rates. On the other hand, less social interactions and a slower pace of life may have contributed to lower crimes. Our goal is to examine the impact of the pandemic on the crime rate in four major U.S cities. We hypothesize that the lockdowns imposed during the COVID-19 pandemic have contributed to a decrease in crime rates across the U.S. Our work complements the work performed by the United Nations Office on Drugs and Crime, which examined the global impact of the pandemic and related restrictions on violent and property crimes (Research Brief: Effect of the Covid-19 Pandemic).

We chose the cities based on size and location so that it can be as reflective as possible of the entire geography of the United States. Understanding the impact of the pandemic on crime rates in the United States can provide us with valuable insights that can translate into major changes and improvements in existing laws and enforcement methods. Furthermore, data from

this pandemic can be used as a blueprint for dealing with future pandemics or other similar events that may disrupt social life.

## **2.0 Literature Review**

<https://www.nature.com/articles/s41562-021-01139-z>

The study, “A global analysis of the impact of COVID-19 stay-at-home restrictions on crime”, collected data from multiple cities throughout the globe and focused on time series analysis to determine the effects COVID-19 had on different types of crime. The study found that urban areas with stricter lockdown restrictions resulted in a decrease in crime, however there was still a significant variation across cities. This correlated with our finding for New York City and Chicago as there was an overall decrease in crime.

## **3.0 Data and Methods**

We collected our data from the various government crime databases. These databases were all organized in different formats since each state has a different way of handling their collection and storage of crime data. This made it hard for us to bring all the datasets together since there are a lot of features that they did not share. Each dataset started fairly clean with very few null values so besides the difficulty in joining the datasets together, there was not much we needed to fix. One thing that we did for preprocessing to help align all the different datasets, was organize all the crimes into six different categories. The categories that we chose were property, violent, white collar, organized, public order, and other. We chose these categories because we felt that they were the best broad descriptions of the types of crime that occur in cities. We each sorted the specific crimes in our datasets into these categories by our best judgement and any that did not fit went fell under the other category.

```

import pandas as pd

Chicago_crime = pd.read_csv("../Chicago_Crime_2019-2021.csv")

Chicago_crime['category'] = "other"

Chicago_crime.loc[Chicago_crime["Primary Type"].isin(['THEFT',
                                                    'MOTOR VEHICLE THEFT',
                                                    'CRIMINAL DAMAGE',
                                                    'CRIMINAL TRESPASS',
                                                    'BURGLARY',
                                                    'ROBBERY',
                                                    'ARSON'
                                                    ]), "category"] = "Property"

Chicago_crime.loc[Chicago_crime["Primary Type"].isin(['ASSAULT',
                                                    'BATTERY',
                                                    'INTERFERENCE WITH PUBLIC OFFICER',
                                                    'INTIMIDATION',
                                                    'HOMICIDE'
                                                    ]), "category"] = "Violent"

```

We made a python script using pandas shown in figure 1 that allowed us to easily organize these crimes and stored our categories in a new column. These large datasets were stored in csv files. The raw files for

**Figure 1.** Part of the python code used to clean, rearrange the data.

each of the cities crime data was over one million rows so excel could not load the whole dataset for each one. We further cut down the size of our data by only looking at the crimes that occurred since 2019. In doing this we were able to cut down the size of the data to a much more manageable load as well as focusing on only the recent years that helped us identify how COVID-19 affected crime in the largest cities in the United States. The CSV files were loaded into Tableau Desktop to create the visuals presented below demonstrating the levels of crime in 2020 compared to 2019.

