Anushna Prakash
Professor McDonald
DATA 512 Human-Centered Data Science
14 December 2021

The Effects of the COVID-19 Pandemic on Mortality and Fertility in Orange County, CA

I. Introduction

It has been difficult to imagine what may have been on our collective minds had the COVID-19 pandemic not taken over our thoughts from the winter/spring of 2020 until now. Reactions across the globe have varied in many ways, as new data is collected and information is released. In particular, many found themselves with lockdown restrictions, or a reduced need to leave their homes due to remote working capabilities. In the U.S., many lost their jobs early on in the pandemic, or got pets, and perhaps were or knew people who were personally affected by the pandemic in their personal lives. As of the beginning of December 2021, the U.S. is approaching nearly 800,000 deaths from COVID-19.

At the same time, data about a situation such as this one has never been as available. As we slowly approach post-pandemic life, it is possible to ask and answer questions of how the pandemic affected different aspects of society. Instead of looking at national data, I zoom in to the Orange County, CA geography specifically, and analyze two aspects of the pandemic. First, I examine how mask mandates in this county may have affected the number of cases. Answering this question will provide more insight into the effectiveness of local masking policies on infection rates.

Second, I examine mortality and fertility in this county and the change over the pandemic. For mortality, I examine how all-cause mortality (excluding COVID-19) has changed, as well as accidents and suicides. For fertility, I examine how the total number of births has changed from pre-pandemic. Answering these questions will provide more insight into how the pandemic affected the kinds of deaths that occurred during the pandemic, if people being more cautious may have reduced the overall number of fatal accidents, or if the mental health crisis caused higher suicides than is typical, and how family planning strategies may have changed in response to this tumultuous time.

II. Background/Related Work

There has already been reputable research published with respect to mask efficacy. A paper published in The Lancet by Dr. Chu et al. shows that surgical and comparable cloth masks are effective in preventing the transmission of COVID-19, with 67% efficacy [1]. Mask usage in Orange county was found to be quite high, at 90% of residents wearing masks frequently or always, according to survey data collected by the New York Times [2]. Originally, COVID-19 cases spread quickly throughout the U.S. in major cities with large populations like New York and L.A. Though masks became overwhelmingly politicized in the U.S., there is evidence that cases and subsequent deaths could be prevented with high mask adoption, with one paper in Nature estimating that almost 130,000 additional lives could be saved by increasing mask adoption to 95% [3]. From this, I hypothesize that mask usage played a large role in preventing the spread of COVID-19 in Orange county.

At the same time, many lifestyle changes were being made to make risky behaviors such as interacting with others in close proximity less likely. Remote work became the norm for many office workers, which changed traffic patterns [4]. Because commuting to work by car is so common for Americans, I was curious as to how the pandemic may have prevented some deaths by reducing the need to travel, be on the road with other cars, in accident-causing situations. However, staying at home had a negative impact on many individuals' mental health. The nation's top physician Dr. Vivek H. Murthy noted that the pandemic intensified mental health issues that were already widespread by the spring of 2020, saying that "emergency room visits for suicide attempts rose 51 percent for adolescent girls in early 2021 as compared to the same period in 2019" [5]. It is clear with this background in mind that the pandemic had varying effects on people's health.

It was less clear what effect that the pandemic would have on fertility trends globally. The United Nations report on this topic showed that experts had varying opinions for what would happen in developing countries across the world, but expected that any disruptions due to the pandemic would right themselves by 2023 or 2025 [6]. It had this to say about fertility in the U.S.: "The total fertility rate in the United States of America continued to decline from a historic low of 1.7 births per woman in 2019 to 1.6 births per woman in 2020. It is expected that in the short term the United States will continue to observe declines in both the number of births as well as in total fertility levels." This leads me to believe that Orange county will have data to support this trend, and that births will have fallen in the pandemic.

III. Methodology

The first part of this analysis was conducted using daily COVID-19 cases in Orange County, CA from February 1, 2020 to October 15, 2021. The population count was assumed to be static and taken from the 2020 Census bureau count (3,186,989), and no change in population was assumed over the analysis period. In order to show the potential number of cases without masking mandates, I assumed the 67% efficacy rate as shown in The Lancet by Dr. Chu et al., calculating the estimated number of cases if there had been no mask mandate as 49.2% higher than the actual number of daily cases [1]. I smooth the figures by taking a seven-day rolling average to prevent numbers being affected by fewer tests being taken on weekends compared to weekdays.

