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GEOG 28202-1 Autumn 2020

13 December 2020

Project Final Draft

Background

During the COVID-19 pandemic in the United States, a common concern among medical professionals have been so-called “superspreader events”, clusters of cases that can all be traced back to a single event where a lot of people attended. Scientists believe that nearly three percent of all traced cases in the United States as of August originated at a biotechnology conference in Boston taking place in late February, using analysis of a specific mutation in the disease¹. As scientific knowledge about the pandemic has increased, many have warned about holding subsequent events that could classify as superspreader events.

During the first few months of the pandemic, there were few large events that could be studied as potential “superspreader events”. The George Floyd protests in late May and early June were some of the first large gatherings since the start of the pandemic. Although the events were outside, and mask wearing was commonplace, some conservative commentators believed that these events could cause widespread exposure to the virus². In early August, almost 500,000 people attended the annual Sturgis Motorcycle Rally in Sturgis, SD, an event that was decried as a potential superspreader event as well³. Although the rally took place outside, few attendants at the event followed COVID protocol—with mask wearing being virtually non-existent, and even

¹ Tuchscherer 2020

² Avril 2020

³ Dave 2020

reports of events like a “sneezing competition” at the rally⁴. In early September, as the presidential election approached, the Donald Trump campaign began hosting in-person rallies again across swing states. These have also been considered potential “superspreading events”, especially because some of them were indoors and adherence to COVID guidelines at these rallies was low⁵.

Now that these events are more than two weeks old, we can analyze the impact of these events using maps and other GIS techniques, and discover if these events did contribute to abnormally increased coronavirus cases in the community and nearby communities. This data may also test whether there are responsible ways to hold group events during a pandemic, and whether the COVID impact from different events varied between the type of event, whether factors like whether or not the event was indoors, or the prevalence of mask wearing, affected the event’s impact on COVID-19 in the surrounding area.

The technique used to analyze this data will be to test the change between COVID-19 cases in regions with large events and comparing it to the change of number of cases across other similar regions of the state. The scale of this study may be in the census tract level or county level, depending on the availability of data. Then, we can use QGIS and other tools to construct choropleth maps to visualize the difference between the case change in locations of the event versus similar counties or cities in the same state.

GIScience techniques will provide new insight into this problem because they can visually demonstrate the trends that we are looking at. Because the events we are looking at are specific and geographical, we can use upticks in cases to show the impact that the event had on coronavirus in the surrounding community. This would allow for cleaner presentation visually

⁴ Orecchio-Egresitz 2020

⁵ Zetino 2020

and allow the reader to more effectively see the mathematical trends and correlation that the data show.

Data and Methods

The primary data source for this analysis would be state boards of health websites, focusing on their distribution of raw coronavirus cases. I chose cases because they are less susceptible to statistical noise rather than deaths when broken down in small geographical subdivisions like census tracts, and because it could provide easier bounds for the time period of the event. The variable for study would be the percentage change in cases from around when the event took place until 3 weeks after, to account for a lag in people getting tested only after first showing symptoms for the disease. Focusing on the percentage increase in cases also meant that there was no need to normalize the case numbers by population, something that would be very difficult to obtain data by in some instances.

For ease of data collection, I selected three Trump rallies and two Black Lives Matter protests to study case growth over time. The three Trump rallies selected were the September 13 rally at Xtreme Manufacturing in Henderson, Nevada⁶, the September 18 rally at Bemidji Aviation Services in Bemidji, Minnesota⁷, and the October 17 rally at Southern Wisconsin Regional Airport in Janesville, Wisconsin⁸. Two of these were outdoor rallies at airports, while the Henderson rally was an indoor event that the Trump campaign was fined for breaking Nevada's rulings on indoor events⁹. The two Black Lives Matter protests selected were the Jacob