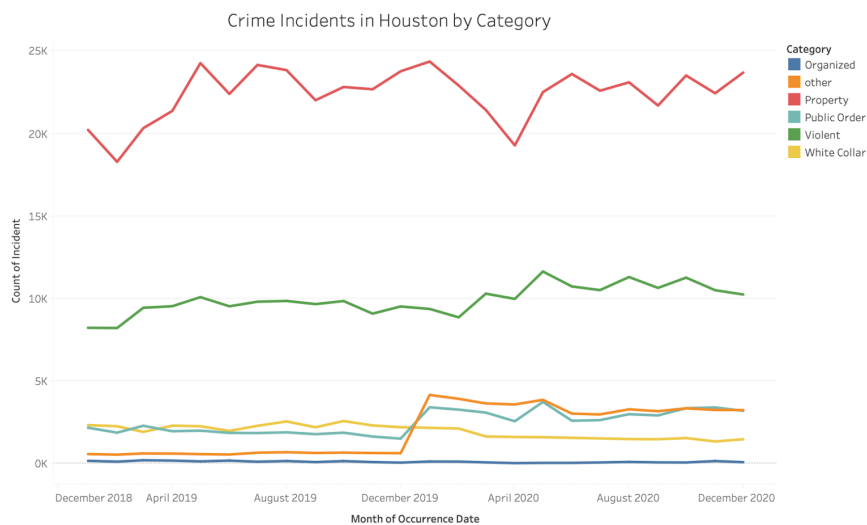
#### 4.0 Results and Discussion

Looking into all the cities covered by this study, there is no particular trend that they all share. This is because crime rates in a certain city are impacted by various factors. Thus, it is difficult to trace back crime to a single variable, making it difficult to provide a side by side comparison. This is in addition to varying laws, classifications, and data collection methods that

are followed by each city. In this study, we examined and analyzed the impact of COVID-19 on the crime rates in each city individually.

#### 4.1 Houston

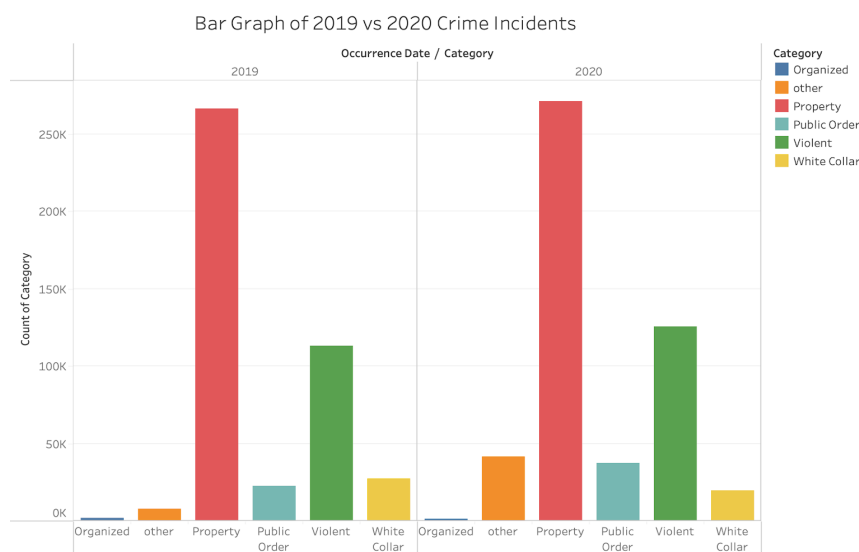
As we looked into the impact of COVID-19 on crime-rates in Houston, we saw a slight increase in the total crime rate in 2020, the pandemic year, when compared to the preceding year. This result was inconsistent with trends observed in other cities in this study. A time-line of the crime incidents by month provides a more thorough picture.



**Figure2.** Crime incidents in Houston from 2019 through 2020.

In Figure 2, we can see an upward trend across most categories. In most cases the peak is between March and May, which is around when the COVID-19 lockdowns began to happen, followed by the protests after the death of George Floyd. The initial decrease in Property crimes around April can be attributed to the lockdown. During the lockdowns more people were at home at all times, which made it more difficult for break-ins to occur. However, this trend seems to have reversed as soon as the restrictions were eased later in the year. This was also coupled with events of civil unrest, and a general sense of instability that may have had a direct impact on