The final computation that requires a number of assumptions is the calculation of the infection rate with and without the mask mandate. The infection rate is calculated as $infection\ rate_t = \frac{active\ cases_t}{population\ at\ risk_t}$, where t is each day and $population\ at\ risk_t = total\ population - \sum_{i=t-10}^{t} infections_i$, or the total population less the total number of infected individuals over the past 10 days. Deaths are not taken into account as lessening the population at risk. 10 days is assumed to assume that infected individuals are able to quarantine and prevent spread of the disease while quarantined, but not for the full CDC-recommended 14 days due to exposure prior to obtaining test results. These people are also not considered the population at risk because they are assumed to already be infected and unable to be reinfected within 10 days.

The second part of this analysis relies on daily death data by county obtained from Johns Hopkins, as well as the number of births and deaths by cause obtained from the California Health & Human Services (CHHS) department. For this, data was filtered down to just Orange county, total deaths not stratified by age or race, since the COVID-19 deaths data is not available with that stratification. Non-COVID deaths are simply the total deaths from CHHS less the COVID-19 deaths reported by Johns Hopkins, and accidents and suicides are the raw figures reported from CHHS. Births are similarly taken as total births without demographic stratification or method stratification. COVID-19 daily deaths are aggregated from daily to monthly to match the granularity from CHHS. Given that this is government-created and government sponsored data, I do not anticipate any serious ethical considerations when using this data. The data is HIPAA-compliant as it is de-identified, and the data is aggregated anyway which prevents my ability to identify specific individuals based on the content in the data. Since it is government data, I have confidence that it was obtained in a legal manner and that patients and hospitals understand that this data will be shared with the government and for public use.

Both non-COVID deaths and births are seasonally adjusted using simple multiplicative seasonal adjustment from Python statsmodel.tsa.seasonal_decompose method. Raw figures for births show that the number of births are highest in the late-summer early-fall time period, and deaths are highest in December and January (Figure 1). After seasonal adjustment, the monthly swings become smaller and long-term trends are easier to see, such as that births steadily declined leading up to the pandemic, and that deaths did not greatly increase over time (Figure 2). Accidents and suicides were not found to have a strong seasonal component (Figure 3).

