How Does the Spread of Coronavirus Affect the Crime Rates in California from 2016 to 2020?

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## **ABSTRACT**

Coronavirus disease (COVID-19) was an infectious disease caused by the SARS-CoV-2 virus. It spreads through the transfer of liquid particles from an infected person’s mouth or nose. Under prevention protocols, people wear masks, clean their hands, and maintain social distancing to prevent its spread. Because COVID was first discovered in China, racially motivated crimes against Asians have increased in the United States. My research question was ‘How does the spread of coronavirus affect the crime rates in California from 2016 to 2020?’. California, a state in the Western United States with diverse and nuanced demographic features, can be used as a sample to estimate the characteristics of the United States. Based on data from the State of California Department of Justice, this research paper seeks to analyze trends in crime progression, pre/post the spread of coronavirus and produce color-coded maps using geographic information systems (GIS) to showcase the results. This research will simultaneously explore the impact of other demographic features on the crime rates, such as ethnicity, education level, and income level. This question was worthy of investigation because it affects groups of people in California, enabling a greater understanding of the topic. Through the map plotting and trends analysis, it was discovered that the outbreak of COVID was correlated with a decrease in property crimes and an increase in the number of violent crimes. Most of the crimes may be bias-motivated crimes, and the drop in crime case numbers may be attributed to COVID restrictions.

Keywords

Crime rates, COVID, and GIS maps

## **INTRODUCTION**

Initially, all available criminal data banks from police departments in the US in all 50 states were explored, despite the limitation that the records of some of the states are not available due to political sensitivity as the aim was to find a region that would offer the best sample to study. The official crime statistics websites of all 50 different states were collected to recognize the states with types of data available (e.g., data tables, reports, and raw data). Based on the complexity of available data and the correlation between COVID and state data, the 50 states were narrowed down to California. The research question and goal were to investigate the effect of the spread of COVID-19 on the crime rates in California, where it was hypothesized that there may be a cause-and-effect relationship.

According to the data provided by the California Department of Finance, California’s population has reached 39.2 million as of January 1, 2022 (State of California - Department of Justice Office of the Attorney General). As the most populated state in the United States and a sub-national entity in North America, California undoubtedly has a diverse population with varied races, ethnicities, languages, and religions. “No race or ethnic group constitutes most of California’s population: 39% of state residents were Latino, 35% were white, 15% were Asian American or Pacific Islander, 5% were Black, 4% were multiracial, and fewer than 1% were Native American or Alaska Natives, according to the 2020 Census. (Johnson, McGhee, Mejia, 2022)” Therefore, it was reasonable to use California as a sample for trend analysis of COVID’s impact on the crime rates across the population of the United States as a whole. As a coastal state, its wide range of unique geographic features, namely its climate, rivers, cities, and towns, may also be factors relevant to the crime rates, as shown by the map of California below. The names of the cities and the color-coded areas can be matched in case the maps were unclear.

Research regarding the correlation between demographic features and crime rates (Urban Institute, 2017), and the global impact of COVID-19 stay-at-home restrictions on crime has been investigated and discussed by previous researchers (Nature, 2021). Valid conclusions drawn from this research were used to explain the trends observed in the maps. However, this research paper approaches the problem using maps, which show more directly and clearly the trends of the number of crime cases. Moreover, it focuses more on explaining the trends and insights of crimes in California from 2016 to 2020.

Diagram

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*Figure 1 Map of California with the names of its cities(GisGeography, 2022)*

The hypothesis was that regions with lower median income, more diversity, and with lower education rates will have a greater number of crime cases. The pandemic could potentially increase poverty and spur individuals to commit crimes either for sustenance or out of anger. For example, cities like San Bernardino, with only a median income of $29,613, would have more criminal cases, and cities such as Contra Costa, with a median income of $166,866, would have fewer (State of California - Department of Justice Office of the Attorney General).

## **METHODOLOGY**

Secondary quantitative data, or data that already exists, was used from the open justice website managed by the California Department of Justice Office of the Attorney General, which had relatively complete data sets with fewer N/A values and outliers. From all datasets provided, the two disparate sets of data utilized were crime and clearance (cases solved by the police) data and tables of demographic trends data such as income levels and unemployment rate. The data was cleaned by checking for missing data and removing the outliers. Moreover, variables that could warrant further exploration, such as oddities with education status and agency codes were made clear by reading the information provided in the “Read-Me'' files, where the definitions of table titles in acronyms were listed. The range of data was further narrowed down to only five types of crime (homicide, robbery, aggravated assaults, burglary, and larceny-thefts), so all the data utilized was applicable and could be influenced by the spread of coronavirus in the defined context of the data elements.

