# COVID-19 Effects on Crime Rates

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**Class: BUS 110 Data Mining and Visual Analytics**

**Section #: 001**

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**New York**

Section I: General Data

In the United States, New York is considered one of the most dense and populated states rivaling those of Florida and California. With an expected population of approximately 18.8 Million people, New York ranks as the 4th most populated state within the United States. However, unlike much of the other states, New York is quite dense with a great reliance on public transport along with the abundance of skyscrapers which leads to a big problem with open space. In turn, this has resulted in an environment where petty crimes and assaults are more likely to occur given the close proximity of the population. This section of the Crime analysis report will focus on New York's dense atmosphere which has its own unique atmosphere in the creation and flow of crime. Furthermore, we will cross analyze the crime rates, occurrences, and scaling alongside COVID-19 which has ushered in a new atmosphere for crimes to occur in.

New York consists of 62 different counties, each which encompass different common occurrences of crimes. We will look at data sets gathered by the New York State Division of Criminal Justices ranging from the year 2010 through 2019. It is important to note that while the dataset ends in 2019, the spread of COVID-19 started at the direct end of 2019 and is still occuring throughout 2020. This particular dataset still documents data from 2020, but is logged in the database as 2019 due to the reasoning that the year 2020 is still ongoing and has not fully ended yet.

From the master dataset, we have curated 5 different visual graphs to showcase detailed views of the different crimes and how they correlate with one another. Furthermore, we will place an emphasis towards the areas of the dataset where COVID-19 is present to present why crimes have changed in the ways they did under the circumstances. Factors that we will be looking at include but are not limited to: Economic depression, housing crisis, government aid, areas affected by the average income, and previous historical trends.

Section II: Total Crimes

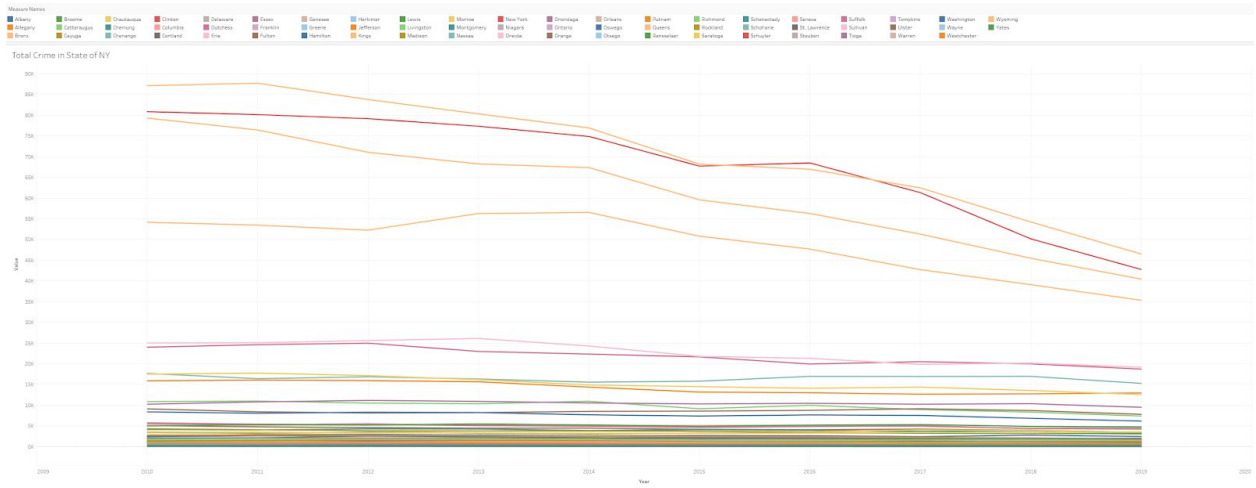


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*Figure 2.1: Total Crimes in the State of New York by county from 2010 - 2019*

As previously mentioned in Section I, there are many factors that come into play when considering crime, crime rates, and the type of crimes committed. Closely examining Figure 2.1 shows all the different counties that make up the state of New York, and we can see that Kings, Bronx, and Queens, are the top three ranking counties in total crimes recorded. These three counties are also the most well known areas within New York as they make the most common appearances within news reports and articles. When looking at the geographical landscape of the three counties, we can see that it consists of a strong presence of a rundown rural area. This along with the dense landscape and environment of New York can potentially call for a reason for why crimes are so high in these three counties. In low income areas, we see more residents relying on getting tasks done themselves rather than doing things legally and properly. This is not to say that these actions do not exist at all in these areas, but rather they are less likely to occur due to the increase in neighborhood violence and low levels of sense of security in residents.

On the flipside of the graph, we see a cluster of counties ranking in quite low compared to the top three counties for crime rates, however unlike the top three, the cluster of counties at the bottom are not directly opposite in terms of economic factors of the living conditions. Rather, they are counties that are in the middle of the economic scale being not the wealthiest or the poorest, which shows that economic factors are not the determining factor of total crime rates by counties. If we look towards the well off end of the economic spectrum, counties such as Westchester and Nassu, are actually in the higher middle rankings of total crimes. This could

potentially be a result of a focus on these areas due to being more well off opposed to the middle of the pack counties.

Section III: Types of Crime

Now that we have looked at crime occurrences within counties, it is time we took a closer look at the type of crimes committed. By looking at the types of crimes committed we can gain a better understanding of why these crimes occur without solely looking at economic factors.

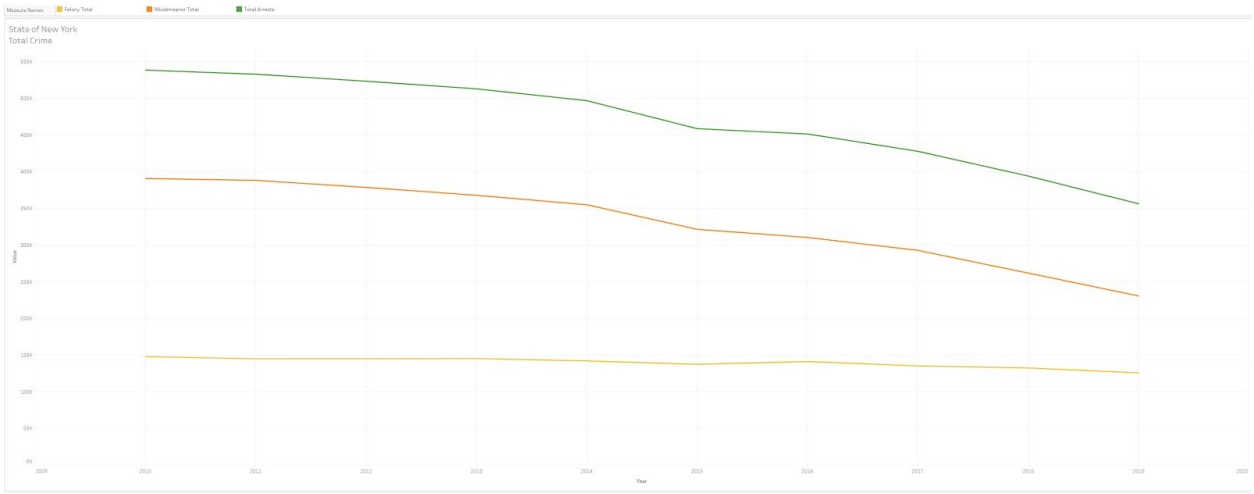


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*Figure 3.1: State of New York Total Crime*

From the master dataset, the crimes are broken down into three categories: felony, misdemeanor, and arrests. Figure 3.1 shows us that within New York, the most concentrated type of crime tends to be arrests while felonies are the most diluted. We can gather that most of the crimes that occur within New York tend to fall on the more serious side leading to actual arrests, as felony and misdemeanor charges are much lower. An important thing to take notice of is that despite being ranked differently, each of the crimes start falling down in occurances from 2015 onwards. We can then take this information and look at historical events that occured in 2015 such as the inauguration of a new president in 2016, the introduction of new technology, and the quality of life. Without getting political, the inauguration of President Donald Trump in 2016 was extremely controversial due to the way the voting and results ended up being. Furthermore, we also see that occurances such as the Zica virus, and ISIS terrorism, and an increase in shooting events making a ripple throughout the world.