⁶ Ritter 2020

⁷ Scott 2020

⁸ Beck 2020

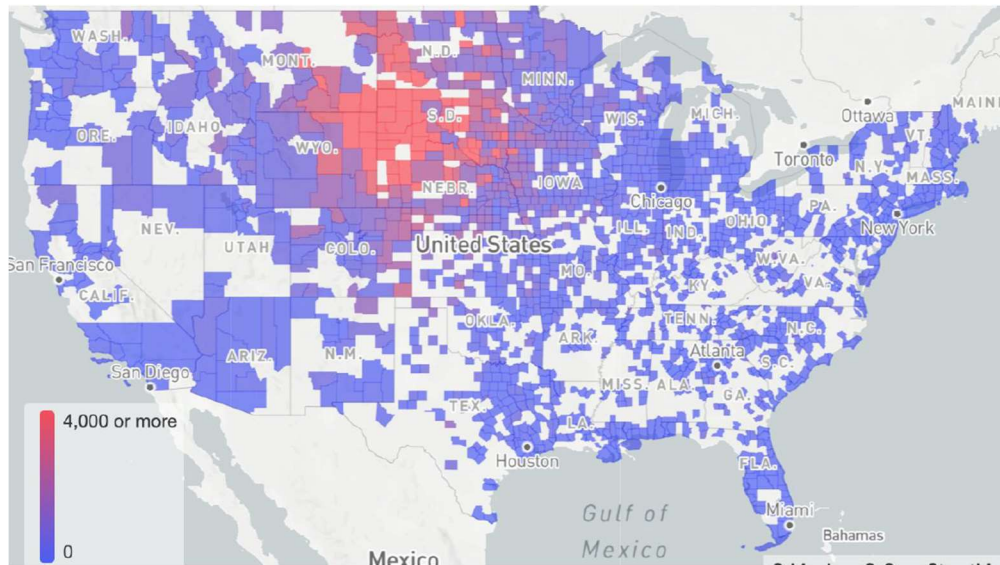
⁹ Ritter 2020

Blake protests in Kenosha, Wisconsin starting on August 23¹⁰, and the Chicago George Floyd protests, starting on May 28¹¹.

The quality of data for this study available on state Board of Health websites were of different qualities. I wanted to use data finer than the county level if possible, to capture finer trends, something that would be especially important with the Black Lives Matter protests in downtown Chicago. In Wisconsin, data was available for all census tracts for each day of the pandemic since April, making the Kenosha and Janesville data easy. In Minnesota and Illinois, the Department of Health website publishes a weekly report of COVID cases by ZIP code, but only has data for the last four weeks, so I had to use the Wayback Machine to get some of the COVID data around the Bemidji rally, and the George Floyd protests in Chicago. The Nevada data comes from the Southern Nevada Health District, again by ZIP code, but it includes only Clark County (Las Vegas) rather than the entire state. For the Sturgis rally, due to the wide range of attendants from all over the country, I used data from a *Washington Post* study of per capita attendance at the rally by county to compile an approximate list of the 115 counties with the highest attendance at the rally per capita. Since most of the counties with high Sturgis attendance were low-population rural counties, I decided to do the maps for the Sturgis rally only on the county level, as the data was easier to collect.

