Social Distancing: Fact or Fib?

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Abstract

Background: When COVID-19 came to the United States, some states opted to install a stay-at-home order, starting with California on March 15, 2020. This was done in hopes that if everyone stayed home, the virus would not spread anymore and could be contained in the few counties where it was being seen.
Objectives: To see if lockdown has actually helped to diminish the spread of COVID-19. In instances that social distancing is taken away, I hope to see a significant difference in the number of cases. I expect to see a decrease when lockdown is implemented and a rise in cases when social distancing is taken away like during spring break and holiday travel.
Methods: Using the data set containing the number of confirmed cases in US counties, differences in the number of cases were tracked to see the effects that different dates had on different states and the country as a whole.
Results: While after a 2 week stay at home order in California did see spread to other counties, the cases in certain counties were dropping. During the 2020 spring break, college students traveled to Miami, Florida and cases in Miami spiked. The same can be seen in the US as a whole after families traveled for Christmas.
Conclusion: It is hard to see if lockdown is/was effective only because lockdown was not perfect. It is impossible for everyone to stay at home. However, when social distancing is taken away, like in the case of spring break and Christmas, COVID-19 cases start to rise. This means that social distancing can slow the spread of the COVID-19 virus.

Introduction

COVID-19 is a disease that was first seen by the end of 2019. Having only been a few cases to begin with, there was not much worry when 2020 came around. However, news was spreading about the virus coming into countries where it had never been. In January of 2020, the first COVID-19 case came to the United States. No one was sure what it was or even how it was spread, and fear started to rise. By the end of February and beginning of March, it seemed that there were now cases in every state. Evidently, the cases were spreading quickly, and something needed to be done. Multiple states declared a state of emergency and as well declared lockdown. What lockdown meant for many states was closing down all businesses and requiring people to stay at home. Quickly, masks were also required in many states if a person were to be outside, as well as keeping a distance of at least six feet between each household.

Data Set

I am using the data set that was given to us for the second data academy. This data set has a lot of information about the daily cases in the united states. With this data set, one can zone into a specific county in a state and see cases by the date. We can also use this data set to visualize individual states as well as the United States as a whole. I will be taking this data set into RStudio in hopes that we can visualize trends in individual states for different important dates.

Goals

With this data set, I am hoping to use RStudio to be able to visualize individual states on particular dates. States went into lockdown on different dates and I am hoping to see if closing down the state truly had an impact of the number of cases. There have also been instances, however, when lockdown rules have been ignored, especially for spring break and for holidays like Thanksgiving and Christmas. I hope to see if there are any trends in the rise of cases due to a lack of social distancing. With these findings, I hope to see if social distancing actually helps decrease the transmission of the COVID-19 virus.

Previous Literature

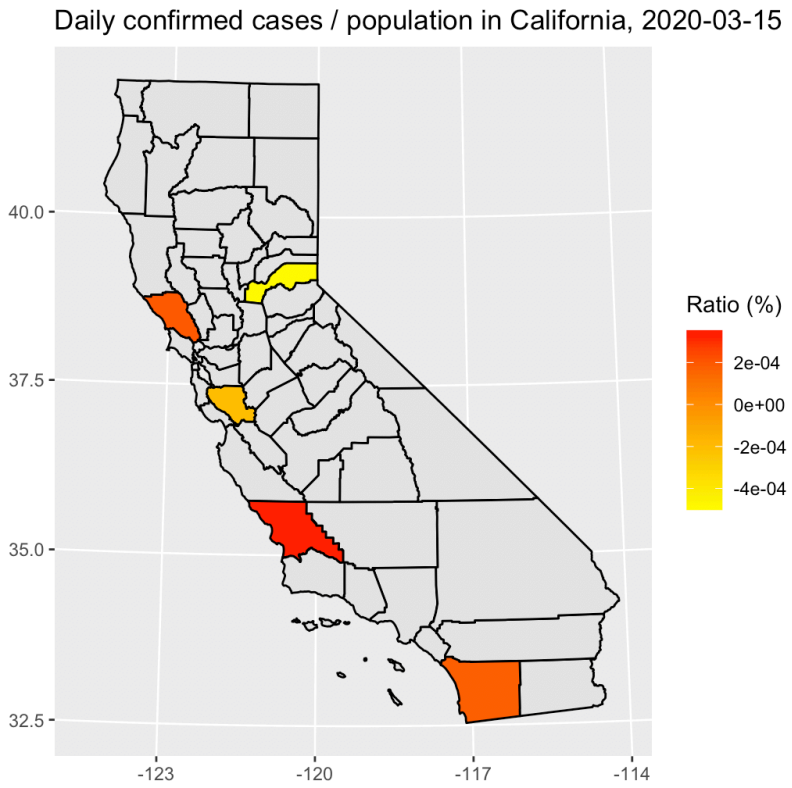
Vincenzo Alfano and Salvatore Erocolano conducted a research study in which their goal was to find the efficacy of lockdown, similar to what my goal is. They had a similar data set in which they had data from 202 counties around the world, not just the united states from January 22 to May 10, 2020. They found their results by creating an estimation equation. What they found was that lockdown had a negative and statistically significant coefficient. This means that with what they found, they had evidence that lockdown was effective and reduced the COVID-19 cases where lockdown was implemented. They found this was especially true when lockdown lasted for 10-20 days.