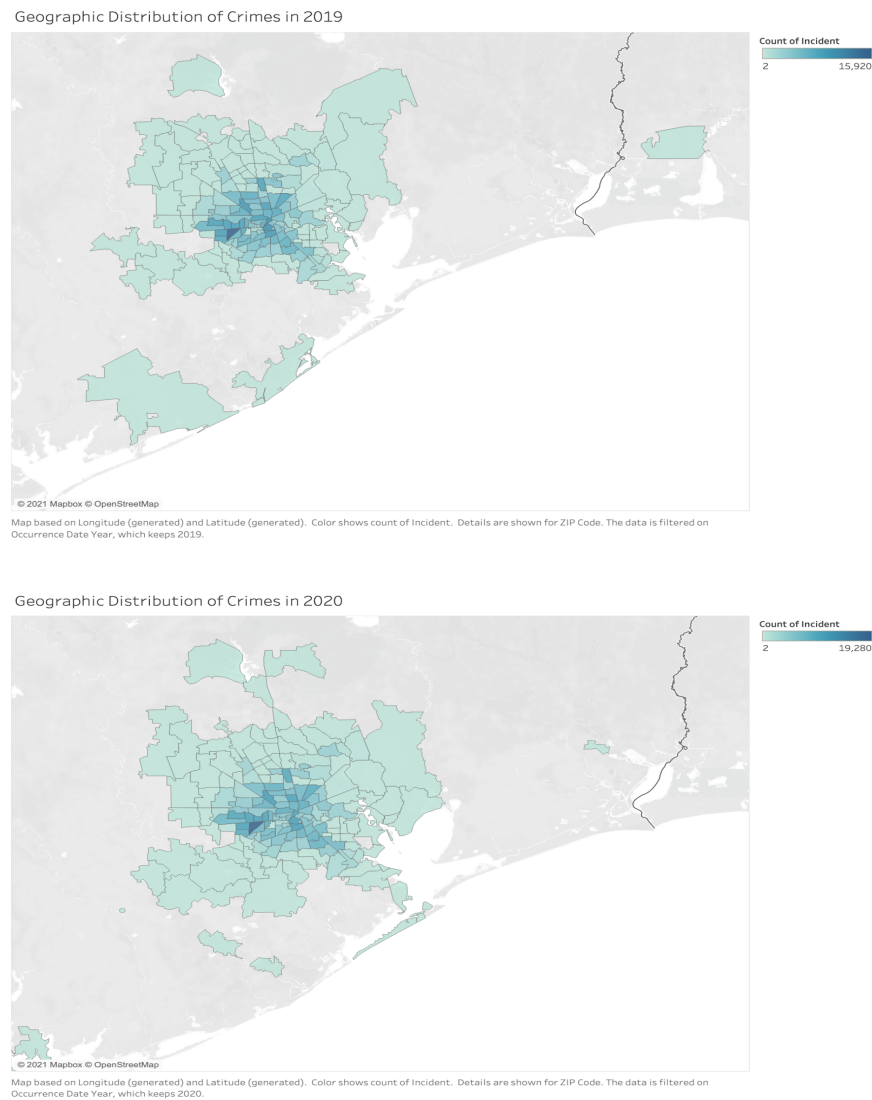
property crimes. On the other-hand, we see two major peaks in Violent crimes, with the first one occurring in March and the second in May of 2020. The first peak coincided with the lockdown, when people were experiencing varying degrees of mental stress. Also, a rise in domestic violence can be the driver of the increase due to all members of the family being present at home for extended periods of time. These conditions meant that in cases where domestic violence was already an issue, the victim was spending an increased amount of time with the aggressor which contributes to more events of violence. It is also worth noting that the time in which the second peak happened correlates with when the protest took place (end of May), which could be another contributor along with the implications from the pandemic restrictions.



**Figure 3:** Houston crime count by category in 2019 vs 2020

Figure 3 is a bar graph by category. The figure shows the increase in crime in 2020 compared to 2019 has been across all major categories. However, one exception to the trend is in White Collar crimes. We believe the decrease in White Collar crimes is due to lack of social interaction during the pandemic. Extremely low levels of social interactions as well as fewer unnecessary business transactions may have contributed to the decrease in White Collar crimes.

Criminals had fewer opportunities to act on victims, and people resorted to more trusted and well known brands and vendors during the time of uncertainty.