¹⁰ Vox Staff 2020

¹¹ Gerner 2020

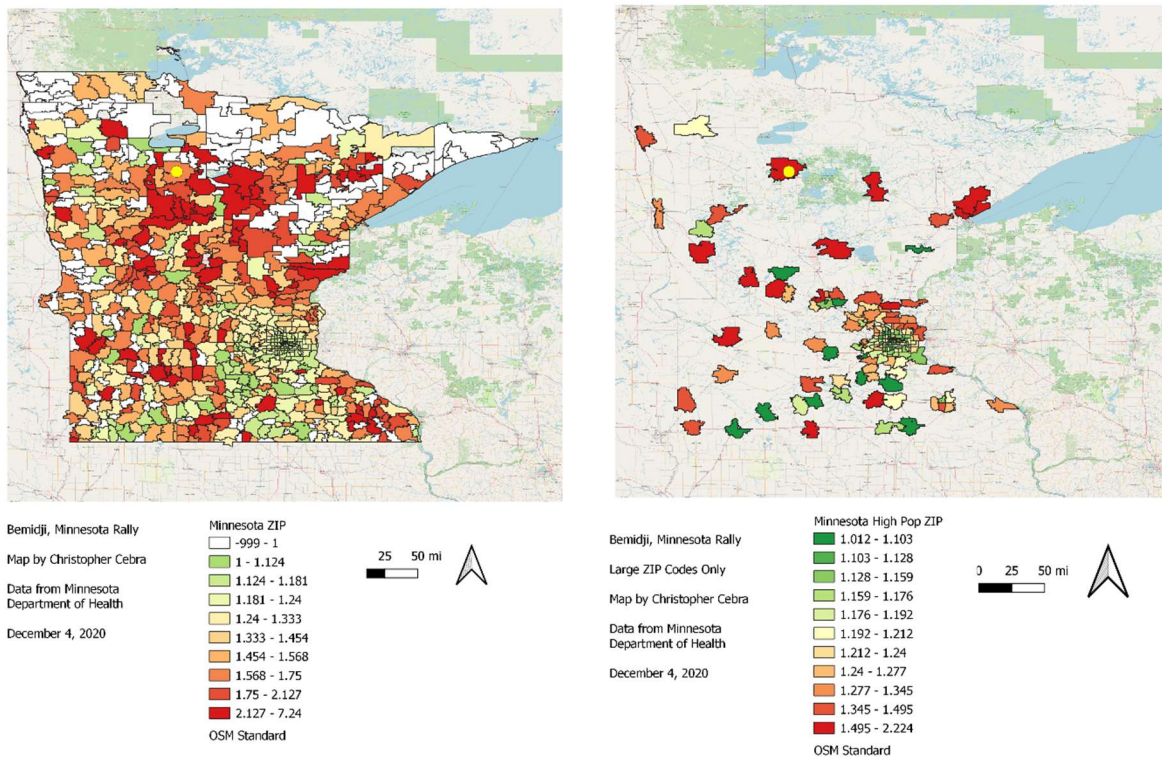


Picture 1- COVID Alliance report used to find counties with high attendance at Sturgis rally¹²

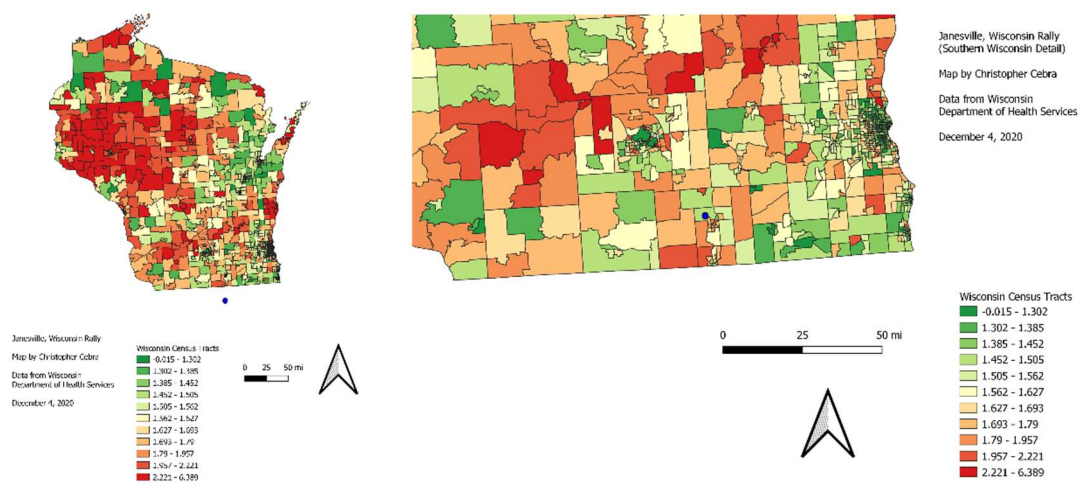
Once I obtained the data by census tract or ZIP code for the state, the procedure was fairly simple—compiling a CSV with the census tract or ZIP code ID and the percentage change in cases from the day of the event to 3 weeks after. In some states, they did not disclose case numbers between 1 and 4 in an area for privacy reasons, these were normalized to 4 cases when computing the percentage change. Then, the data was imported into QGIS as a vector layer, and joined with the county or census tract shapefiles. Case growth was plotted with a green-yellow-red gradient color scheme, with red indicating the highest growth in cases. Analysis focused on comparing the change in cases for areas around the rally to the entire state—usually there are comparable areas within the state that did not have an event at the same time.