Another study conducted by Massimo Marchiori focused more on social distancing. The question here was that in theory, social distancing should have eliminated the virus by now but that is not the case. Marchiori developed the first data set on social distancing in order to see how social distancing is actually being carried out. Wearing a 'social distancing belt', they measured how people actually social distance in Italy. They did the same while wearing a mask, not wearing a mask, wearing a DIY mask, and wearing a mask with goggles. They found that people were more inclined to social distance if the person was seen with a mask, and even more-so if the person was also wearing goggles. They concluded that wearing a mask has a repulsive effect. People will generally stay six feet away if they see one is wearing protective gear.

With these two studies, I hope to find similar outcomes. I hope to see that lockdown is effective and so is social distancing.

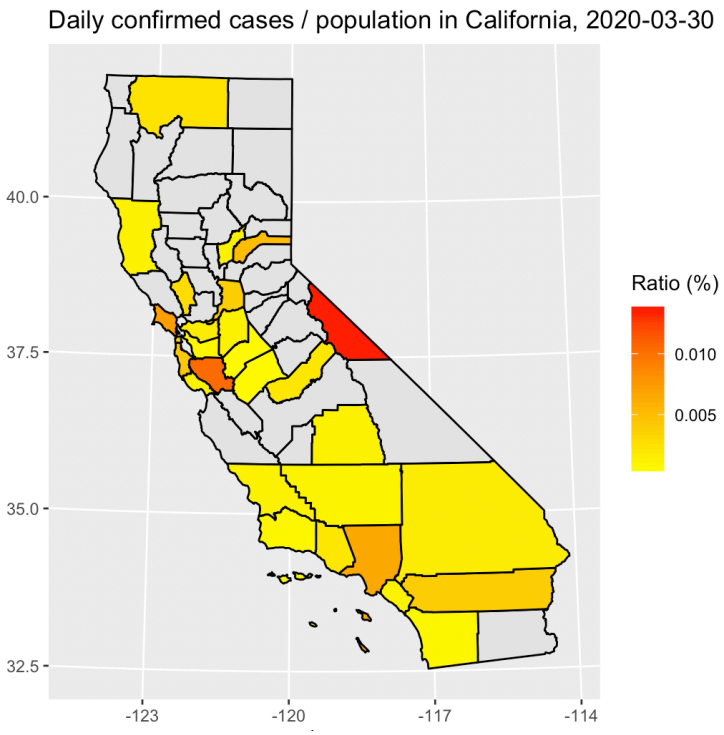
Findings

The state of California was the first state to implement the stay-at-home order on March 19, 2020. In the first figure, we see the state of California on the date that the stay-at-home order was issued. Cases were only seen in about 5 counties, however, those counties had a very high ratio, as we can see those labeled with a dark red.



