A close-up, high-magnification image of several COVID-19 virus particles. The particles are spherical with a distinct wavy, spike-covered surface. They are set against a light gray background with some darker, out-of-focus particles visible.

Rural vs Urban impact of COVID on Crime Rates in Florida

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Problem Statement & Background

COVID lock-downs worldwide reduced personal mobility and forced people to stay home. Research on US and international metro areas showed a drop in overall crime, but highlights that assaults and murders generally went up while property crimes (larceny, burglary, etc) went down (Abrams, 2021, and Nivette, et al., 2021), but did not focus on rural crime rates. Boman and Gallupe (2020) saw similar changes in a small Ohio city, and continue to propose that urban crime rates are more likely to fall due to a reduction in minor crimes than the more serious crimes due to the social component of committing minor crimes in a group (bonding, social credit, reputation), while serious crimes are more likely solo acts.

This research seeks to answer

- Did COVID-19 lock-downs also significantly change crime rates in rural areas in the state of Florida?
- Additionally, is there correlation between the impact of the COVID disease, not just the lockdowns, in counties and change in crime rates?

Answering these research questions can assist state and local governments to predict the impact of future pandemics and subsequent lock-downs on their communities and identify resources to mitigate those impacts.

Defining Success

Success for this project would be to answer the two questions on the previous slide.

- Identify if rural areas follow the same crime trends as metro areas
- Identify if there is correlation with the change in crime rates and the impact that the COVID disease had on communities in Florida

Challenges

- Crime data from FL is cumulative for the year, when other research had access to daily totals, so this research cannot narrowly focus on weeks when lock-down protocols were more stringent, or disregard the months in 2020 before the lock-downs were implemented.

Timeline

- This research collected crime data for the past 10 years in order to establish a trending baseline to determine if 2020 crime rates were a deviation from that trend, and could be attributed to COVID and the lock-downs. Once the crime trends were established, this research looked at the crime from 2020 and the COVID cases/deaths for 2020. This did not look at 2021 as the crime data was not yet available for that year.

Data Discussion

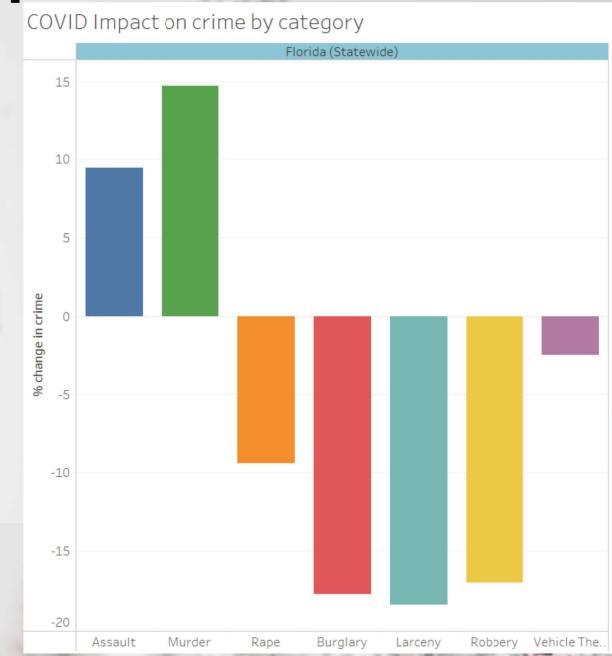
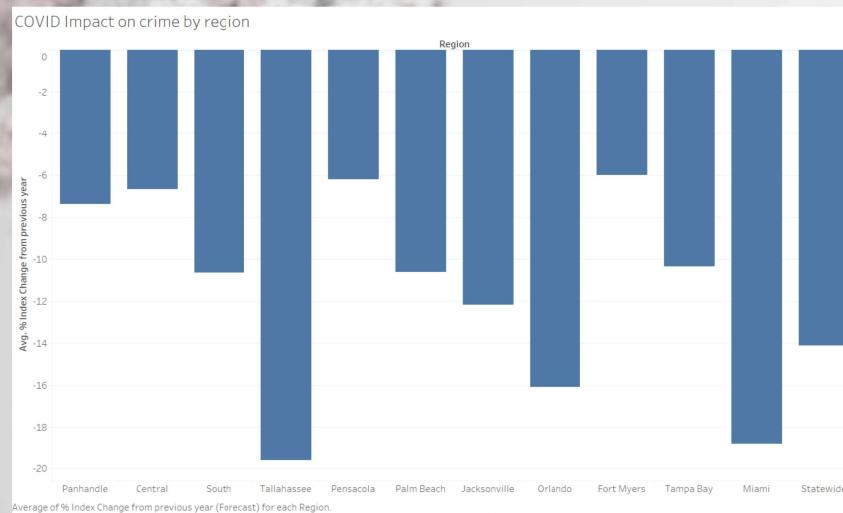
- Open Source, semi-structured data (html, pdf, and csv files)
- Public COVID data was updated daily per FL county
 - Cumulative totals from 31 Dec 2020 were used to represent COVID totals for 2020
- Public crime data was collected for entire year per FL county by FL Dept of Law Enforcement
- FL county information (area, population) copied from public website (usa.com)
- Differences in labels between data sets required corrections, e.g. *De Soto County* vs *Desoto County*
- Manipulated data in Excel before importing into Tableau (derived crime rates by category, population density, COVID rates)
- Created forecast data for 2020 (see methodology section below)
- All crime data for this research came from single source (FL DLE), but other sources could have differing definitions for categories of crime, e.g. all property crimes lumped together as theft.