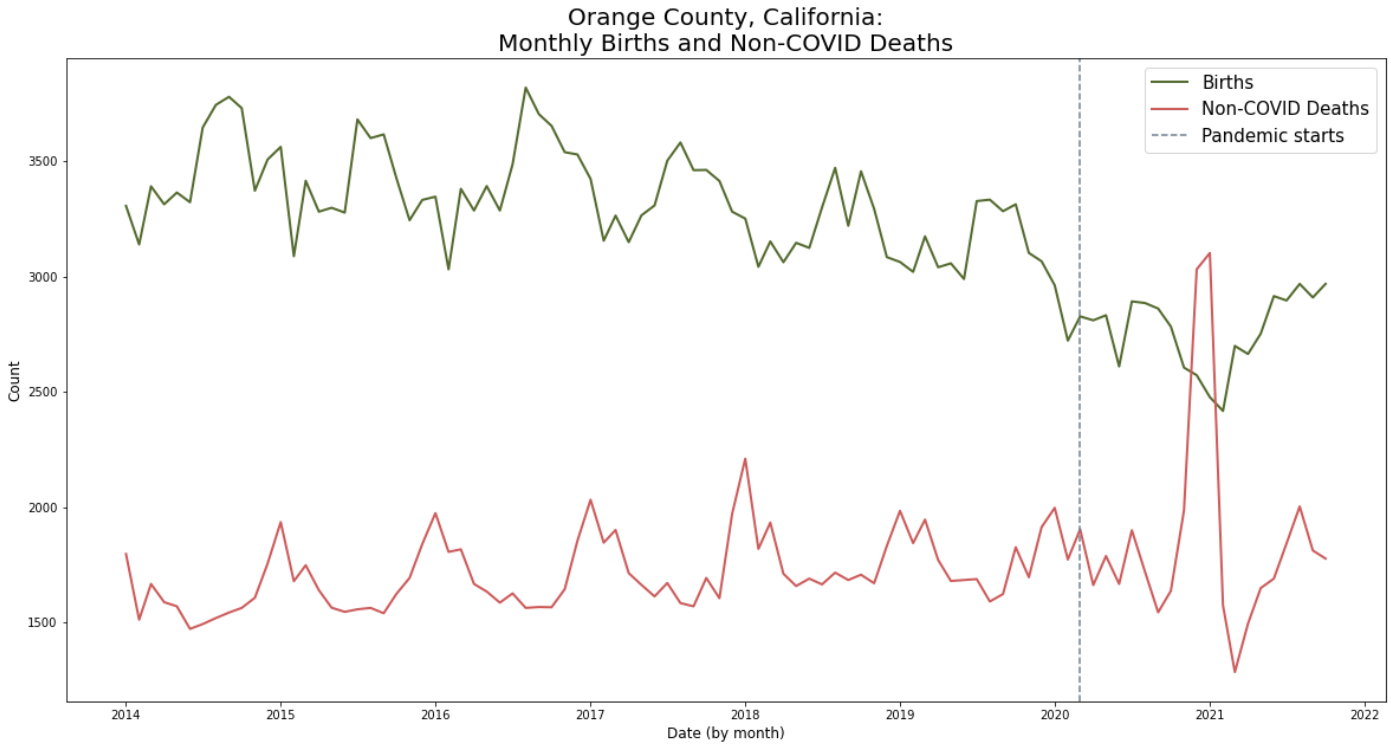

Figure 1: Raw births and deaths in Orange County

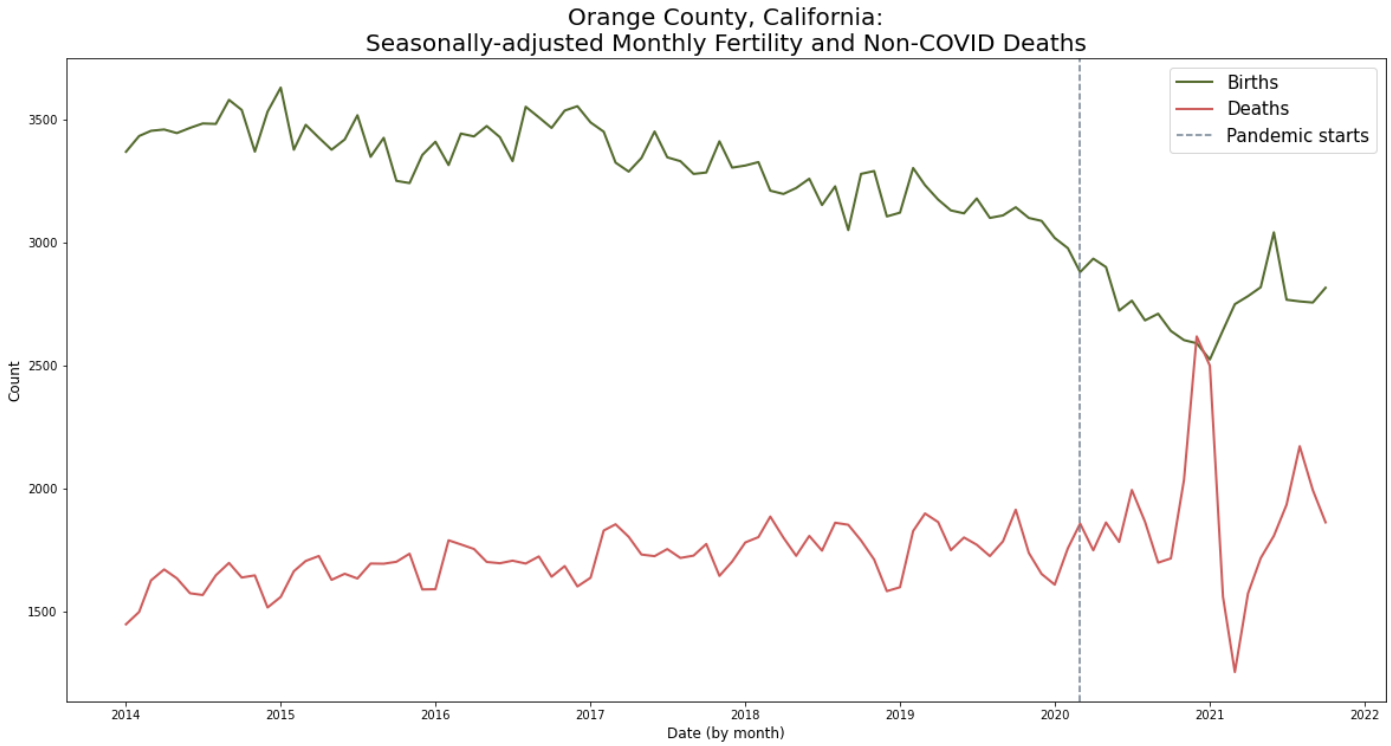

Figure 2: Seasonally-adjusted births and deaths in Orange County

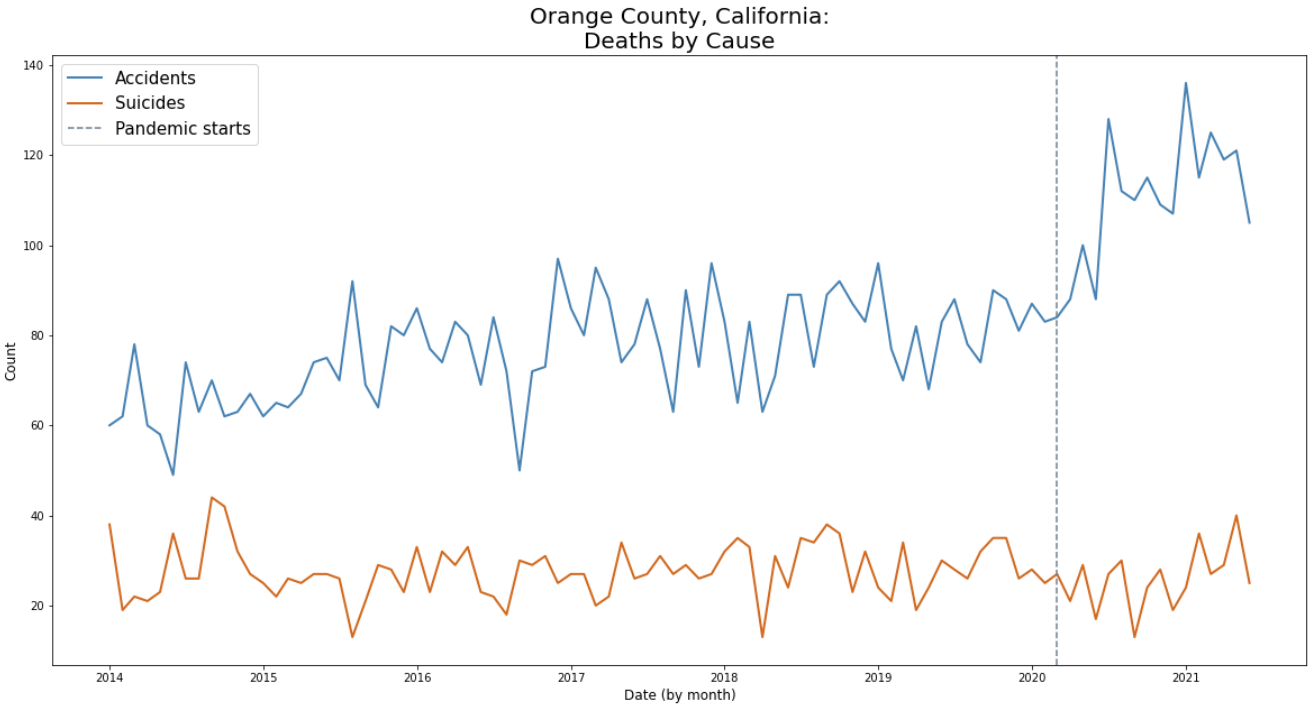

Figure 3: Raw Accidents and Suicides in Orange County

For statistical analysis, the boolean pandemic variable is set to begin in March 2020, since this is the first month that effets from the pandemic can be noticed for deaths. For births, the pandemic is assumed to start in January 2021, which allows for families to experience the pandemic and make family planning decisions that will be observed in the future. Two-sided unequal variance T-tests are conducted to compare average deaths and births during normal and pandemic years. I am using T-tests instead of a more complex model or machine learning method so that the results are straightforward to understand and can be shared widely, even amongst a lay audience. An alternative would be to linear regression or Poisson regression, however the coefficients in these models require more interpretation for a lay audience, particularly when there is a multivariate regression. In particular, the relative risk interpretation of Poisson regression coefficients can be complex to explain to a wide audience, so I favored the T-test which compares sample averages, a more widely-understood concept.