To map the crime data for visualization, FIPS codes, numbers that give each area a unique identity, were used to match the data with the map. After the county-level data was examined, all coordinates and their corresponding unique data values were merged for plotting to ensure the completeness of the map. Therefore, the data can be treated at the county and year levels. When the data of a specific crime type in a year was recalled, the map of California can be filled with colors corresponding to different levels of crime counts for every county.

However, the limitation of the data set was that the data might be distorted. For example, even if an area has a relatively high crime rate, if the other areas within the same county have significantly lower crime rates, then the crime rate of the whole county can be misleading.

## **RESULTS - Color-coded GIS Maps by Crime Type in California from 2016 to 2020**

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*Figure 2 Trend of the Number of Aggravated Assaults from 2016 to 2020 in California. As shown in the legend, the areas with brighter colors indicate more crimes.*

The overall pattern of the number of aggravated assaults had shown an upward trend from 2016 to 2020, despite the small drop from 2018 to 2019. The regions with the most aggravated assault crimes were Los Angeles, San Bernardino, Riverside, San Diego, and Sacramento, but for Sacramento, the number of crimes was relatively lower in 2018 and 2019. The number of crimes in Sacramento has increased from 1,511 to 2,501 from 2018 to 2020. As shown in figure 2, the number in Alameda increased during these two years, highlighted by the brighter colors on the map. The regions with lower numbers of aggravated assault crimes were Modoc, Mono, Trinity, Colusa, and Sierra. The numbers in these regions were consistent over the years and remained to be the areas colored with darker colors, indicating fewer crimes. These counties all had high education rates and low unemployment rates. For example, 33.3% of citizens in Mono had a bachelor's or higher education degree, and the unemployment rate in Sierra was only 7%. They also tend to be small counties where there were only limited numbers of police agencies.

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*Figure 3 Trend of the Number of Burglary from 2016 to 2020 in California*

The crime rates of burglary in California from 2016 to 2020 have been decreasing, with the most noticeable change coinciding with the year of the outbreak of COVID, which may be explained by the sudden changes in daily life because of COVID and the stay-at-home restrictions (Nature, 2021). This trend was uniform across all counties, irrespective of demographic features. For example, both Los Angeles and Mariposa see a decrease in crimes. Both counties saw a decrease despite the great gaps between their median incomes, education rate, and unemployment rates. While the Cudahy Police Department in Los Angeles reported that the percentage of citizens with a bachelor's or higher degree was only 4.3%, the police agencies in Mariposa reported a greater percentage of 22.4%. While the median income in Mariposa was $50,560, that of Los Angeles was $245,694. The unemployment rates of Mariposa and Los Angeles were similar, respectively 13.2% and 16.7%.

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*Figure 4 Trend of the Number of Homicides from 2016 to 2020 in California*

The number of homicides has been decreasing from 2016 to 2019, even before the start of COVID, perhaps because of the greater number of criminals put into prison, improved and more strict policies, and an aging population (Lind, Lopez, 2015). The number of crimes has been consistent throughout the city, except in San Bernardino, where the number of homicides increased from 2019 to 2020, jumping from 508 to 677 (33%). In counties such as Lassen and Plumas, there were fewer homicides, fairly consistent throughout the years. These two counties have high education rates and high median incomes. In Plumas, 22.7% of citizens were bachelors or hold an even higher education degree, and the median income in Lassen was $53,351.

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*Figure 5 Trend of the Number of Larceny-Thefts from 2016 to 2020 in California*

The number of larceny thefts in California has been diminishing consistently since 2016, with more significant declines in more recent years, as these tend to increase with the volume of social interactions. Due to COVID restrictions in the more recent years, people interact less, so the number of larceny thefts happens less frequently. The commitments of larceny-thefts include the illegal taking of properties from others’ possession, where the thieves have to be in close contact with the stolen items and their owners (Nature, 2021). This was becoming more challenging with the implementation of the regulation policies such as keeping 6 feet distance from other people in public areas.

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*Figure 6 Trend of the Number of Robbery from 2016 to 2020 in California*

The number of robberies has been fluctuating before COVID but in a trend that was generally leveling off. The reason for its dwindling might be similar to that of burglary crimes. The stay-at-home policies triggered the sudden decline in urban mobility, reducing opportunities and increasing guardianships relating to high-volume crimes.

## **DISCUSSION - TREND ANALYSIS**

San Bernardino, Los Angeles, and San Diego were the three counties that had the greatest number of crime cases, regardless of the crime type and year; on the other hand, counties such as Modoc, Lassen, and Inyo have fewer crime cases. The possible reasons for disparities between general crime rates include demographic features such as income level, education level, and unemployment rate. For example, while San Bernardino had 2353 burglary cases in 2016, there were 0 in Modoc in the same year. The percentage of San Bernardino citizens having a bachelor's or higher education degree was only 6.4%, and its median income was $33,345. In contrast, the percentage of Modoc citizens having a bachelor's or higher education degree was 18.5%, and its median income was $38,560. While the unemployment rate of San Bernardino was as high as 62.9%, Modoc citizens’ unemployment rate was only 11.2%.