Methodology

To determine significance of COVID impact on crime, each category of crime by county were forecast for 2020 based on county trends from 2011-2019

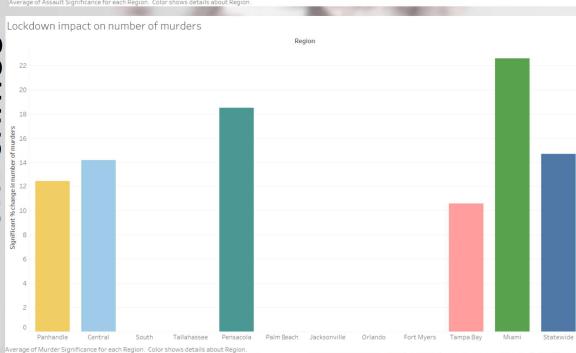
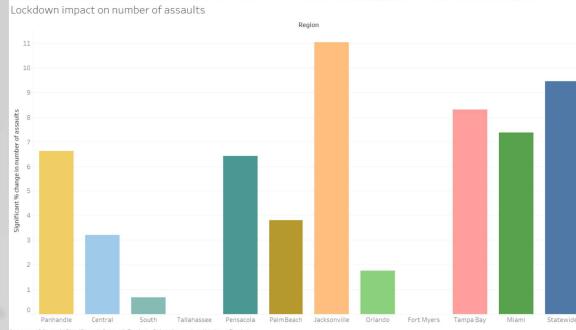
The forecast was compared to the actual 2020 count with the hypothesis that the 2020 lockdowns altered crime patterns with a threshold of $\alpha = 0.05$. Significantly significant results are identified and the change from the 2019 counts are presumed to be related to the lock-downs. Further research should pursue investigating if other factors could have contributed to the significant results.