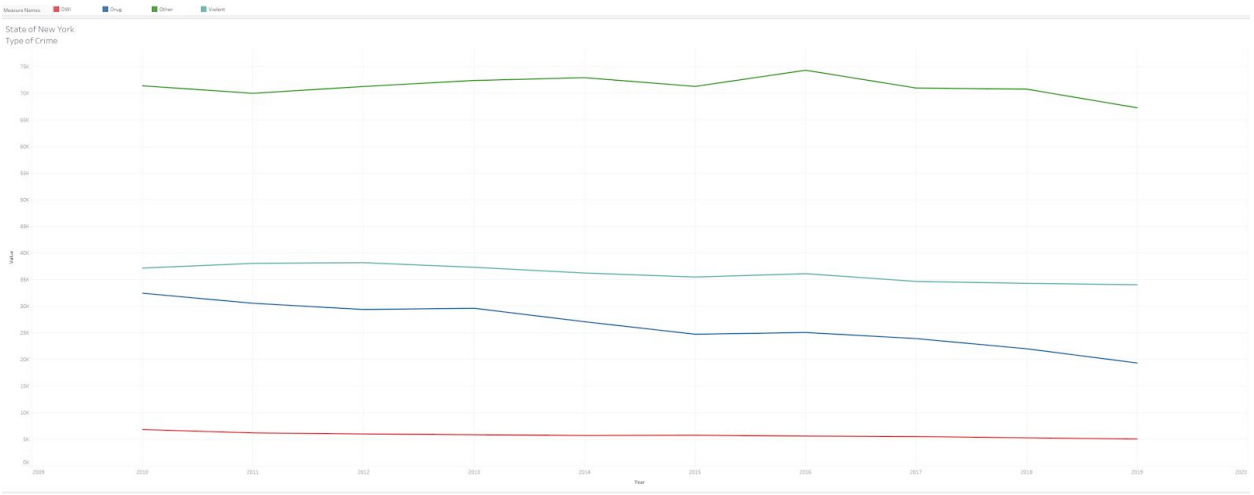


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*Figure 3.2: State of New York: Type of Crimes*

Figure 3.2 displays the type of crimes that occured throughout the timeline, and we can draw assumptions and ideas linking to Figure 3.1 which give us a better understanding of why the categories of crimes ranked as they did. Furthemore, with the advent of COVID-19, we can look back at 2016 and see that crimes do seem to be somewhat affected when there are mass outbreaks of disease spreading causing people to grow more wary and cautious of their surroundings along with the involvement with other civilians.

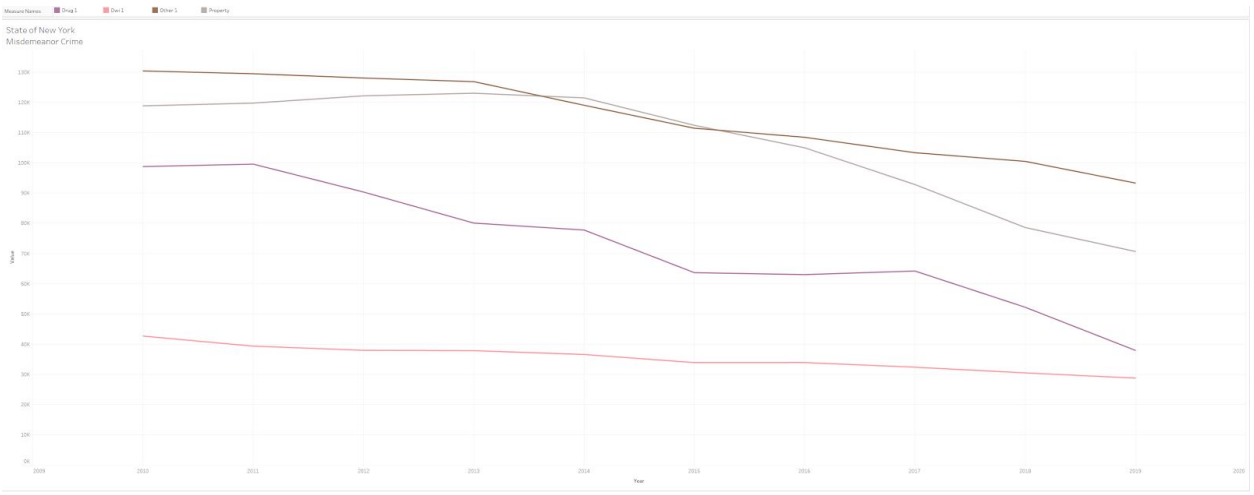


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*Figure 3.3: State of New York Misdemeanor Crimes*

In Figure 3.3 we take an even closer look in the misdemeanor crime category. By breaking down the misdemeanor crime category into sub categories, we can link all figure 3 section graphs

together to draw a big picture of how congested each crime can be and how there are different variations to each crime committed and why they led to arrests being so high. When looking at sub categories such as DWI( Driving while intoxicated), taking a look at the structure of New York's transit system could show why it ranked so low. Being that New York relies on mainly public transport to get around, there are much less drivers compared to those in California and Florida. To further add to the impact made by COVID-19, we see that there is a big decrease in property crimes and drug crimes. We can also see that the tipping point for the change in these crimes occured in 2013, and seem to be on a continuous downward slope. With the emergence of the Ebola virus in 2013, Zika virus in 2016, and COVID-19 being prominent presently in 2020, we can further back up the claims that residents and people are growing more aware of safety and self protection.

Section IV: Geographical Data

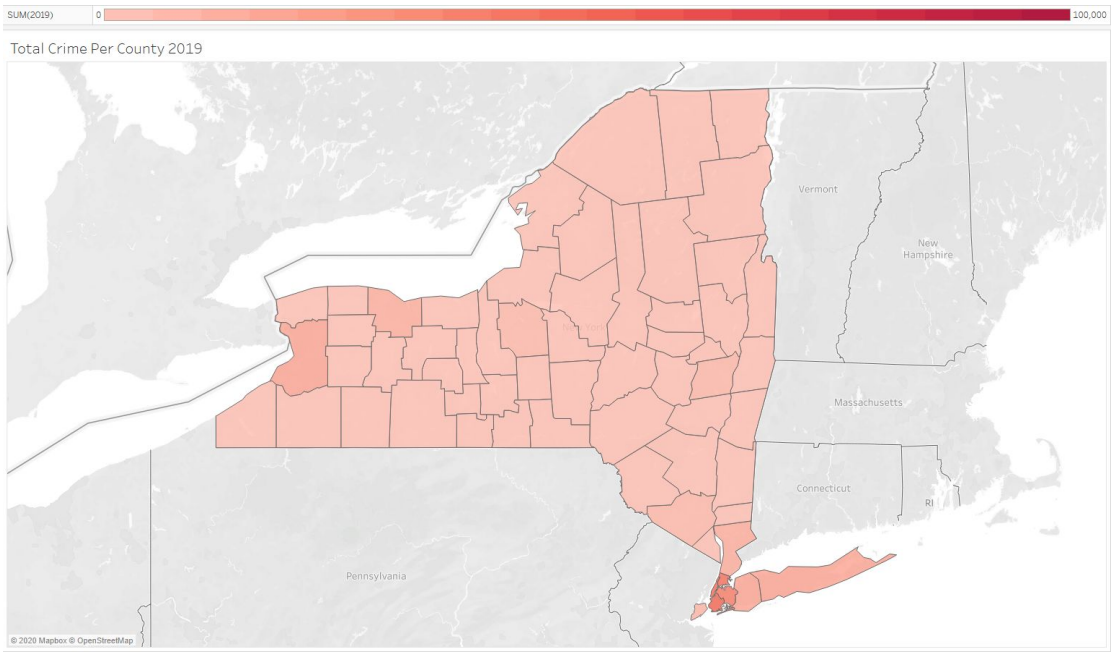


*Figure 4.1: Geographical look at crimes in New York over time.*

For our last graphical presentation of crimes in New York, we take a look at a Figure 4.1, a geographical change over time on crimes. Scrubbing through the years, we can see that overall, crimes have indeed dropped in New York over the years. While we still cannot draw concrete facts on the reasonings behind this, there is strong substantial evidence pointing to economic factors, and global influence of events.

Section V: COVID-19 and the effects on crime

When looking at the effects of COVID-19 on crime rates, we can gather the trends appearing on the graphs shown above to come to an assumption that crime rates do seem to be decreasing. With stay at home orders being held in place, there is less interaction between civilians coupled with the worries of spreading or catching the virus results in less crimes. This is not to say that all crimes are solely decreasing simply due to COVID-19. As we have discussed early, we have also stated that economics also plays a role in the crime rate, and due to governmental help, families and individuals are experiencing more help than ever in these unprecedented times.

Due to the extent of COVID-19's run in 2020 still being present, we only have previous datasets from past outbreaks where diseases were present. Diseases such as the Zika Virus, or Swine Flu will be detrimental in helping us make inferences on how the virus could run its course. We expect to see a further decrease in crime rates until events start to stabilize. Once the population acclimates with its response to COVID-19, we may see a spike in crimes due to the lack of governmental help and a return of regular life. In this assumption, we may see a slow increase in petty crimes such as misdemeanors, but as time goes on, we may see the effects of more distinct crimes making a comeback. This is due to the relief efforts of COVID-19 running dry. There are a mix of people who will make an effort to use the government help to no longer rely on crime, but there are high odds that there may be many who will quickly turn back to crimes after the relief funds run dry.