Fresno was a county with a low median income and a low education rate. Its crime rate was relatively high but not as high as Los Angeles. This showed a possible negative correlation between income, education level, and crime rate. The high crime rate can likely be accounted for by the citizens’ distrust of criminal justice systems and their unwillingness to cooperate with the police, making it a chaotic and unsafe neighborhood (Urban Institute, 2017). However, there were exceptions to this rule of thumb. For example, Alameda was a county with a high education level, and a high crime rate and Los Angeles had a high crime rate, high median income, and high employment rate. Although the data might be distorted, there was better security in these neighborhoods where the residents have higher incomes, but the high median income also incentivizes the criminals to commit crimes (Atchison, 2019).

Before the outbreak of COVID, the number of criminal cases was generally dropping, except for aggravated assaults which showed an increase of 8%. However, from 2019 to 2020, all crime rates dropped with a most significant decline in the case number of robbery in Los Angeles, which dropped from 18,607 to 15,221, an incredible decrease of 22%. The possible causal relationship established here indicates that the spread of COVID does hurt the number of crimes committed in California. Due to the COVID restrictions such as social distancing and the mandatory quarantine plans, people reduced contact with other people, hence decreasing the number of crimes taking place.

Nevertheless, the number of aggravated assaults and homicide cases increased again, both being higher than the pre-pandemic data. Both of these two crimes may be committed as a consequence of hate. As hypothesized, the victims of these crimes were mostly Asians because the criminals may blame and have negative feelings towards Asians for the outbreak of COVID, resulting in possible intended conflicts and murders. In 2019, the number of anti-Asian hate crimes jumped from 19 to 25, a significant increase of 25%. Additionally, the number may even be underestimated because of “language barriers, immigration status, unfamiliarity with the criminal justice system, and fear that reporting hate crimes could bring retaliation or unwanted publicity”, according to the Los Angeles County Department (Licas, 2021). Moreover, the counties with more crime cases were concentrated around Los Angeles and San Diego. (United States Census Bureau, 2021). According to the World Population Review, 10.7% of the Los Angeles population were Asians, and San Diego had an even larger Asian population of 17.25% (World Population Review, 2022).

In contrast, the number of cases of robbery, burglary, and larceny thefts continues to fall from 2019 to 2020. The number of robbery cases was the most affected. The number has dropped from 18,607 to 15,221, a percentage of as much as 18%. The victims of these crimes were chosen randomly for the most part, and the objective of the criminals was generally to gain possessions. Still, for these types of crimes to be committed, the criminals had to be near the victims. Under COVID restrictions, people generally stay at home, which explains the downfall in the number of crimes.

## **CONCLUSION**

In conclusion, from 2016 to 2020 in California, the number of violent crimes increased, which may be accounted for by Asian hate crimes. However, at the same time, the number of property crimes and shoplifting behaviors decreased. This was correlated with the COVID restrictions and less physical contact with people.

The limitation of this research was that the data acquired was not specific enough to be allocated to different districts but only cities. The assumption was that the data for each city was evenly spread out in the regions, but this was not the case in real life. As a result, the data may be misleading if an area with fewer crimes and an area with significantly more crimes were in the same city, then they still appear to have the same number of crimes. This impacts both the accuracy and the precision of the results although may not impact the analysis of trends as much. The findings may not be extended to the whole country because the sample size, though it was based on a diverse area, was too small, and nonrandom. To improve and further this study, data that were specific to the district level would need to be collected. In the color-coded maps, the areas could be divided more.

## **ACKNOWLEDGEMENT**

I would like to thank Raksha M. for helping and supporting me to do the whole process of researching, coding, and finishing this research paper.

I would like to thank editors from Polygence for checking my grammar, structure, citation style, and use of statistics.

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## **APPENDIX**

### Definitions

The definitions listed below were taken from the official website of the State of California - Department of Justice Office of the Attorney General (State of California - Department of Justice Office of the Attorney General, 2022).

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| *Crime Types* | *Definitions* |
| Aggravated Assault | an unlawful attack by one person upon another to inflict severe or aggravated bodily injury. This type of assault usually is accompanied by the use of a weapon or by means likely to produce death or great bodily harm. |
| Burglary | the unlawful entry of a structure to commit a felony or theft. Attempted burglary is included. |
| Homicide | the willful (non-negligent) killing of one human being by another. Murder and non-negligent manslaughter are included. |
| Larceny-Theft | the unlawful taking, carrying, leading, or riding away of property from the possession or constructive possession of another. Attempted larcenies are included. Embezzlement, confidence games, forgery, check fraud, etc., are excluded. |
| Robbery | the taking or attempting to take anything of value from the care, custody, or control of a person or persons by force or threat of force or violence and/or by putting the victim in fear. |

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