**Figure 4.** Heat map of the distribution of crime incidents in Houston in 2019 (top) vs 2020 (bottom).

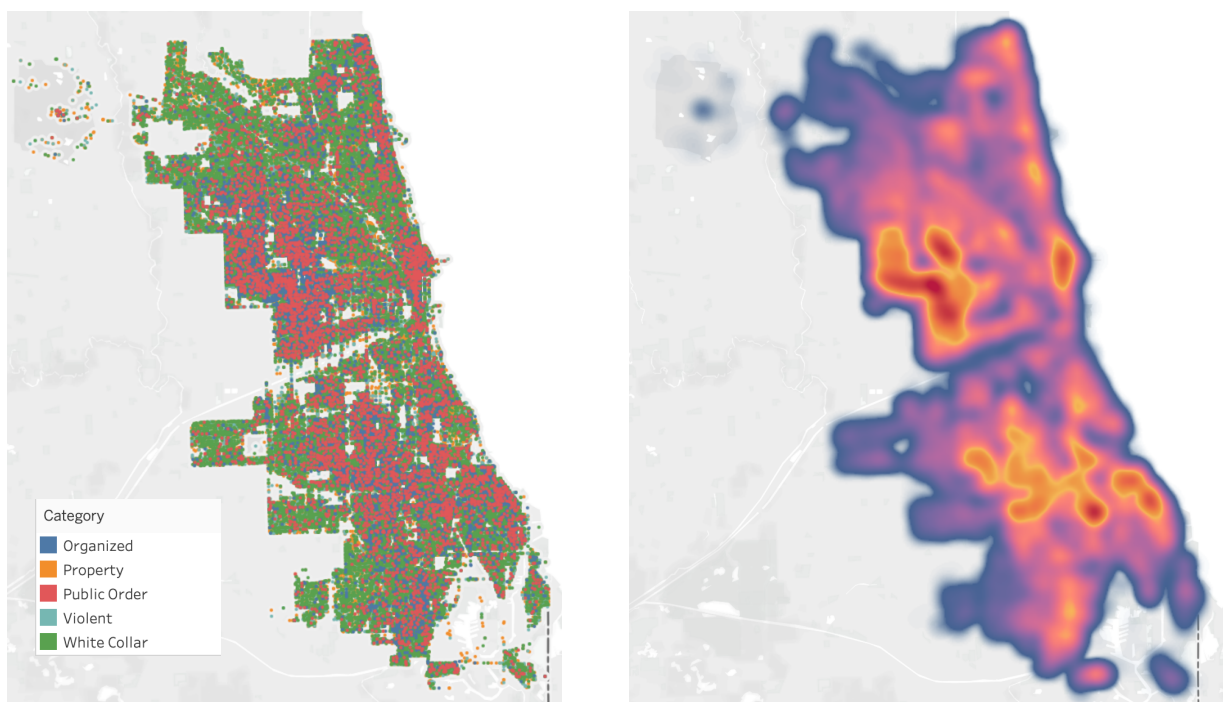
Figure 4 shows two heat maps of the crime incidents in Houston during 2020 and 2019. The figure shows a broader spread of crime incidents from the city and into the suburbs in 2020. This is to be expected as people who lived in the suburbs were more likely to be there and interact with people within their community rather than in other areas. This is particularly true for bedroom communities. The restrictions from COVID-19 limited the distance people traveled.

Also, with most offices and businesses closed, the downtown area experienced a decrease in traffic, while people in what is normally a commuter community were spending more time in their community.

## 4.2 Chicago:

With a population of 2.7 million, Chicago is the biggest city in the midwest and the third largest city in the United States. This makes Chicago a great city to represent the general crime rates in the midwest and the broader United States. The data we gathered was only from 2019-2021 so we could take a close look at the trends that occurred over those years. The crime rates in 2019 were used as the base so we can compare the rates before and after the pandemic.

The first thing we looked at was the distribution of crime throughout the city to see if we could notice any hot spots or relationships between the categories so we can get a better understanding of the data. In figure 5 on the left we can see that crime rates are distributed pretty evenly across all the categories. The only relationship we were able to see was the crimes of public order and organized crime often happened in the same general areas. However this