Section VI: New York Final Analysis & Recommendations

After examining different factors for crimes in New York, we have come up with many different conclusions as to why the density of crimes and the nature of crimes are the way they have been presented in this particular dataset. Focusing on the current global situation, COVID-19 has an unprecedented influence globally and each country, let alone states, are tackling the pandemic in their own ways. At least, within the USA, we see that the government is helping citizens by issuing grants and funds, which helps many of the low income spectrum citizens pave through these difficult times. Furthermore, looking at the economic state of the United States, we see that housing problems such as rent have been heavily hit. COVID-19 has made it extremely difficult for citizens by destroying many jobs, and leaving people unemployed. 40% of house renters are allowed to go on living without paying rent which has eased up a lot of stress. This may also be a factor as to why crimes have been falling. Due to there being less stress of tackling the situation all by oneself, many citizens are feeling strongly supported by their government and have currently lowered the rate of relying on crimes to get by.

This is not to say that this period of low violence and crime will continually drop. By looking at previous historical trends such as the great depression of 2008, we can see that the US could potentially go through another depression. From this, COVID-19 may actually see a worse long term track for crime rates due to governmental support and ease of stress being time limited. By looking at all the New York related figures shown in the previous sections, we could expect to see that 2020 onwards may introduce a repeat of the increased crime rates onwards.

Some recommendations that we can make for New York to come out of COVID-19 in a safe manner is to follow some of the suggestions provided below.

- Extend relief efforts past the stabilization of COVID-19
- Public programs introduced to help recover from effects of COVID-19
- Introduce more efforts and help with civilians to show that there is a joint effort to help everyone.
- Request for banks and loans to extend their relief efforts.
- Provide awareness and appropriate response over misdemeanor crimes
- Enhance data collection capacity on the number of crimes to reinforce different types of response protocols according to severity.

To end on the analysis of New York crime rates and how the current global situation will affect future crime rates, it is important to remember that graphs and datasets are extremely important. They show us historical events and occurrences logged in as neat data for us to view and make predictions for the future. Predictions and assumptions however, are simply that. We cannot draw concrete facts as to what the future holds for New York, but by looking at these graphs, we can prepare ourselves for what could potentially come and try to curve the future in a way where it will be beneficial to everyone.

**Los Angeles**

Section I: General Data/Summary

California is one of the most populous states in the United States currently, with a population of over 38 million people as of 2019. Alongside New York and Florida, California is a densely populated state that focuses most of its massive population around specific counties such as Los Angeles and Riverside county. These massive concentrations of people lead to certain counties being skewed towards higher crime rates due to the sheer concentration of people in a relatively small space. In addition, much like New York, there are varying degrees of social classes that inhabit different counties, which can result in crime being skewed to poorer areas such as downtown LA compared to imperial countries, creating potential outliers where the population is

most concentrated. This section of the crime analysis report will focus on all of the counties of California as a whole, with particular attention drawn to Los Angeles county due to the large concentration of California citizens located there. The analysis of Los Angeles will take into account the different types of crimes committed compared to the rates of those same crimes in previous years. The crime rates will be separated into four distinct categories: Violent (Any crime that involves violence against another being), Property (Theft/Damage/Infringement of private/public property, Sex (Prostitution/Lewd Acts), Drugs (Distributing/Taking Drugs), and Other (Which include misdemeanors such as DUI's or other crimes that do not belong to the other respective categories).

California consists of 58 counties in total each of which vary in total population and crime rates. We will be using several data sets to build the graphs necessary to interpret and create potential solutions to the problems faced by law enforcement. The first data is a historic one that calculates the amount of arrests in each county starting from 1980 to 2018. This historic data set will allow us to create a trend and a state of normality for the type of crime that has been committed in the state of California to compare our own modern data to. This will allow us to catch potential spiked increases in certain types of crime in response to the COVID-19 outbreak. The dataset itself is historic however, meaning that none of this data can be used to help dampen current crime rates or give us direct insight into how COVID-19 affects crime rates. This data was collected from the DOJ's UCR (Universal Crime Rate) program. The next dataset involves COVID-19 cases in California by county. This data will help us examine where the spread of COVID-19 is most severe and analyze the crime rates of those counties. This is where connections will be made regarding Crime Rates and COVID-19. The Data has been sourced from CNN's live tracker of COVID-19. The third dataset involves the crime rate for Los Angeles specifically. We have chosen to focus on Los Angeles because it is a massive population center for the state of California, leading to much more data available. Furthermore, Los Angeles has a reputation of embodying the culture and practices of California as a whole, thus we believe that whatever trends we find with LA we can apply to the majority of California as a whole. The data was sourced directly from the DOJ. Note that all data gathered here has the potential to be updated in real-time, but as of the making of this report our team did not have access to future data.

From these datasets we have created a total of 6 graphs that can be used to connect crime rates in California with the recent COVID-19 outbreaks. The first graph involves the distribution of different types of crime throughout the counties of LA in Bar graph form, followed by a line graph that shows the historic trend of crime rates through 2019. This is then followed by another line graph that shows the occurrences of different types of crimes focused around LA county, with a pie chart that directly shows the distribution of the different types of crime present. Lastly, we will be covering the geographical spread of COVID-19 throughout each county via a

geographical map. Our primary focus will be on any potential spikes in crime rates after 2019 compared to historic data, the effect of COVID-19 on county crime rates, past responses to previous outbreaks, and geographical location.

Section II: Crime Rates of California Prior to COVID-19

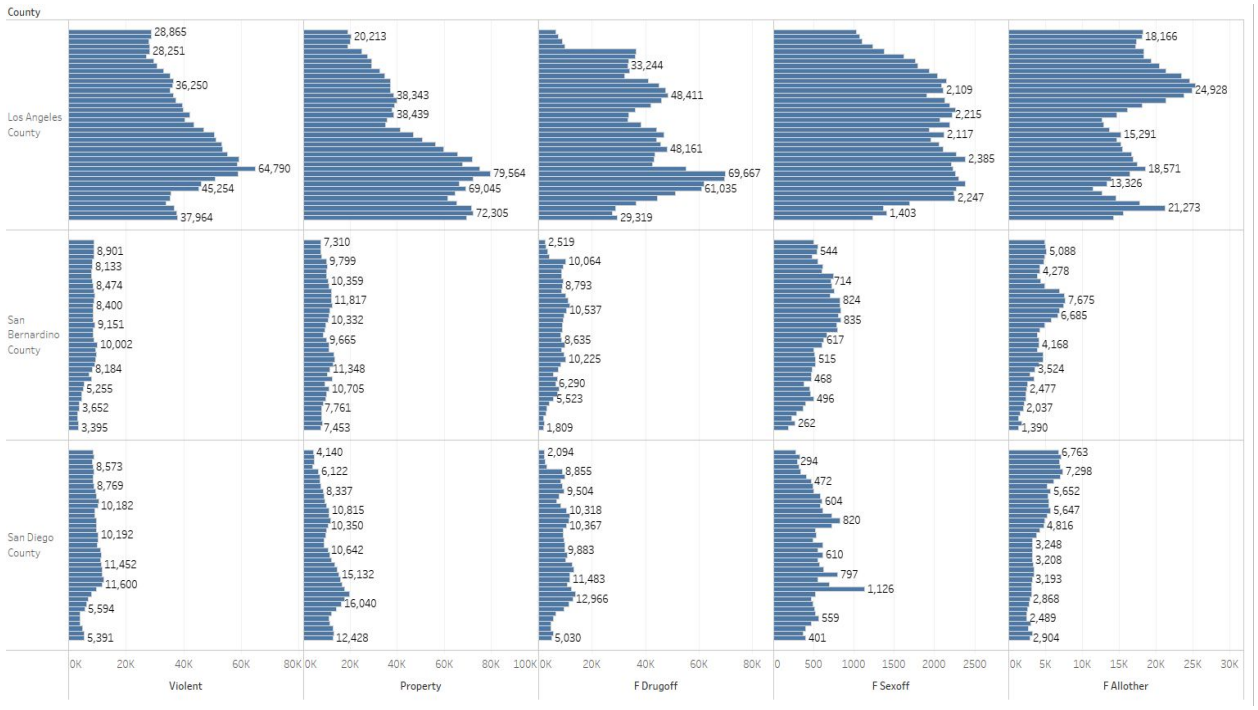


*Figure 2.1: Top 3 California Counties by Crime Rate 1980-2019*

The historic crime rates of California vary from county to county, with some counties being so small that they barely contribute to the total crime rate of California as a whole. As a result we have taken the top 3 most heavily crime-ridden counties and calculated their crime rates to establish a fundamental foothold and base level for our analysis on crime rates. There are a few patterns that can be gleaned from the data presented. Firstly, it is obvious that LA has the highest crime rate by far compared to its predecessors. This can be attributed to the fact that LA has a steep divide between upper and lower class neighborhoods, which has been a constant source of tension for the city. This has been shown to cause an increase in crime as criminals from poorer neighborhoods tend to engage in more crime than their richer counterparts resulting in LA's poorer neighborhoods becoming disproportionately affected. Combined with the fact that poorer neighborhoods are far larger, it results in a breeding pit of illegal activity (https://www.huduser.gov/portal/periodicals/em/summer16/highlight2.html). Furthermore, the overall population density is much larger than any other city in the US with 38 million individuals, thus increasing crime by law of averages. Furthermore, with the exception of San