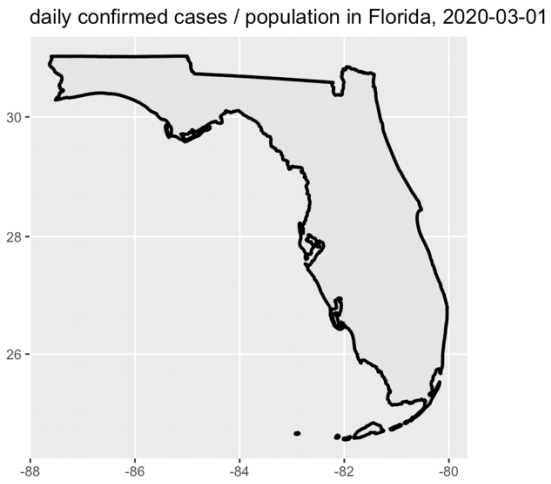
Ideally, symptoms and the contagion period for COVID-19 lasts 14 days, so in a perfect society, if everyone was at home and no one interacted with those outside of their household, the COVID-19 cases in California would be gone in 2 weeks. The next figure shows the state of California on March 30, 2020, 15 days after the stay-at-home order was issued. As it can be seen, this was not the case. Now, this is not to say that social distancing and staying at home does not work yet. It could so be the case that the inhabitants did not follow stay at home orders perfectly, and that is something that just cannot be done. People need to go to work, they need to get groceries, and they need medical attention. It is almost impossible to expect the whole population to stay completely at home.

In the second figure, we can see that more counties now have cases of the COVID-19 virus. However, what can also be seen is that counties that had previously been colored red, depicting a very high ratio of COVID-19 cases, now have a yellow color, meaning that the cases in that county dropped significantly.

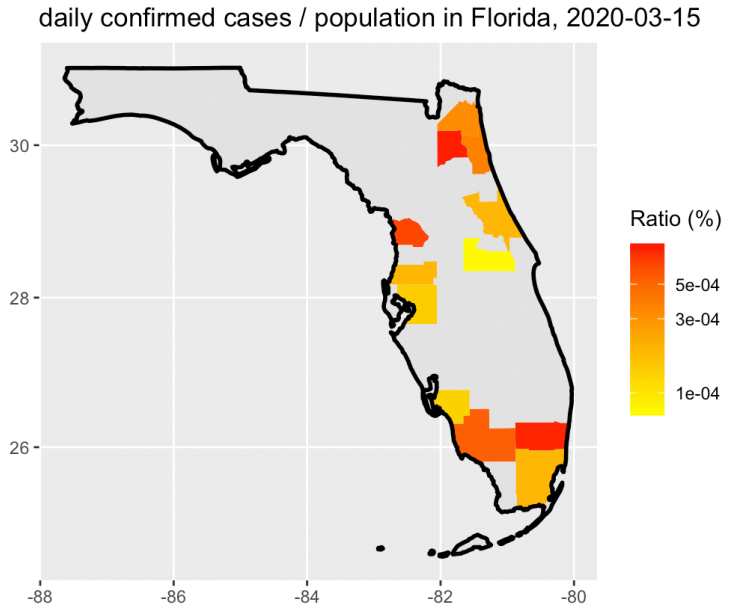


Near the end of March and the beginning of April, college students typically have a week off for spring break. It has become somewhat a tradition for students to travel to a place with a beach and party. These beaches are typically in Mexico or in Miami, Florida. In 2020, it was no different. News was spreading that college students were ignoring social distancing rules and traveled to Florida despite the pandemic. The beaches were open and college students were coming in from every state.