Maps and Analysis

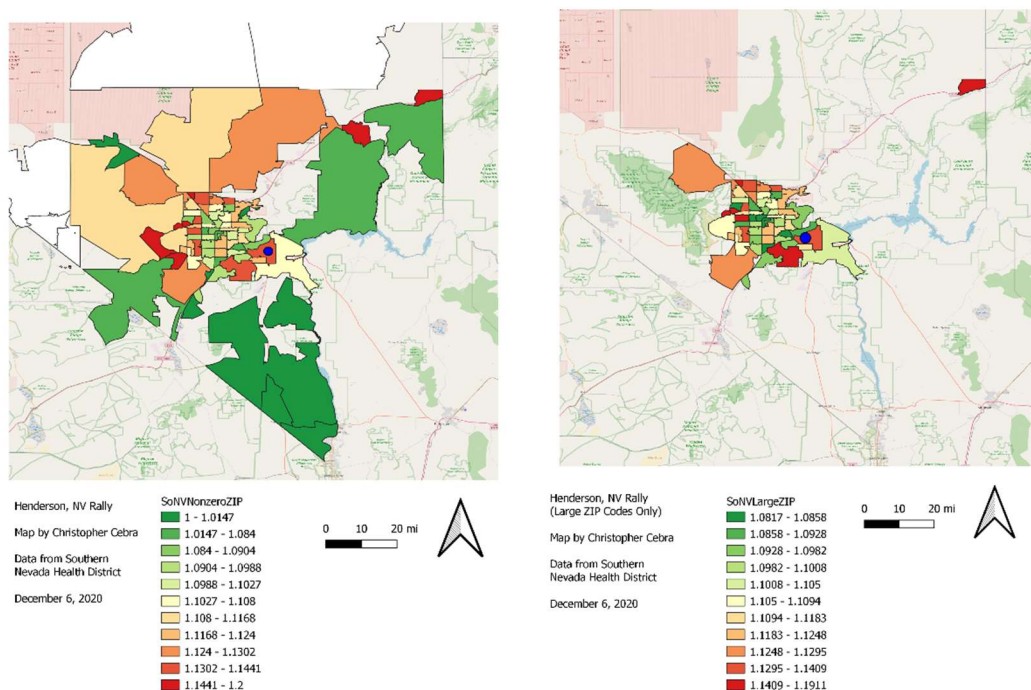
¹² COVID Alliance 2020



Map 1- Trump rally in Bemidji, MN—All ZIP codes on left, only ZIP codes with 80 or more cases at the time of the rally on the right, Bemidji’s location is shown with the yellow circle