Bernardino's Violent and other crime rates. Crime seems to be decreasing significantly from 2015-2019 the start of the Coronavirus epidemic. This implies that the police are either vigilant enough to stop crime in its tracks, or are allowing crime to slip under the radar. It is imperative to remember that all the crime data collected here is based around the number of arrests, this means that crimes that do not involve an arrest are discounted. However, the trend is not related to just the top 3 counties in California but rather all of them as shown here:

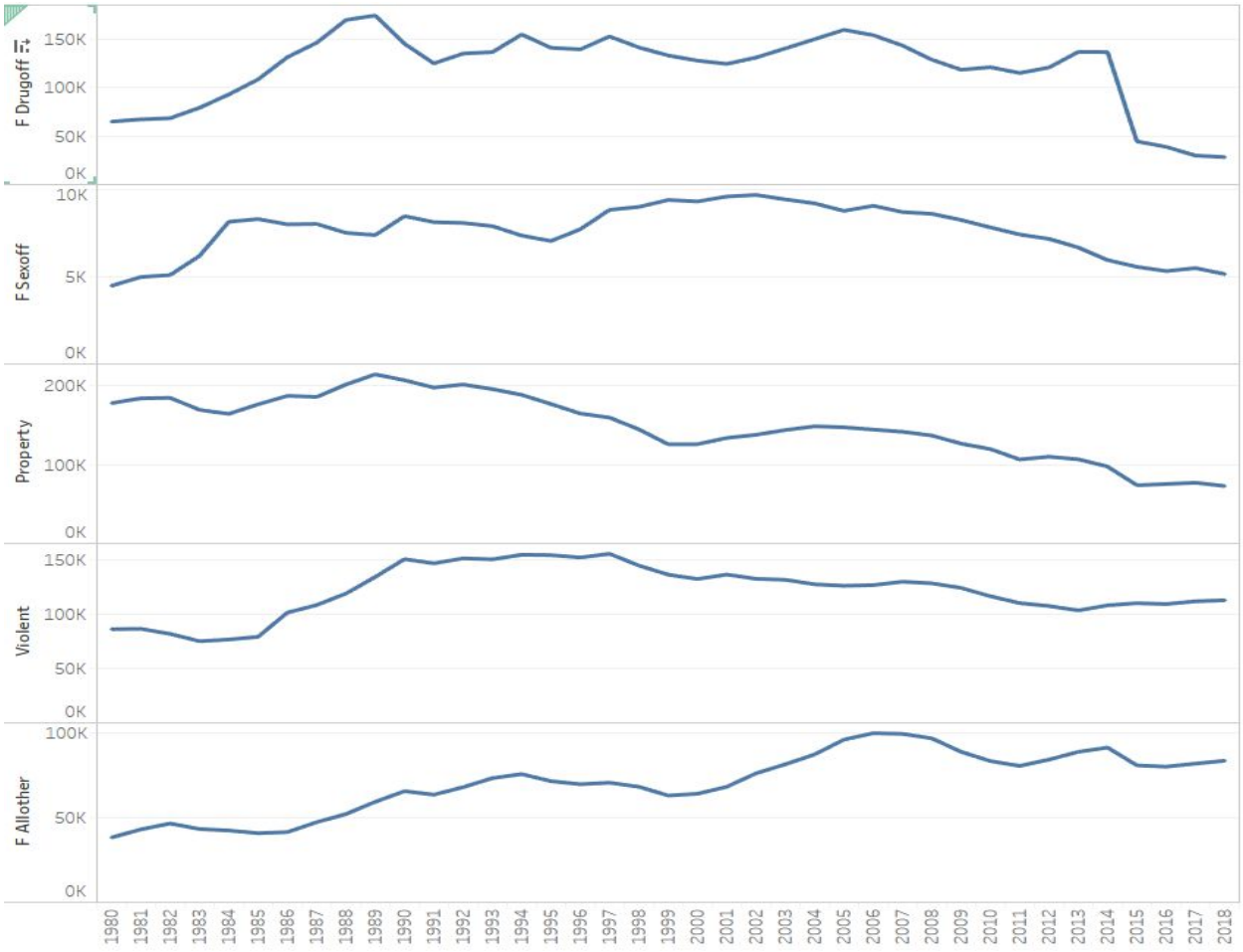


*Figure 2.2: Crime Trends Across all Counties of California*

As one can see from the trend lines all crime has decreased across all counties from their peaks centered around the early to late ’90s. This is primarily due to urban crime rates decreasing due to a recent California Department of Justice reform that fought against mass incarceration from legislative efforts such as AB109 and Prop 36, 47, and 57. This has reduced the number of arrests for almost all crimes across the board. Though, surprisingly, “Other” crimes, which include minor crimes, have increased during modern times rather than in the ’90s like all other crimes. This could be due to the fact that California Criminal Law logs individuals brought to the police station as an arrest. This can include individuals only receiving a warning without any

change to their permanent record potentially skewing the results. Drug related crimes have also fallen off significantly in recent years in response to the LAPD's efforts in the War on Drugs and increased sentencing for those caught with drugs, making such business inherently risky for criminals. The War on Drugs was integral to curbing drug-related crimes since Los Angeles was once considered the hotspot for drug delivery and distribution. Overall, it seems that crime rates prior to the quarantine and pandemic have fallen drastically due to law reform and police initiatives. The trend of all crime rates is on the downturn with no unusual spikes from 2016-2019. Now that the necessary context and Homeostasis has been established for the data, we will now look at how the quarantine and the peak of the COVID-19 epidemic have affected one of the most populous places in the United States, Los Angeles.

Section III: Crime Rates of LA during Covid-19 Pandemic

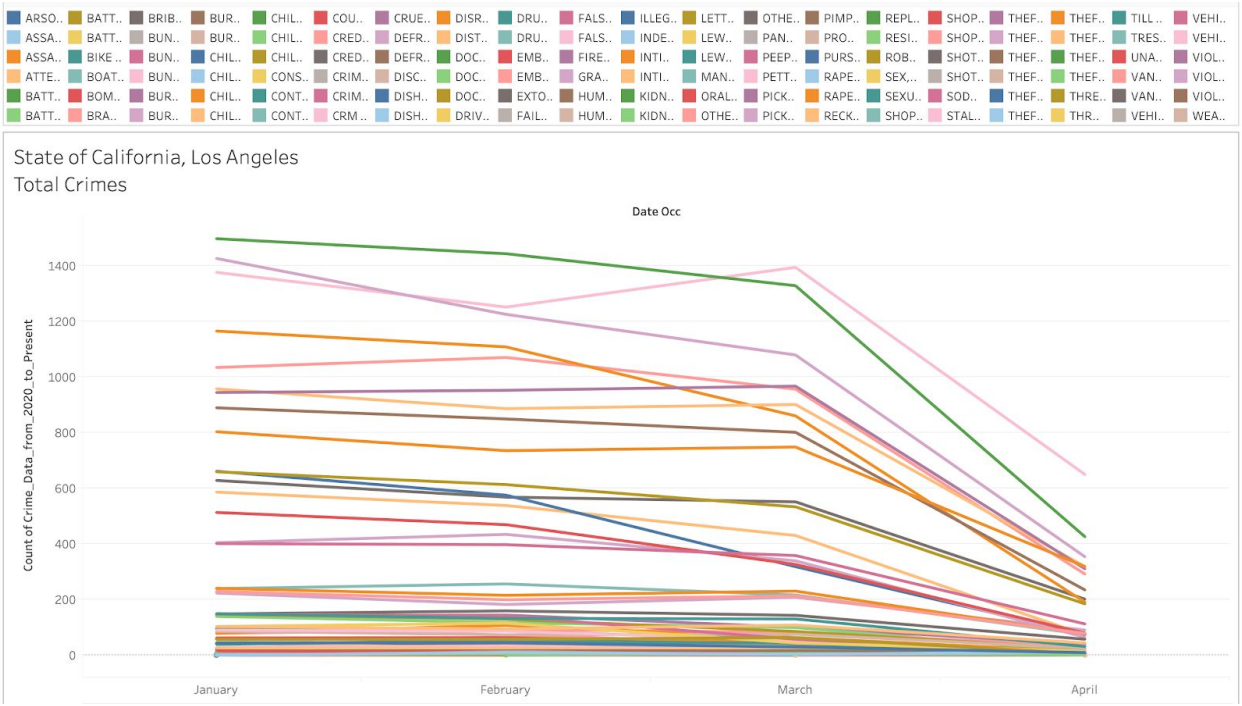


*Figure 3.1: Total Crimes in the State of California from January 2020- April 2020*
(from DOJ)