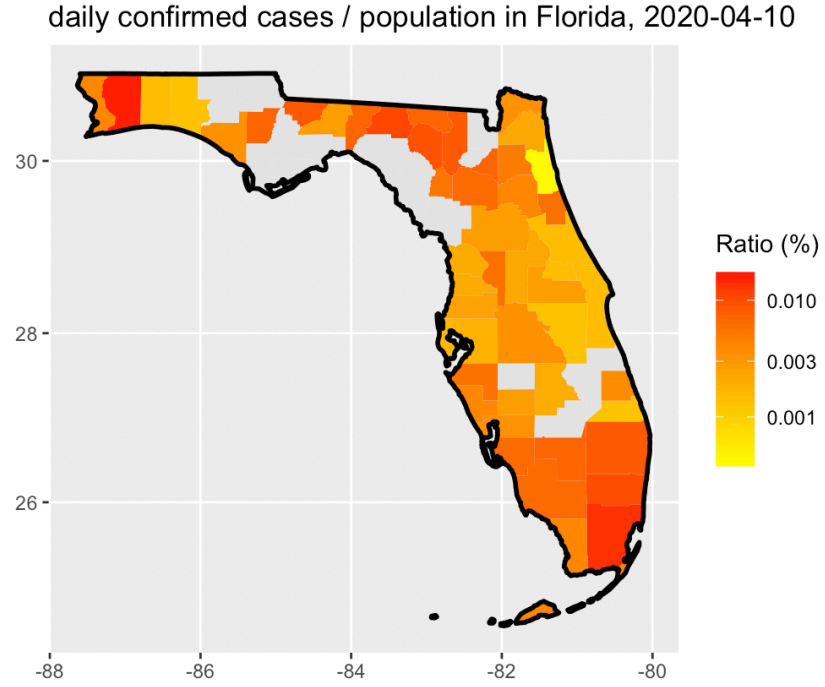
In the following figure, we see the state of Florida on March 1, 2020. We see that no counties are colored in, meaning that there were very few or no COVID-19 cases on that date. This date is before colleges started having their spring breaks.



It is difficult to say when exactly college students started to come to Florida as every college has different dates for their spring breaks. However, they typically fall between mid-March and the beginning of April. The following figure shows the state of Florida on March 15, 2020. As you can see, multiple counties now have cases of COVID-19. If we look at Miami specifically, which is the county on the very southern part of Florida, COVID-19 cases rose significantly to orange in only 15 days.



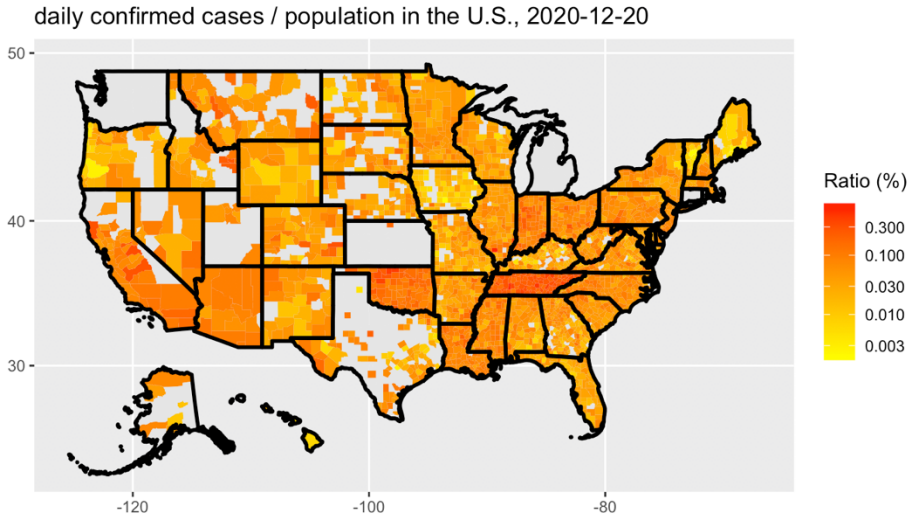
The following figure shows the state of Florida on April 10, 2020, which is near the end of when colleges had their spring breaks. Florida as a whole has an abundance of COVID-19 cases now throughout the state. Again, however, looking specifically at Miami, which is where most college students traveled to, Miami is now a dark red color.