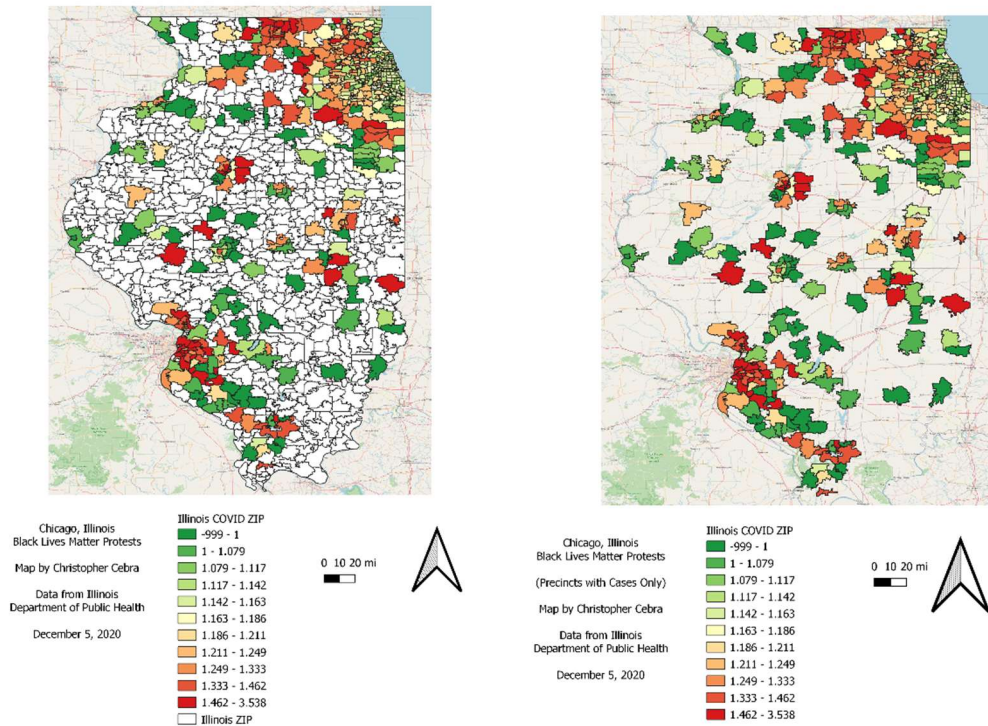
Map 2- Trump rally in Janesville, WI. Janesville is at location of the blue dot.



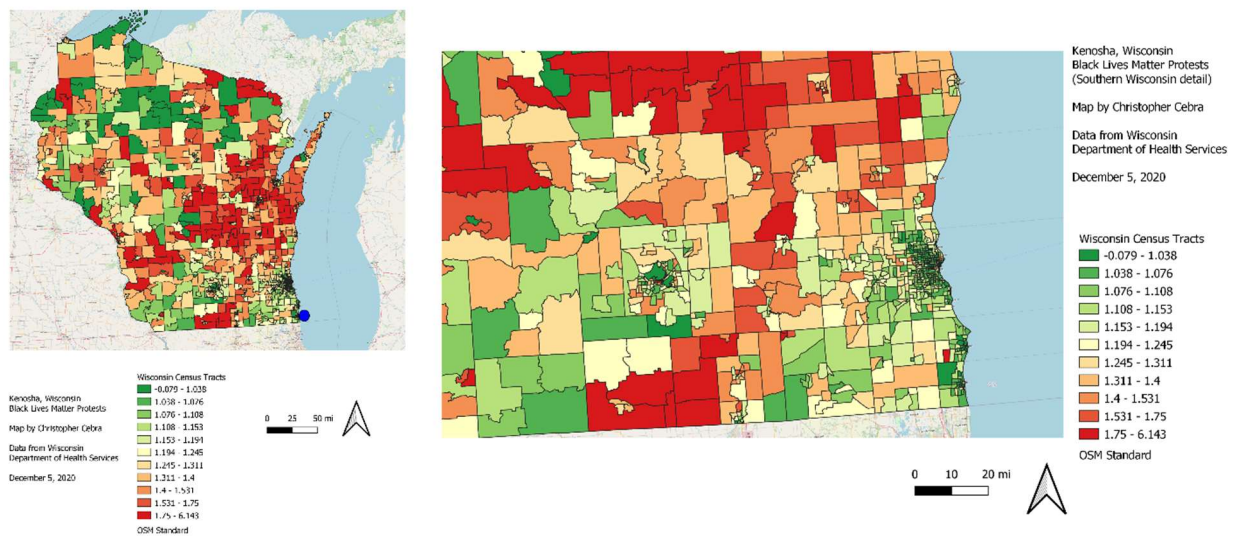
Map 3—Trump rally in Henderson, NV—All ZIP codes on the left, only ZIP codes with 80 or more cases at the time of the rally on the right, Henderson’s location shown with blue circle