Now that we have talked about the total crimes of California, we can focus on one city in California which would be LA. We will be looking at data only from January 2020 to halfway through April 2020 as that is the data that we could acquire. The graph above shows the crimes committed during the Covid-19 pandemic by month. The top three criminal activities committed during this time period were simple battery assault with 4,697, burglary from a vehicle with 4,674, and stolen vehicle with 4,087. As we follow the graph, we can see that many of the crimes

have seen a relative decrease in activity. For example, a simple battery assault had 1,498 instances in January by February it was down to 1,444, but by March it had decreased to 1329. We had only half the data from April but projections showed it would be even less than March. It was not just a simple battery assault that saw this relative decrease as the months went on during the pandemic. Burglary from a vehicle, vandalism, plain theft petty($950 or under), and robberies saw a significant decrease as well. Most of these crimes need an individual, another or themselves, to be out of the house to be committed. As more and more people stay at home due to the increased danger from the pandemic, a significant decrease in some crimes has been seen.

On the other hand, not all types of crimes have followed this trend. There have been a few that have seen an increase as the months have passed. A few examples of this increase would be stolen vehicles and assault on an intimate partner. The increase in stolen vehicles can be attributed to the stay at home orders as well. As more people have gone to the safety of their homes to quarantine themselves from the disease, they have left their vehicles unprotected. This makes them easy targets for criminals. With fewer people outside, there are not many to look after vehicles. This can explain the increase in stolen vehicles. As for the assault on an intimate partner, this can also be attributed to the stay at home orders. People are spending more time than they have spent together than ever before. This has the potential to lead towards frustrations, arguments, and other forms of violence. Overall, the graph does show that crimes in LA have seen a relative decrease as the months passed.

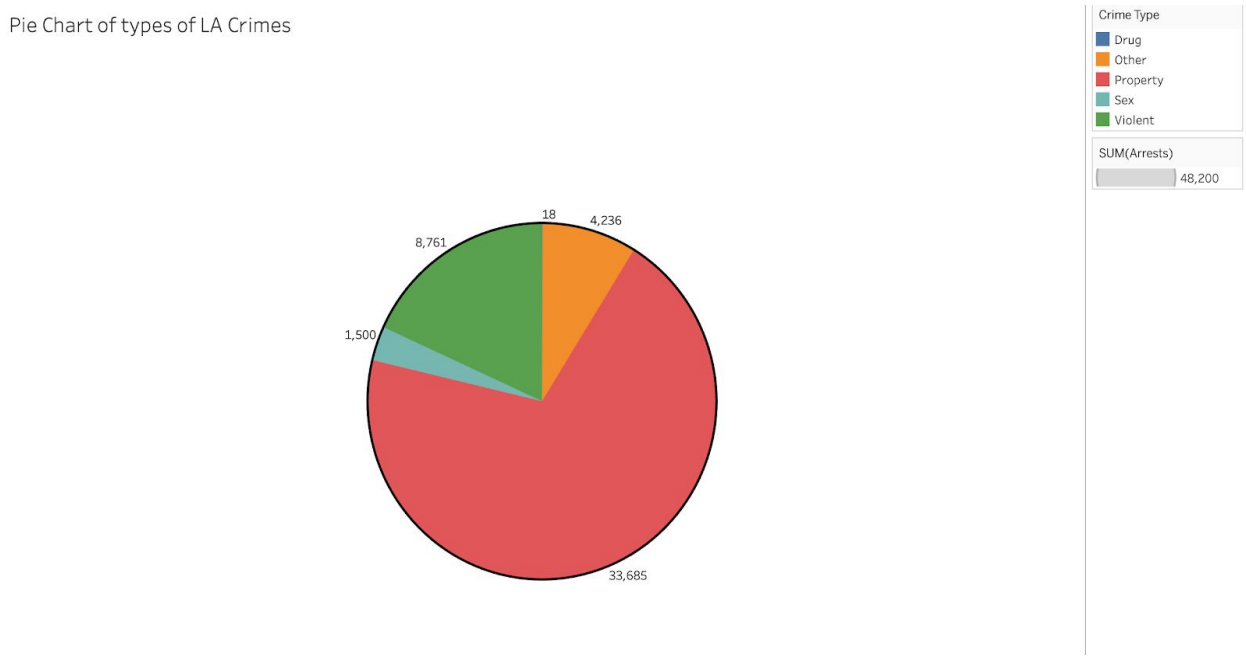


*Figure 3.2: Types of LA Crimes*

This pie chart breaks down the types of crimes committed in LA in a more general way. We categorized types of crimes into five different categories: a violent crime which is a crime where someone is injured or harmed in some way, sex crime where a sexual act is committed, property crime where either someone's property is destroyed or stolen, drug crime where the selling of narcotics is involved, and finally other crime for all other crimes. If you look at the data you can see that property has taken the largest portion of the pie chart with 33,685 instances. This category is much larger compared to the other because some of these crimes have not been affected by the pandemic such as identity theft or stolen vehicles. Drugs have the smallest portion of the pie chart with only 18 instances. If related this data back to the Covid-19 pandemic, we can see why drugs have only taken such a small portion. As more people are staying at home, it has become either harder or less likely for them to meet with a drug dealer. Sex crimes are another category with only a small portion of the chart. There are fewer people outside so there has been a significant decrease in sexual crimes report or otherwise. Every category in this pie chart has seen a significant decrease due to the pandemic.

Section IV: COVID-19 Spread Through California

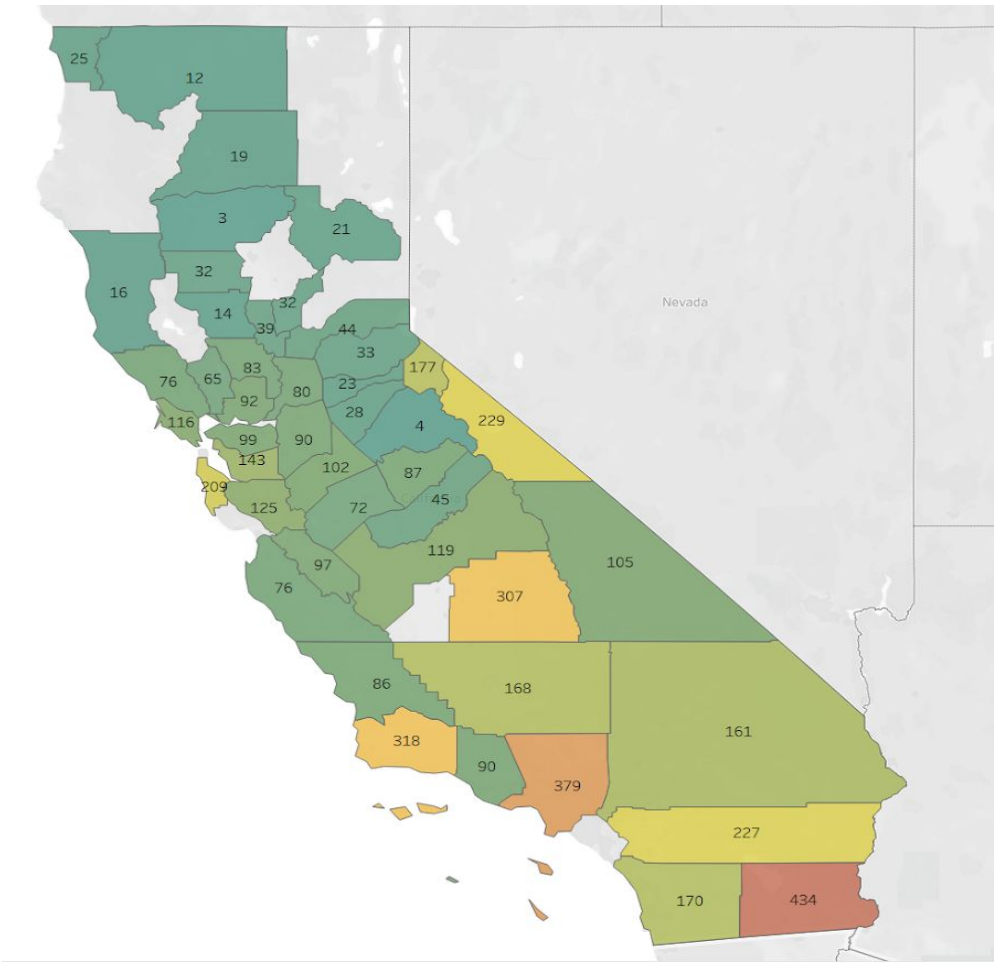

*Figure 3.3: Geographic visualization for Covid-19 cases within counties of California (Est. cases per 100,000 residents). Live case data gathered on May 17th from CNN (https://edition.cnn.com/interactive/2020/health/coronavirus-us-maps-and-cases/)*

Here is a geographic depiction on the estimated amount of reported Covid-19 incidents per 100,000 residents within each respective region. These are based on diagnosed and reported cases only, meaning that there are potentially much more cases than that which is indicated. It should also be noted that certain counties that are not highlighted above have not been deemed recognizable by the Mapbox software on Tableau or that there has not been sufficient enough data based on on-going inconsistent fluctuations in those regions. As seen on the map, it would seem that there are less cases present on average in the majority of northern California in comparison to the southern regions. Although there is no concrete evidence indicating why certain regions have more cases than others as this is a matter of whether the populations in each area are following the correct procedures and health regulations enacted which would surely vary, we can still form certain speculations based on this data.