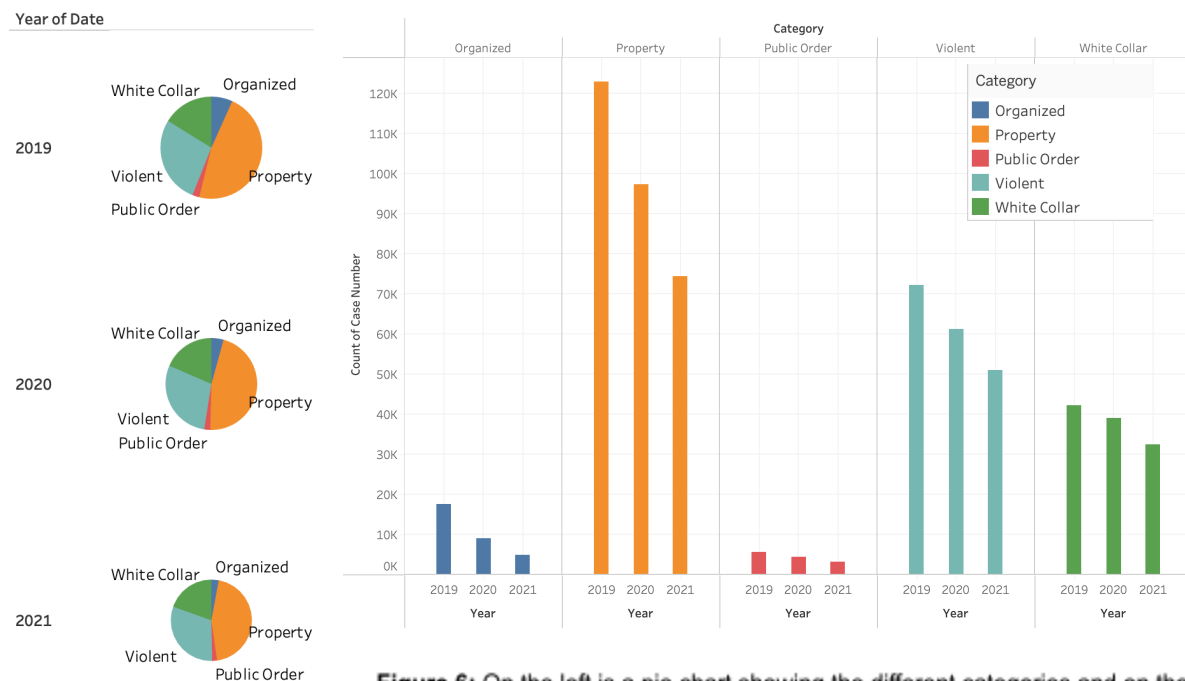


**Figure 5:** The left map shows the distribution of the different crime categories while the right map shows a heatmap of all the data together



relationship might only show since these are the two smallest categories and the distribution of the larger categories is hidden in their numbers. On the right map of the figure we can see there are three main hot spots which are in the same areas where organized and public order crimes are distributed. We also looked to see if there was a difference in the distribution between the crimes before and after the start of COVID-19.

Although the pandemic did not affect the distribution of the different categories of crimes in Chicago, there was a very noticeable effect on the rate of those crimes. As shown clearly in figure 6 there was a significant decrease in the rate of crime after the onset of COVID-19. The largest category was property crime and it also had the largest drop in rate. This large drop in property crime could be explained by the stay at home orders. Since people were spending a lot more time at home there were fewer opportunities for criminals to commit these property crimes. On the other side of things white collar lowered the least. This could be due to gambling being

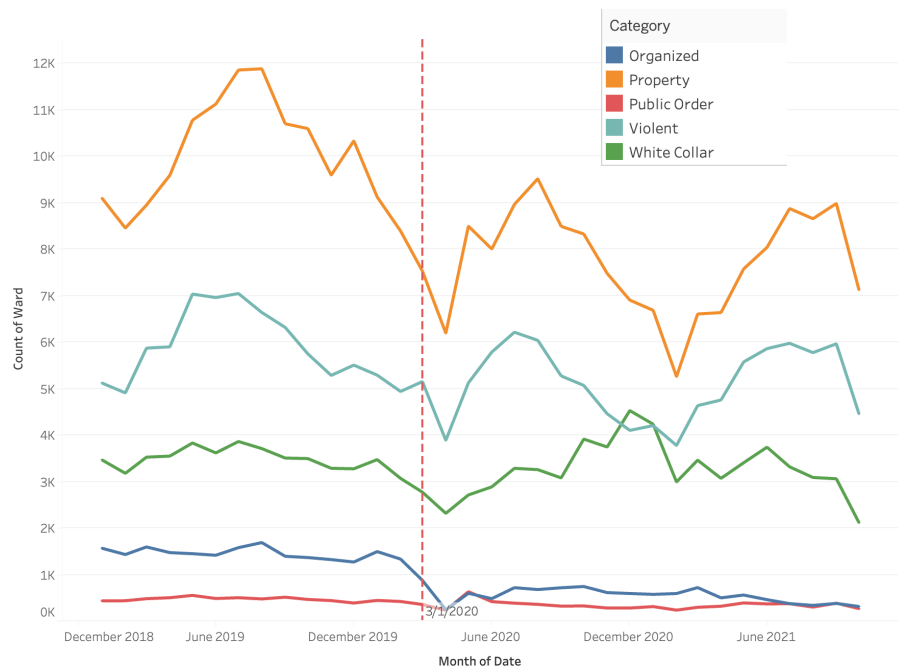


**Figure 6:** On the left is a pie chart showing the different categories and on the right is a bar graph showing how much crime has dropped over the three years

included in this category. Gambling is a crime that can be done in the comfort of your own home so the pandemic and the stay at home orders did not have as much effect.