Dashboard: COVID Lock-down Impact on Crime

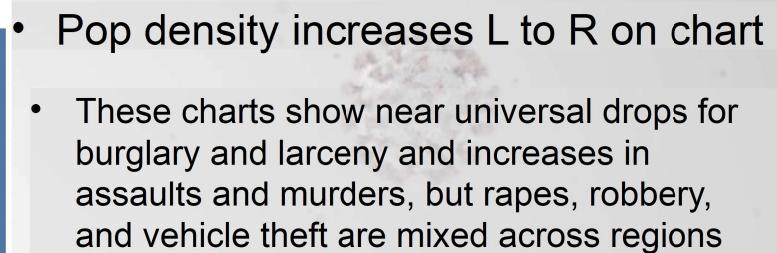
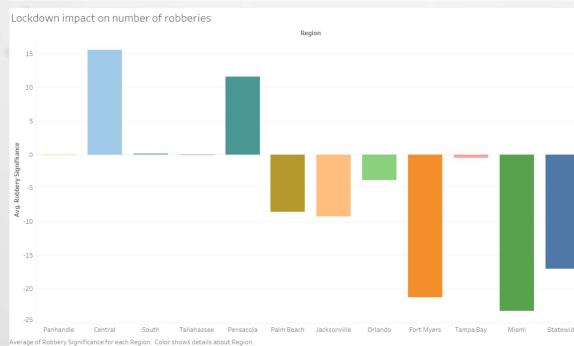
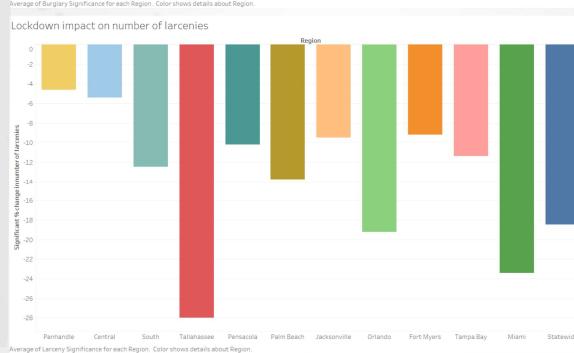
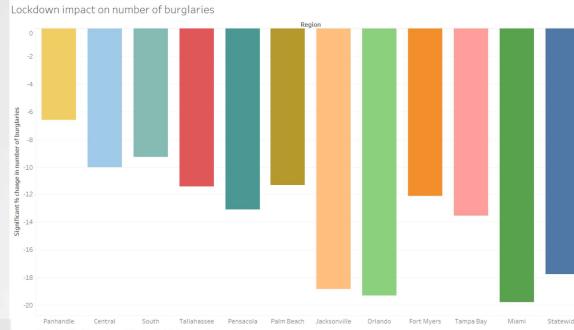


- Overall, COVID had a larger effect in densely populated counties, but outliers existed in the less dense counties
 - Violent crimes rose with the exception of rape (reported)
 - Assault: Statewide increase of 9.5% from 2019, mostly Tampa: +13%, Jacksonville: +22%, and rural Central FL: +47%
 - Murder: FL: +14.7%, Miami: +, Pensacola: + 18%, Polk County: +74%
 - Rape: FL -9.3%, Miami: - 17%, rural Central FL: +32%, rural South FL: -22%
 - Property crimes decreased
 - Burglary: FL: -17.8%, most counties saw a significant decrease
 - Larceny: FL: -18.5%, also across most counties
 - Robbery: FL: -17%, mostly metro counties other than Tampa Bay and Orlando
 - Vehicle Theft: FL – 2.5%, Orlando metro: -12%, Pinellas county: -10%