The data from the Trump rallies presents a varied conclusion. In the Bemidji rally, the area immediately around the city seems to have had some of the highest increases in cases in the state, and, among high-population ZIP codes, the one containing Bemidji was in the top 10 percent. It seems clear here that either the rally was a superspreading event or that it took place at the same time as a stark increase in cases across northern Minnesota. The rallies in Janesville and Henderson, however, are less clear. Wisconsin’s highest case growth around the time of the Janesville rally appears to be located in the northwest portion of the state, hundreds of miles from the location of the rally. However, Janesville seems to have had above-average case growth for southern Wisconsin, and higher than neighboring Beloit (a college town), or Madison. In Henderson, the ZIP code containing the rally and another in south Henderson were two of the

highest case growths in the Las Vegas area, but others adjacent to the rally location were much lower.

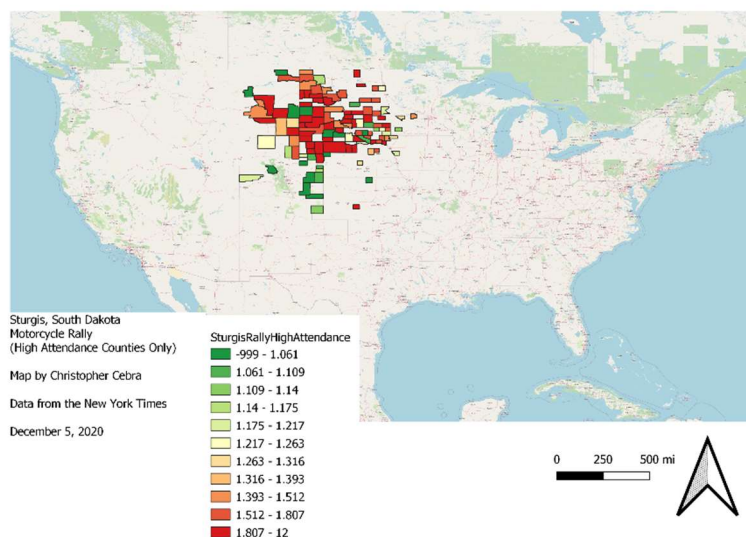
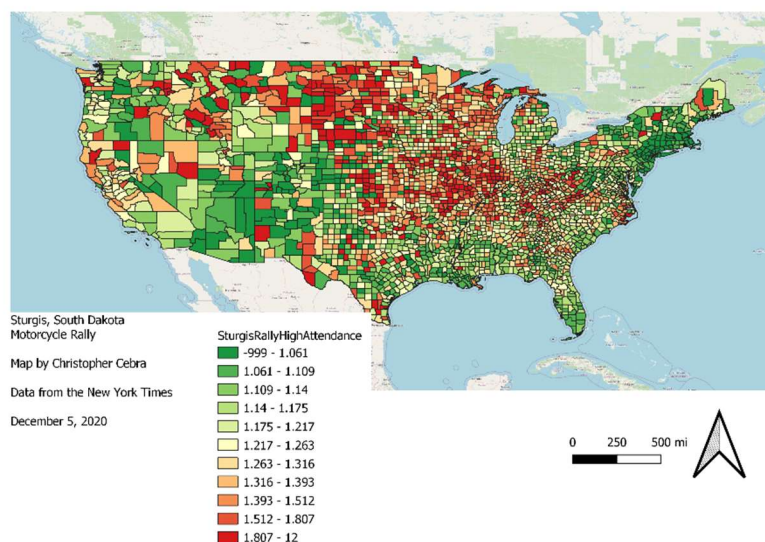


Map 4-George Floyd protests in Chicago, right map shows only ZIP codes with confirmed cases