In figure 7 we took a closer look at the timeline of the crime rates. The dotted orange line represents the start of the pandemic in the beginning of March 2020. There is a very clear drop in crime right after the onset of covid and the stay at home orders. We then see a clear rise in the rate as the first wave died down and restrictions were lifted, only to take another dive when the second wave hit and restrictions were reinstated. This suggested a negative correlation between the crime rates and covid

cases. As shown in the bar graphs above we can clearly see that property crime has the greatest negative correlation as reasoned before. The last drop in crime can be explained by the time it takes for the crimes to



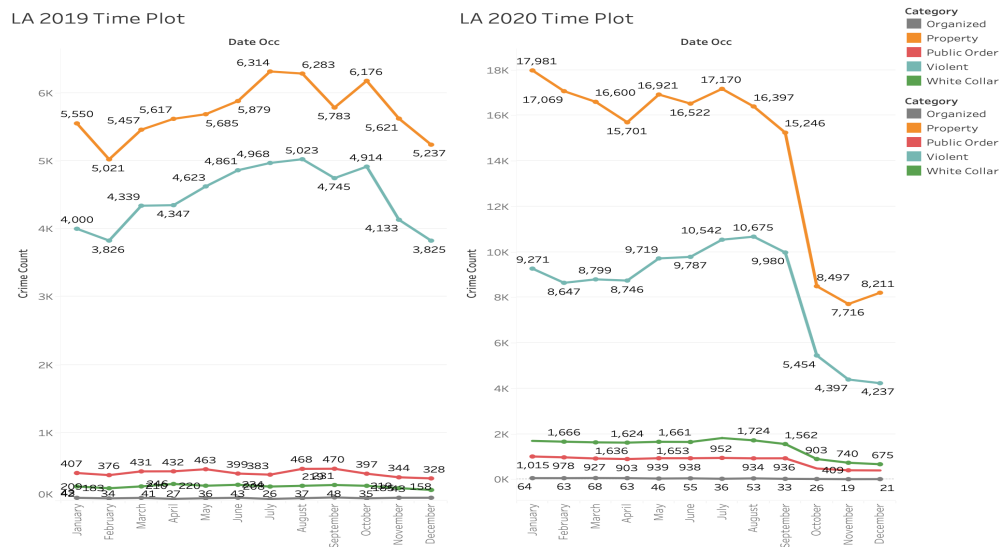
**Figure 7:** This time series shows the trends in crime rates split into the 5 categories

be reported. In Chicago the crime rates behaved how we hypothesized but that was not the case with every city.

### 4.3 Los Angeles

We look at the crime rate of Los Angeles before and after the beginning of the COVID-19 virus as well as the initial country wide shut down. We decided to look at a credible source for open data from the Los Angeles area and were provided with data tables of criminal

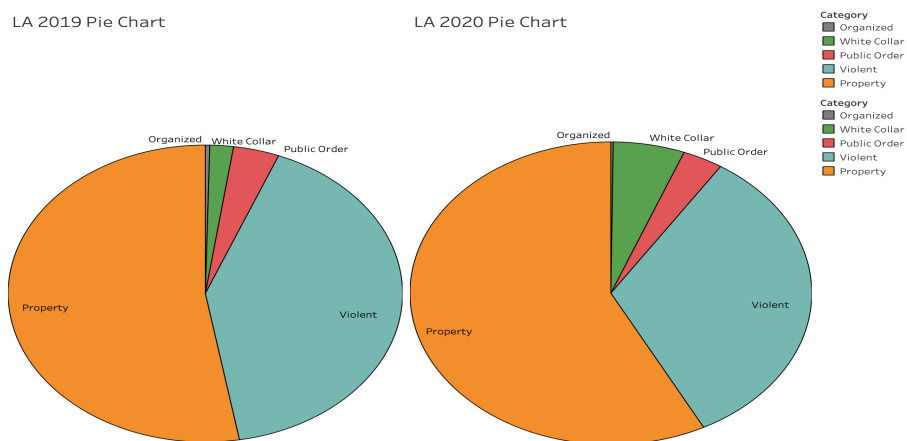
reports in the Los Angeles area from 2010-2019 as well as a separate data file from 2020-2021. As we mentioned before, we wished to look at the year right before the COVID-19 epidemic's arrival in the US and the year that the virus took a hold of the general population in America that was the cause of the shutdown.