It would also seem that many of the counties in the middle to upper northern section of the state seem to have less geographical area in addition to the concentration of the population in each respective region being so compressed especially around that of the Bay Area. This may be why the demographic within these more close-knitted counties are facing more viral cases than those in the furthest northern regions of the state. In relation to the latter, the areas in the north typically feature more space for residents which significantly reduces its population density as a result, hence the lower cases. Although the spike of cases in some regions may seem random, based on some of the most impacted counties having higher population densities per square mile, it is likely that this would indicate the reasoning behind higher cases in regards to a contagious virus that would thrive in such locales.

The order for some of the most impacted regions would include Imperial county, Los Angeles county, Santa Barbara county, Tulare county, Mono county followed by Riverside county. With the exception of Mono county, the rest of these regions are located primarily in southern California. Counties like Tulare, Santa Barbara and Los Angeles have high case numbers likely due to the population density as aforementioned. However, counties such as Mono, Riverside, and Imperial have high cases despite not typically having massive population densities. There is a pattern for these regions though, being that they are resting alongside the borders of other states and even another country for Imperial county, which would be Mexico. Due to these counties being so close in proximity to regional borders, it is fair to assume that these areas have to deal with non-residents as well and thus are impacted by a demographic outside of California whether it be from Nevada, Arizona, or Mexico. Thus, the hospitals and treatment centers in these

counties are overloaded with more patients due to the unforeseen impact of taking in out-of-state patients which only facilitates higher population density for a virus to spread among.

Sections V: Critical Analysis

Throughout the time that our data set covers, California has seen an increase in various types of crimes or crimes that have not been affected. The four months that are covered show that property crimes have increased by four times than what it usually is in one year. The increase in the types of crimes can be attributed to the stay at home orders issued by the governor of California. Residents have left parts of their property relatively unprotected to hide from the pandemic. This includes cars, restaurants that have been closed down, unsecured items on lawns, packages, and many other things. Domestic crimes have also seen an increase as more people are spending more time together leading to frustration and potentially violence. Cybercrimes have also not been affected by the closing of the state. Identities are still being stolen and software is still being hacked. The anti-quarantine protests have also distracted the police by taking attention away from criminals and giving criminals more opportunities for property theft.

While property crimes increased astronomically, all other types of crimes decreased from the historical rate. This includes crime categories: Other, Drug, Sex, and Violence. There are several reasons as to why these types of crime decreased during the pandemic. Firstly, many crimes in this category require physical interaction within close proximity to another party. As a result of the quarantine and the spread of fear of catching COVID-19 spreads throughout the population many individuals refuse to leave their homes and thus many crimes cannot be committed. The refusal for the average citizen to leave their home also has a knock-on effect regarding other crime rates regarding violence. Since the majority of violent crime in Los Angeles involves muggings at knife or gunpoint, there has been a severe decrease in violent crimes as a whole, due to a lack of "easy marks" on the street. Drug crimes have also further decreased due to dealers not wanting to interact physically and drug addicts being less open to injecting or ingesting substances that could be contaminated. Combined with LAPD's War on Drugs, this has led to drug-related arrests to reach an all-time low. The same reasoning can also be applied to sex crimes, as individuals want to isolate themselves as much as possible from other contacts, which inherently drives the crime rate down. "Other" crimes have also fallen since many of those crimes are derived from DUI's and minor traffic incidents. Since no one is driving their vehicles during the quarantine this has decreased "Other" crimes significantly.

In regards to the highest number of Covid-19 cases present in California, although Imperial county does have this recognition, it should be considered as an outlier due to external factors like population inflation due to its geographic proximity in relation to other regions outside of California. If this is taken into account, then the county of Los Angeles should be recognized as

the most impacted region in the state regarding Covid-19 cases based on the existing population of residents present without having to count for sizable population increase from out-of-state locales. However, certain crimes in both counties have decreased in relation to the high amounts of cases recorded. Specifically in the county of Los Angeles as mentioned above, crimes that involve physical interaction such as those of drugs or sexual nature have decreased while crimes absent of interaction being present such as property damage have increased. Imperial county respectively has also seen a historical increase in property damage since the outbreak of the pandemic. This indicates that there does seem to be an existing correlation between the effects of Covid-19 and the rate of crime within impacted regions both in a positive and negative manner.

Based on the following data we have created a list of solutions that law enforcement could use to stymie crime rate:

- The police department can issue reminders to local residents to take preventative measures both for their vehicles and property via newsletters, online article publications, amber alert notifications, APB broadcasts, etc.
- Police could create an escalation protocol where there are different levels depending on the severity of the protesters. It can be broken down into five levels where one receives the least amount of police attention and five receiving the most. Level one is a peaceful protest. Level two is they have potential to harm. Level three the protesters are agitated. Level four is where the protestors will harm people. Level five is where people will riot.
- Since many of the crimes decreasing are Drugs, sex, and Other. Law enforcement should prioritize focus on investigations regarding Violence and Property related crimes, since many leads regarding the other types of crimes will be lowered in priority due to a lack of human interaction.
- Police could send patrols to areas where theft is likely to occur. They could find these areas by looking at previously collected data or be sent to neighborhoods with either no garages or large numbers of cars on the streets.
- Specified training to appropriate response in domestic cases for both police dispatchers and officers alike. This should feature pertinent advice from the dispatcher to the caller to defuse or handle the situation in the best possible scenario leading up to the arrival of first-responders at the scene.

COVID-19 has caused unprecedented changes in the way that crimes are committed and what types of crimes are committed. From our research and data analysis, we have found that while the majority of different crime rates go down, involving direct human interaction such as Sex, Drug, and other offenses, property offesnes tend to increase dramatically as people are trapped in their homes, unable to observe and protect their property properly. While violence continues to decrease, other violent events such as domestic conflict and abuse continue to rise, preventing

the Violence crime rate from decreasing as fast as the others. Furthermore, COVID-19 seems to have a profound impact on larger concentrations of people, causing property and violent crimes to balloon to higher numbers. On the other hand, smaller areas seem to be having the opposite effect, where their crime rates decrease significantly showing that quarantine is actually decreasing crime rates across the board. Thus our conclusion is that in larger areas, violent and property crime rates will increase while others decrease, and in smaller areas, crime rates decrease overall across the board.

**Maryland**

Section I: General Data

Maryland is ranked as the 19th most populous states amongst the United States, with a population of just over 6 million people. However, being that Maryland is one of the smaller states, it is considered as one of the most densely populated states in the United States. These high concentrations of people in certain cities lead to higher crime rate in a relatively confined space. This section of crime analysis report will focus on all of the cities in Maryland with particular attention drawn to Prince George's county due to the large population of Maryland citizens located there. The analysis of Maryland will take into account the different types of crimes being committed in comparison to the rate of crimes being committed in previous years. Crime rates will be separated into four categories: Crimes against persons, Crimes against property, Crimes against society, and other.

Maryland consists of 24 counties that are unique in their population and crime rates. We will be utilizing several data sets to build graphs necessary to analyze and create possible solutions for law enforcement. The first data set that we incorporated is one that tracks and records the types of crimes being committed from 2017 to 2020. This data will allow us to follow the trend of crimes being committed in comparison to the most recent crimes. That way, we will be able to see an increase or decrease in a certain type of crime in response to the COVID-19 outbreak. The next dataset included in this report includes the Coronavirus Cases in Maryland by county. This data has been sourced from CNN's live tracker of COVID-19. This data will reveal the county with the more severe number of cases. With the two datasets included in the report, connections can be made between the COVID-19 cases and crime rates.

From the datasets we used, we have created 4 graphs that can be used to find a relationship between the crime rates in Maryland with the Coronavirus outbreak. The first graph includes a line graph of the total crimes being committed throughout the cities of Maryland. The next graph is also a line graph that sorts the crimes by the type of crime being committed. Next, there is a graph that reveals the number of crimes being committed within each respective category.