Dashboard: Lockdown impact on categories of crime

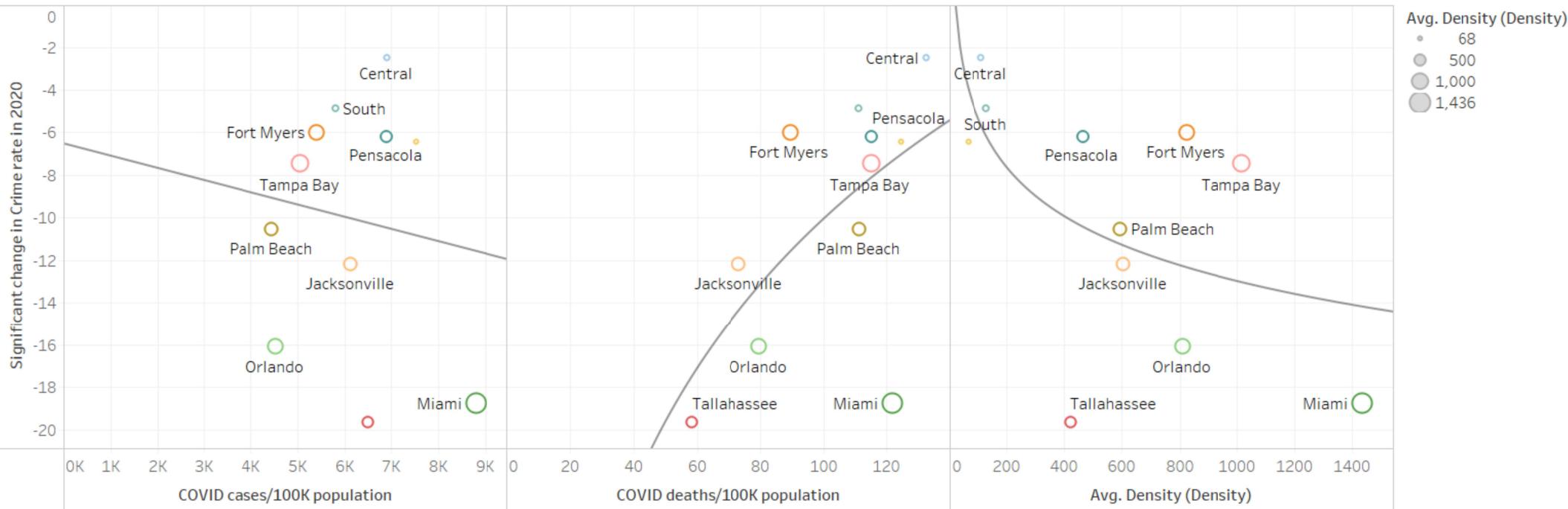


- Property crimes



Dashboard: COVID cases/deaths impact on crime rates

Correlation of COVID cases/deaths to crime reduction by region



Average of Cases/100K, average of Deaths/100K and average of Density (Density) vs. average of Crime Significance. Color shows details about Region. Size shows average of Density (Density). The data is filtered on Year1 and County Name. The Year1 filter ranges from 2020 to 2020. The County Name filter excludes Florida (Statewide).

No trend function showed close correlation between the change in crime rates and the number of COVID cases per 100K population, probably due to Miami's large drop in crime but also high number of COVID cases, not repeated in the other metro areas.

A logarithmic trend between death rate and reduction in crime had a p value of 0.045, suggesting strongly that a high death rate is correlated to a low reduction in crime. The final graph's logarithmic trend (p value = 0.07) shows a possibility of higher reduction in crime with a higher density of population, expected based on other analysis on previous slides.

Conclusion & Future Work

- While the lock-downs significantly affected crime rates in the more dense counties surrounding metro areas, less dense rural counties had less significant reductions
- Florida followed the models identified in other research where violent crime generally increased during the pandemic and lockdowns, while property crimes decreased
- There is a strong correlation between the number of COVID deaths per 100K population and reduction in crime rates.
 - Future research could explore if availability of medical care in larger cities is linked to the lock-downs greater reduction of opportunities for crime in cities than in rural areas.
- Other future research
 - Why did certain crimes (rape, vehicle theft) increase in some areas and reduce in other areas, not correlated with population density?
 - How to employ state resources to mitigate the increase in violent crime when the next lock-down occurs
 - Did differences in the severity of lockdown protocols between urban and rural counties contribute to the difference in crime reduction?

A background image showing several COVID-19 virus particles, which are spherical with a distinct spike protein layer. They are rendered in a light brown or tan color against a white background.

References

- **Data**

- "Historic data for all states, counties, or metros." COVID Act Now API (2020), accessed March 12, 2022. <https://apidocs.covidactnow.org/>
- "Annual State Crime Data Reports: Statewide County Report." Florida Department of Law Enforcement, accessed March 27, 2022. <https://www.fdle.state.fl.us/FSAC/CJAB-Home/Uniform-Crime-Report/Data-Archives>
- "Florida Land Area County Rank." USA.com, accessed March 27, 2022. <http://www.usa.com/rank/florida-state--land-area--county-rank.htm>

- **Articles**

- Abrams, David S., "Crime in the Time of COVID." ECONOFACt. March 30, 2021 <https://econofact.org/crime-in-the-time-of-covid>
- Carr, Jordan, "How and when to calculate statistical significance." The Signal, accesed March 27, 2022 <https://mixpanel.com/blog/how-to-calculate-statistical-significance/>.
- Boman, John H., 4th, & Gallupe, Owen, "Has COVID-19 Changed Crime? Crime Rates in the United States during the Pandemic." *American journal of criminal justice : AJCJ*, 45(4), 537–545. (2020) <https://doi.org/10.1007/s12103-020-09551-3>
- Nivette, Amy E., Zahnow, Renee, Aguilar, Raul, et al. "A global analysis of the impact of COVID-19 stay-at-home restrictions on crime." *Natural Human Behavior* 5, 868–877 (2021). <https://doi.org/10.1038/s41562-021-01139-z>