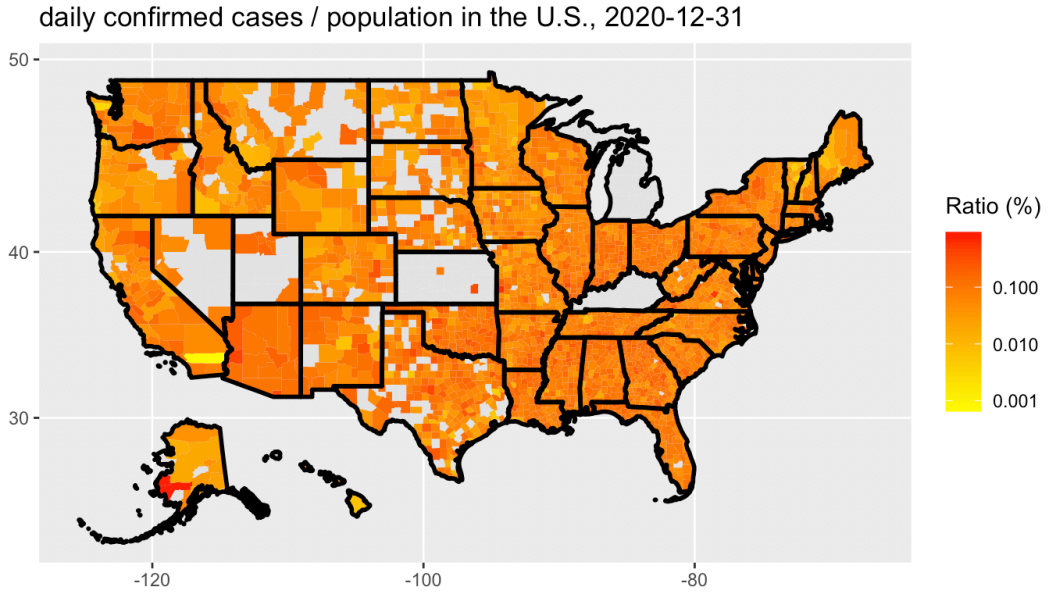
In only a few weeks, Miami went from having close to no cases to having an extremely high ratio.

Another example I wanted to explore was nationwide cases in the event of travel. Most cases did not ban travel from state to state. For holidays, families were driving and flying to visit their families.

The following figure shows a map of the United states as a whole on December 20, 2020. This was 5 days prior to Christmas. As can be seen, many, if not all states have COVID-19 cases. It would not be smart for travel in this case, seeing as most states are a dark orange, almost red. But travel was inevitable during the holidays.



The following figure shows the United States as a whole on December 31, 2020. This is 6 days after Christmas. 6 days would give the virus enough time to be transmitted and show symptoms. It can be seen that more counties now have cases of the virus and the ratio is increasing in other counties that previously had cases.



Conclusion & Discussion

In the case of California's lockdown, it is difficult to say that lockdown stopped the spread of the COVID-19 virus, however, we can see that in counties that had the virus when the order started had a decrease in the percentage of active cases. In this case, one can assume that by staying home, those counties were able to lessen the cases that had been active when the stay-at-home order was placed.

Because this was difficult to see, I decided to look into what happens when you take away social distancing. In the case of spring break in Florida, we can see that the abundance of college students on the go had a very negative effect on Miami specifically.

We can also see this nationwide in the case of Christmas. Families that wanted to see each other for the holidays ignored social distancing and took the risk of spreading the virus and that is exactly what happened. Comparing the United States map after Christmas, we can see a surge in the number of confirmed active COVID-19 cases.

With these findings, while it is difficult to say with certainty that lockdown and stay-at-home orders had an effect on lowering the spread, we can definitely say that social distancing helps in stopping the spread. When social distancing is taken out, COVID-19 cases rise rapidly. It is difficult to say that stay-at-home orders have a positive effect, simply based on the fact that it is impossible for the whole population to stay at home. Because people need to make a living as well as shop for food, lockdown is not perfect, and it could so be that those that are shopping for food unknowingly have the virus and it gets spread.

The best this to do with these findings is to social distance whenever possible, and based on Marchiori's findings, wearing a mask can increase the probability of others social distancing from you.

References

Alfano, V., Ercolano, S. The Efficacy of Lockdown Against COVID-19: A Cross-Country Panel Analysis. *Appl Health Econ Health Policy* **18,** 509–517 (2020). https://doi.org/10.1007/s40258-020-00596-3

Marchiori, Massimo, COVID-19 and the Social Distancing Paradox: dangers and solutions, arXiv preprint arXiv:2005.12446 (2020).