**Figure 8.** Crimes Reported in Los Angeles from 2019 to 2020

Looking at the data first and foremost there is one major detail to point out and it is that 2020 had a larger number of general crimes to occur in the Los Angeles district than its previous year. Seeing as such a major new occurrence of the stay-at-home order given nationwide it wouldn't be too shocking to see that many people cause a general disturbance in populated cities. However, at the same time it was expected that due to the stay home order, that general crimes should've decreased in some of the criminal categories. It could be pointed out that in 2020, besides COVID-19, a lot of social unrest occurred due to racial injustices from across the country as well as people protesting against COVID-19 regulations imposed by the government. Looking a little deeper into our data, we see that while 2020 had more general crimes, the category of

crimes shifted in position as we began to see more of one category of crime occur more often than the other. An example of this statement is that Public Order classified crimes decreased in 2020 versus 2019. This is quite strange as we previously mentioned that civil unrest was occurring nationwide for multiple reasons. Though one could say that due to this stay-at-home mandate less people were inclined to go out and do any form of public activism with the virus out, especially in large, crowded cities. Violent and Organized crime rates from 2019 greatly decreased in 2020, which is most likely another effect from the stay-at-home mandate that prevented people from going out putting each other at a life threatening risk.



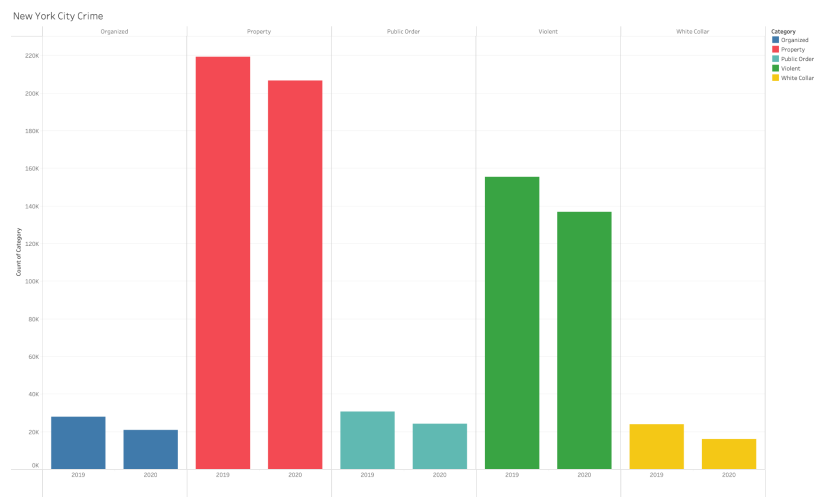
**Figure 9.** Crime count of different categories of crime over the 2 years in LA.

To take this analysis a little farther we can go ahead and evaluate a credible source that has its own reporting of crimes during the pandemic on a much larger scale than just California. This report comes from the United Nations, specifically the Office of Drugs and Crime (shortened to UNODC). While my focus was specifically on Los Angeles, using findings from professionals can give us some useful insight of the situation even when being evaluated on a

more global scale than our own project. Their findings were focused on Violent and Property based crimes, and what they saw was a general decrease of crimes in the year 2020, compared to the crime rate of last year. 2020 had a 25% decrease in Violent crime rates and a 50% decrease of Property based crimes in a majority of recorded countries (UNODC). This is quite interesting to see since for LA County, there was actually a decrease of Violent based crimes (which is similar), but an increase of Property based crimes.

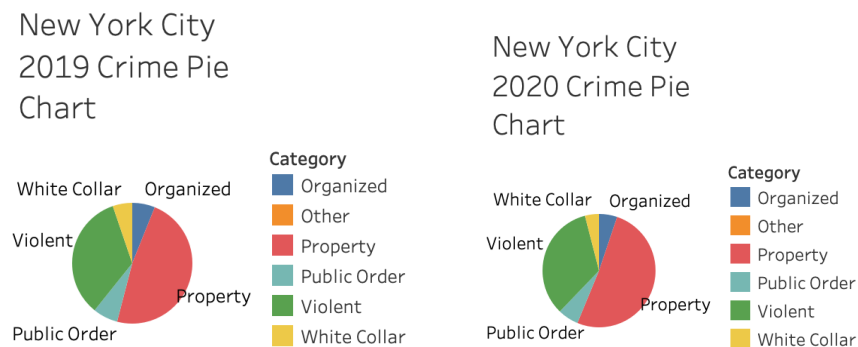
#### 4.4 New York City

The final city that was analyzed was New York City. New York City is the largest city in the US and is constantly visited by people all over the world. The COVID-19 pandemic had an immense impact in the entire county, when the virus first hit New York City became the worst-affected area in the United States. This resulted in implementing some of the strictest and longest lockdowns, the effects of which impacted every aspect of the city. Our initial hypothesis was that the overall amount of crime would decrease significantly during 2020. The 2019 and 2020 NYPD Complain Data from the online “NYC Open Data” portal was used in this analysis.