Lastly, there is a geographical map of the number of COVID-19 cases within all the different counties. Our primary focus will be on the effects that COVID-19 has on the county crime rates and any past responses to previous outbreaks.

Section II: Total Crimes

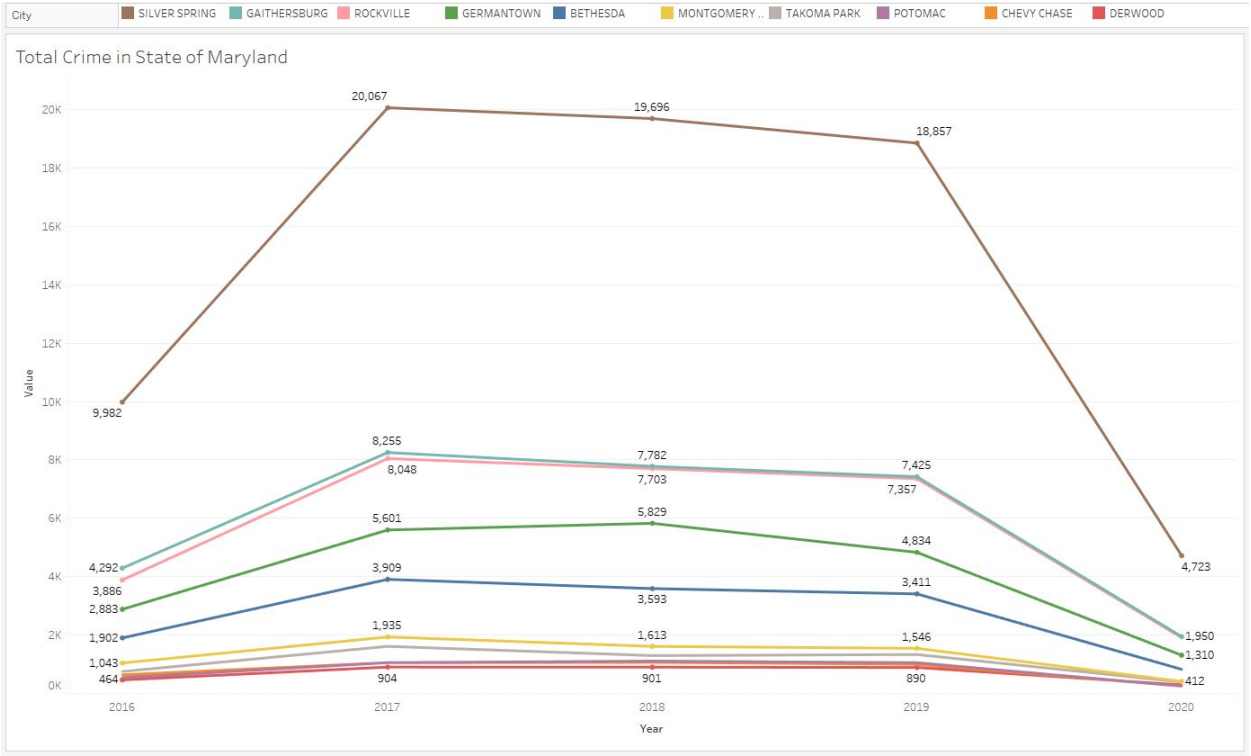


*Figure 2.1: Top 10 Total Crime by County in Maryland*

With the help of Tableau, we can see the total crimes of Maryland and its cities from 2016 to the beginning of 2020. There are many factors that come to mind when deciding the severity of the total crimes within a county such as the total population, average income, average household price, etc. On the top of the list, Silver Spring, has the highest crime value compared to the other cities. After doing more research, we found that total population, average income, average household price, and poverty rate didn't have much correlation to the city's crime value. Some people would suspect that a higher populated area with a lower property value would have more crimes. That's exactly what Germantown, ranked fourth, is compared to Silver Spring. Derwood, ranked 10th, has a lower populated area, with people who have higher income, and higher property value. These factors would generally be seen as a wealthy area with low crime rates. However, this is not the case within Maryland because by comparing the total crimes and total population between Silver Spring and Derwood, Derwood has a 15% higher crime to population

ratio. This shows that a lot of these factors don't have much of a correlation to crime rate than what some people thought they would have.

Section III: Types of Crime

As for some of the counties with the lowest crime value, they have similar population, household income, property value, and poverty. This reinforces the idea that these factors don't have a strong correlation to the cities crime rate with Maryland.

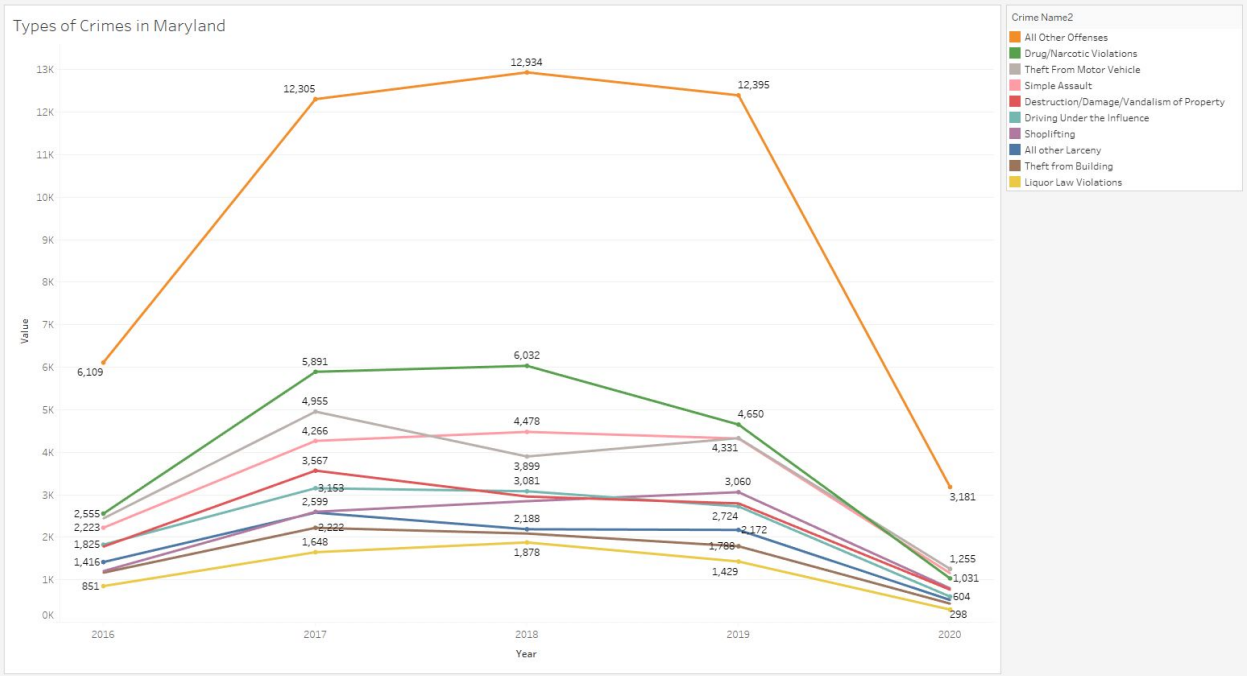


*Figure 3.1: Types of Crimes in Maryland*

Above is a graph that shows the types and instances of crimes within Maryland through the year 2016 to the beginning of 2020. As shown above, all of the types of crimes trended down in 2020 from 2019. This is probably due to the coronavirus scaring people from going outside or interacting with each other.