Map 5-Jacob Blake protests in Kenosha (blue dot at far southeast corner of the state)

The data for the Black Lives Matter protests appears to be more clear-cut. In both the Kenosha and Chicago maps, the location of the protests appears to have a starkly lower case growth than the rest of the state. The census tracts including Kenosha's bright green color indicates that they had among the lowest percentage growth in COVID cases of anywhere in the state, while most of the ZIP codes in Chicago are in the 20th or 30th percentile. Perhaps the characteristics of these events—the fact that they were outdoors and the more widespread mask wearing—contributed to a lower risk of COVID transmission.



Map 6-Sturgis, SD motorcycle rally, second map contains only the counties found to have the highest attendance at the rally from the *Washington Post* data

Here the data is more clear-cut, and it looks to be fairly apparent that the Sturgis rally was a superspreading event. Nearly all of the counties that had the highest attendance at Sturgis were among the highest case growth in the country, including Sturgis itself. The Great Plains in general saw the fastest rise in COVID cases of anywhere in the country, likely buoyed by the 450,000-person event taking place in the heart of South Dakota at the time. The unique characteristics of the rally, with packed concerts, low levels of mask wearing and rumored events including “sneezing competitions” likely contributed to the dangerously high level of COVID spread there¹³.

Conclusion

It is difficult to draw sweeping conclusions from this data because of the nature of these rallies and events—as large draws for people, relying solely on geographical location of an event as opposed to location of attendants at an event can yield incomplete data. For example, a CDC report found that cases related to the Sturgis rally were found in 34 counties in Minnesota¹⁴, despite only three being “high attendance” counties from the *Washington Post* study. The Trump rallies and Black Lives Matter protests have no geographical breakdown for their attendance, meaning that it is impossible to focus on “high attendance” counties in this case. While attendance figures are available for the Sturgis rally, events like Trump’s event in Bemidji likely drew people from all /over northern Minnesota. However, it is likely that people that attended

¹³ Orecchio-Egresitz 2020

¹⁴ Stobbe 2020

rallies also spent some other time in the town, such as at stores or restaurants, so a high increase in cases at the location of an event is still informative.

Based on this data, it does seem that there are precautions people can take to avoid holding events that classify as “superspreader” events. Events outdoors and with high rates of mask wearing, like the Black Lives Matter protests in Kenosha and Chicago, seemed to have little to no impact on a rise in COVID cases in the surrounding area. Meanwhile, widespread disregard for the risks of coronavirus, like at the Sturgis rally, and to some extent at Trump rallies, seems to have been associated with a higher risk of an event becoming a “superspreader” event.

I think that the GIScience tools that we used over the course of the quarter certainly made this study easier. Being able to import and join data into QGIS enabled for exploring the impact of these events below the state and county level, allowing for picking apart the specific impact of the event. QGIS also made it easy to focus on a subset of the data, such as only ZIP codes that had high numbers of confirmed cases, or counties with high attendance at the Sturgis motorcycle rally, to draw more conclusions from the data.

Works Cited

Avril, Tom. 2020. "Will the protests cause a spike in COVID-19 cases? Wait two weeks." *The Philadelphia Inquirer*, May 31, 2020. <https://www.inquirer.com/health/coronavirus/coronavirus-covid19-protest-superspreader-outdoor-transmission-20200531.html>

Beck, Molly and Patrick Marley. 2020. "Trump tells thousands in Janesville that Wisconsin is key to winning 'the whole ball game'" *Milwaukee Journal-Sentinel*, October 17, 2020. <https://www.jsonline.com/story/news/politics/elections/2020/10/17/trump-holds-rally-in-janesville-as-cases-of-coronavirus-soar-in-wisconsin/3682015001/>

COVID Alliance. 2020. "2020 Sturgis Motorcycle Rally Analysis". *The Washington Post*, September 5, 2020. <https://context-cdn.washingtonpost.com/notes/prod/default/documents/8d39bf96-991e-4511-ad80-5770d4d4858d/note/fff0e200-c888-4f18-bcb4-13fafd400437>.