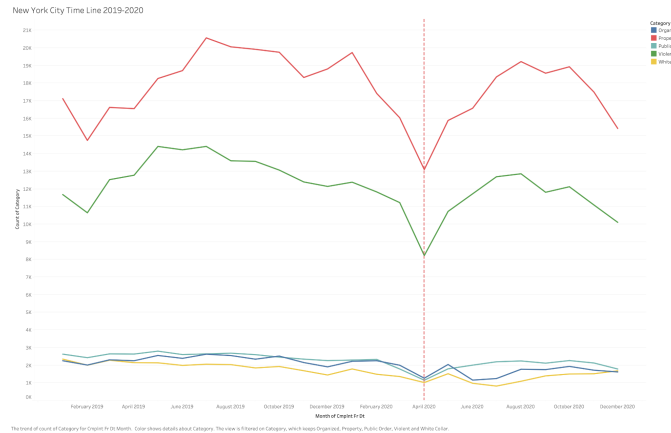
**Figure 10.** Bar graph of New York City crime by category (2019-2020)

By looking at the number of crimes reported by the NYC police in 2019 and 2020, shown in figure 10, each category of crimes shows a decrease from 2019 to 2020. The total number of reports filed in 2019 and 2020 decreased a total of 11.5%, from 457,535 to 404,877. However, it was interesting to see that the lockdown did not influence the type of crime that was committed. The pie charts shown in figure 11 also support this finding, which shows each category of crime having nearly the same proportion of total crime in 2019 as in 2020. Property crime still remained the most commonly committed crime, followed by violent crimes, public order crimes, organized crime, and lastly white-collar crimes.



**Figure 11.** Pie chart of New York City crime categories (2019 and 2020)

As with the other cities, a steep decline in the level of crime can be seen at the beginning of the pandemic, in April 2020. Figure 12 shows how crime quickly begins to increase shortly after the lockdown, as New York begins to implement their 1<sup>st</sup> phase of reopening. The data also shows how the level of crime quickly returns to its usual seasonality trends. As the summer months approach an increase in crime is seen, followed by a decrease in the colder months. Overall, it can be concluded that after the significant decrease in April 2020, most crimes did return to their expected level of activity, however the amounts were still slightly lower than those in 2019.



**Figure12.** Crime incidents in New York City from 2019 through 2020.

Looking into our results, each city was unique. While Houston and Los Angeles experienced what appeared to be a surge in crime compared to the year prior to the pandemic, New York and Chicago were more in line with what we expected, with a general decrease in crime incidents. There are many different factors contributing to how a certain city can react to a global health pandemic. However, this study confirms that there is a direct correlation between COVID-19 and crime rates.

## 5.0 Limitations:

One of the main challenges experienced was that each city's police department had a unique way of collecting crime data with varying styles, formats, and crime descriptions. In some cases, data format varied in the same city from one CSV file to the other on annual or even monthly bases. This made consolidating the data the main challenge.

Los Angeles data showed the crime count almost doubling between 2019 and 2020. This was quite odd considering that typically crime rates of large populated cities, at least for LA, tend to stay relatively constant with minor fluctuations. The reason for such a big difference may be due to disrupted reporting during the pandemic. Aside from human error, recent developments

around Los Angeles may be the cause. The Homeless population may be a contributing factor. The homeless population increased to 63,706 of the whole LA County in the year 2020 which was a 13% increase compared to the pre-COVID year of 2019 (LAist). In addition, the unemployment rate in LA County surged to 13.04% in 2020 compared to 4.6% in 2019 (YCharts). Blue-collar workers were especially vulnerable to the lay-offs that tripled the unemployment rate (Tapp). Restrictions imposed due to COVID-19 may have also affected surveillance and enforcement, resulting in a surge in crime. On the other hand more crimes may have simply occurred more in 2020 compared to 2019 year as drastic changes occurred with the pandemic rising and government mandates as well as general sense of instability which could lead to unrest and increased crime.

## **6.0 Conclusion**

COVID-19 and its related restrictions have completely changed life as we know it. The impact of the pandemic was not limited to health and economy. In this paper, we studied the impact of COVID-19 on the crime rate in the largest U.S cities. Our data showed that while the impact was not consistent in cities across the United States, COVID-19 has been a significant driver of crime rate in those cities. Further studies need to be conducted to understand why each city behaved the way it did, taking into account the city's socio-economical status and other contributing factors, such as the city's response to the pandemic and the homeless population in the city. Future research can focus on the correlation between a major health pandemic or natural disaster and mental health in connection to criminal activity.



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