Now that we have looked at crime occurrences within each city, it is time to take a closer look at the type of crimes being committed. By looking at the types of crimes being committed, we can better understand what types of crimes are being committed due to the COVID- 19 outbreak

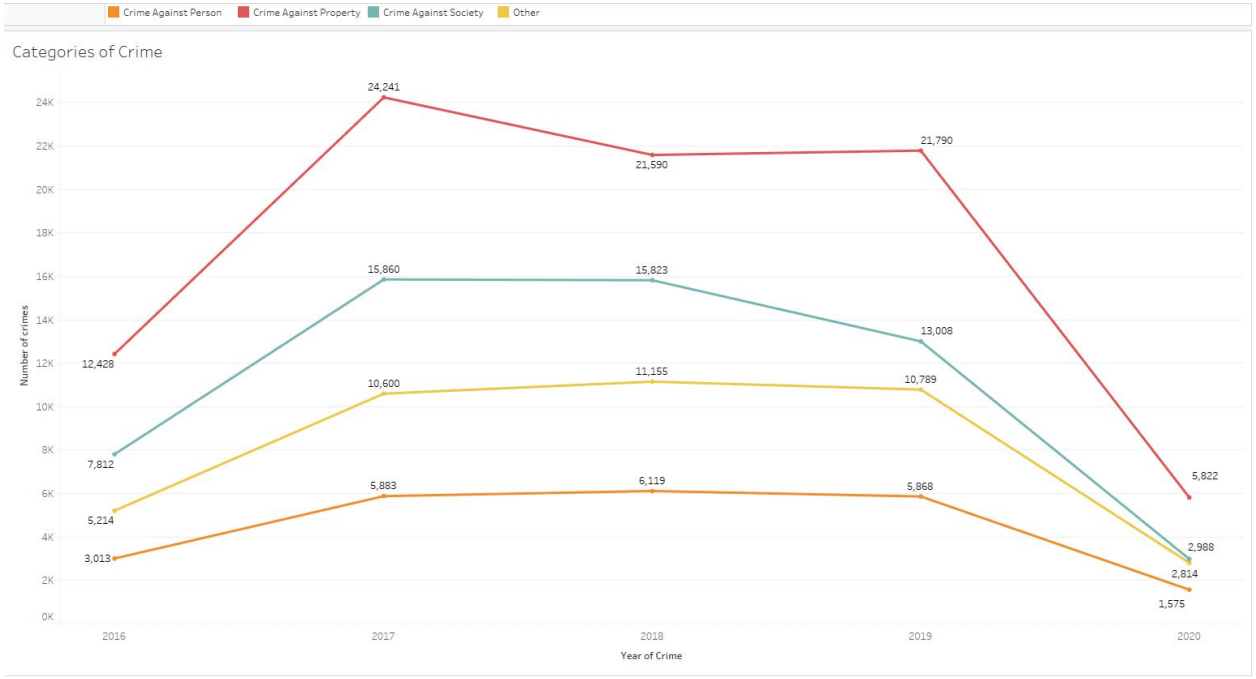


*Figure 3.2: Categories of Crime in Maryland*

Here is a figure that categorizes the types of crimes into three different categories: crimes against persons where a person is harmed or injured in any way, crimes against property where someone's property is destroyed or stolen, crimes against society such as riots and chaos, and other crimes not included in these categories. According to the database, the majority of the crimes committed in Maryland are crimes against property. Despite the high number of crimes that occured in 2017, we can see that the rate of crimes begins to decline from 2019 to 2020 which is around the time of the Coronavirus outbreak. An important thing to take note from the data is that the most recent year has the lowest crime rate since 2016. We can compare the data back from 2016 and see that people are staying inside and being more cautious of their surroundings due to the COVID-19. Although we can use this data to help us predict future trends, it is still a mystery as to what the future holds for the rate of crimes.

Section IV: COVID-19 Cases by County

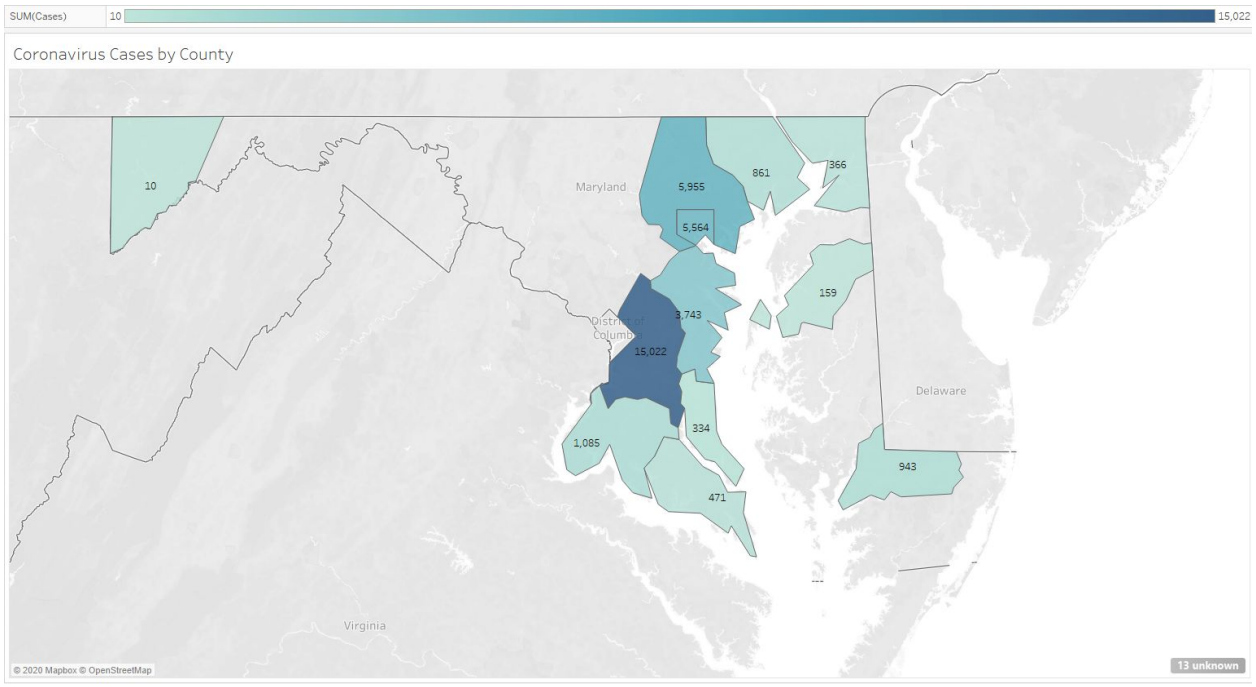


*Figure 4.1: Geographic Visualization of Coronavirus Cases by each County*

Here is a geographic depiction on the estimated amount of reported COVID-19 incidents within each respective county. This map was created so that we can see a possible correlation between the coronavirus cases and the number of crimes being committed. These are based on diagnosed and reported cases only, meaning that there are potentially much more cases than that which is indicated. It should also be noted that certain counties that are not highlighted above do not have sufficient enough data. The map reveals that the majority of the cases occur near the middle of the state and leads to the North. Although it is not directly shown through this geographic visualization, the reason why there is such a high concentration of cases in the middle of the state is due to how the population of Maryland is spread throughout the state.

According to Figure 4.1, one county alone has nearly 50% of Maryland's Coronavirus cases. The reason why this may be one of the most impacted counties is because it can have one of the higher population densities per square mile. The population of Maryland is distributed very similarly to how the coronavirus cases are distributed which explains why there are several gray spots on the map. This also explains why the coronavirus would spread faster in a thriving place where many of the locals live.

The order for some of the counties most affected by the Coronavirus would include Prince George's County, Baltimore County, Anne Arundel, Charles County, Wicomico County,

Harford County, and St. Mary's. With the exception of Wicomico County, the rest of the counties are located along the middle part of Maryland, just above the Chesapeake Bay. Since the population of Maryland is laid out similarly to the map in Figure 4 there are alot of cases where there is high population density. The two highest COVID-19 linked counties are also linked to the borders of Maryland. Since these counties are in close proximity to the border, there is a high risk of exposure to people from Pennsylvania and Virginia. Another possible reason as to why there is a high concentration of cases near the border is because people could have possibly crossed the state's border and spread the virus

Section V: Critical Analysis & Recommendations

After analyzing Maryland and its crime rate in Tableau, we came to a conclusion that the COVID-19 virus affected the state's crime rate. COVID-19 has left many families in America at home and jobless, relying on the government or other means to get by. Some would think that crime rates should've gone up since some people lost their steady source of income. However, that is not the case within Maryland. We concluded that crime rates went down because of people's fear of contracting the virus so people are reducing contact with others as much as possible. As seen from Figure 3.2, 2019 had a high amount of crimes for every type and when 2020 started, which is when the COVID-19 virus started, all crimes decreased dramatically. This is very different from other states like California which saw an increase in crime rate after the COVID-19 virus. This is most likely due to many factors such as population size, average family income, average property price, and more. However, we cannot assume that crime rates will keep decreasing in Maryland since we only had data for the first four months of 2020. In the next few months, we will see how the COVID-19 will really affect Maryland and America as a whole. We predict that crime rates will go back up when people need other ways to get by through this hard time.

However, we came up with recommendations that could help reduce the crime rate and COVID-19 virus spread:

- Increase relief efforts for families in need
- Introduce free-public clinics to help people test and cure patients
- Educate people on the effects of COVID-19 and how the spread could be reduced
- Provide awareness of crimes to ensure everybody is knowledgeable in their area
- Fortify the law enforcement for the safety of the public

Overall, COVID-19 has shown us how unprepared and brittle we are as humans and society. The virus is challenging families over the nation, the economy we have built up, and society as a

whole. However, it also shows us that we as a community want the best for our future generation by reducing the spread of COVID-19. Looking back into the past, we as society have been through a lot of hardships that affect a lot of people such as WW2, Spanish Flu, The Great Depression, and more. All those hardships that we have endured have left us to become stronger and better. Hopefully we can look back at this time and see that this hardship was an achievement for humans.

## References