Dave, Dhaval, Andrew I. Friedson, Drew McNichols, and Joseph J. Sabia. 2020. "The Contagion Externality of a Superspreading Event: The Sturgis Motorcycle Rally and COVID-19". *Institute of Labor Economics Discussion Paper Series* 13670. <http://ftp.iza.org/dp13670.pdf>

Gorner, Jeremy, Madeline Buckley, and Paige Fry. 2020. "Mayor imposes curfew after chaotic scenes unfold in Loop, Near North Side as protesters clash with police during demonstration over death of George Floyd in Minneapolis". *Chicago Tribune*, May 31, 2020. <https://www.chicagotribune.com/news/breaking/ct-loop-protests-property-damage-20200530-ncvxjtwglnfoddlyj4yuhd6lwm-story.html>

Orecchio-Egresitz, Haven. "Sturgis motorcycle rally attendees lounge in bikinis, pack into bars, and mock mask wearers: 'It's like COVID does not exist here'" *Insider*, August 10, 2020. <https://www.insider.com/sturgis-motorcycle-rally-covid-19-attendees-pack-bars-2020-8>

Ritter, Ken. 2020. "Henderson fines Trump rally venue \$3,000 in coronavirus flap". *Las Vegas Sun*, September 14, 2020. <https://lasvegassun.com/news/2020/sep/14/henderson-fines-trump-rally-venue-3000-covid-flap/>

Scott, Paul John. 2020. "Health official not aware of any penalty for health violations by Trump Bemidji rally organizers." *Duluth News Tribune*, September 21, 2020.

<https://www.duluthnewstribune.com/newsmd/coronavirus/6671305-Health-official-not-aware-of-any-penalty-for-health-violations-by-Trump-Bemidji-rally-organizers>

Stobbe, Mike. 2020. "Study: Sturgis motorcycle rally sparked COVID cases in Minnesota." *Twin Cities Pioneer Press*, November 20, 2020. <https://www.twincities.com/2020/11/20/study-motorcycle-rally-sparked-covid-19-cases-in-next-state/>

Tuchscherer, Rebekah. 2020. "Boston superspreading event seeded thousands of COVID-19 cases." *Science*, August 26, 2020. <https://www.sciencemag.org/news/2020/08/boston-superspreading-event-seeded-thousands-covid-19-cases>

Vox Staff. 2020. "Protests in Kenosha and nationwide following Jacob Blake's shooting." *Vox*, August 26, 2020. <https://www.vox.com/2020/9/1/21409369/protests-kenosha-nationwide-jacob-blake-shooting>

Zetino, Griselda. 2020. "Valley doctor: Trump rallies could be COVID-19 'super spreader events'" *KTAR News*, October 20, 2020. <https://ktar.com/story/3638417/valley-doctor-trump-rallies-could-be-covid-19-super-spreader-events/>

<https://www.inquirer.com/health/coronavirus/coronavirus-covid19-protest-superspreader-outdoor-transmission-20200531.html>

Data Sources

"COVID-19 Data", *New York Times* (on Github). <https://github.com/nytimes/covid-19-data>

“COVID-19 Historical Data by Census Tract”, *Wisconsin Department of Health Services*.

<https://data.dhsgis.wi.gov/datasets/covid-19-historical-data-by-census-tract/data?orderBy=DATE&orderByAsc=false>

“COVID-19 Maps, Reports, and Trends”, *Southern Nevada Health District*.

<https://www.southernnevadahealthdistrict.org/covid-19-case-count-archive/>

“COVID-19 Statistics”, *Illinois Department of Public Health*.

<https://dph.illinois.gov/covid19/covid19-statistics> (and the Wayback Machine)

“COVID-19 Weekly Report”, *Minnesota Department of Health*.

<https://www.health.state.mn.us/diseases/coronavirus/stats/index.html#wmapcz1> (and the Wayback Machine)