I hypothesize that the pandemic allowing people greater flexibility to work remotely reduced the number of accident-related deaths, but the mental anguish faced by many at the same time caused the number of suicides to increase. Despite the increase in pet adoptions at the beginning of the pandemic, I hypothesize that children are a different enough decision that families delayed their family planning and the number of overall births declined during the pandemic. Finally, I hypothesize that the overall number of non-COVID-related deaths did not change from pre-pandemic years due to the possibility of fewer accident-related deaths, yet higher deaths from long-term complications of COVID.

IV. Findings

The first part of the analysis, the visual component, shows the striking tale of the rise of COVID-19 cases shortly after the mask mandate in Orange County was enforced and what could have been if mask mandates had not been enforced. Notably, at the height of the pandemic in late winter of 2020, The peak of daily cases is on December 29, 2020, where the potential cases without a mask mandate is estimated to be over 2,500 infections higher without cloth mask usage (Figure 4). By translating this into a daily infection rate, we can see the trend play out a bit clearer, where smoothed infection rates assuming no mask mandate are higher than the infection rates were with a mask mandate

(Figure 5). At the peak of COVID-19 smoothed infection rates on 2021-01-08, the infection rate is estimated to be 0.18% unmasked, but is 0.12% with masks. These combined graphs show the potential reality in which masks are not enforced. Ultimately, this analysis is limited since it does not take into account COVID-19 deaths, new variants such as Delta that cropped up and different rates of spread, nor vaccinations.

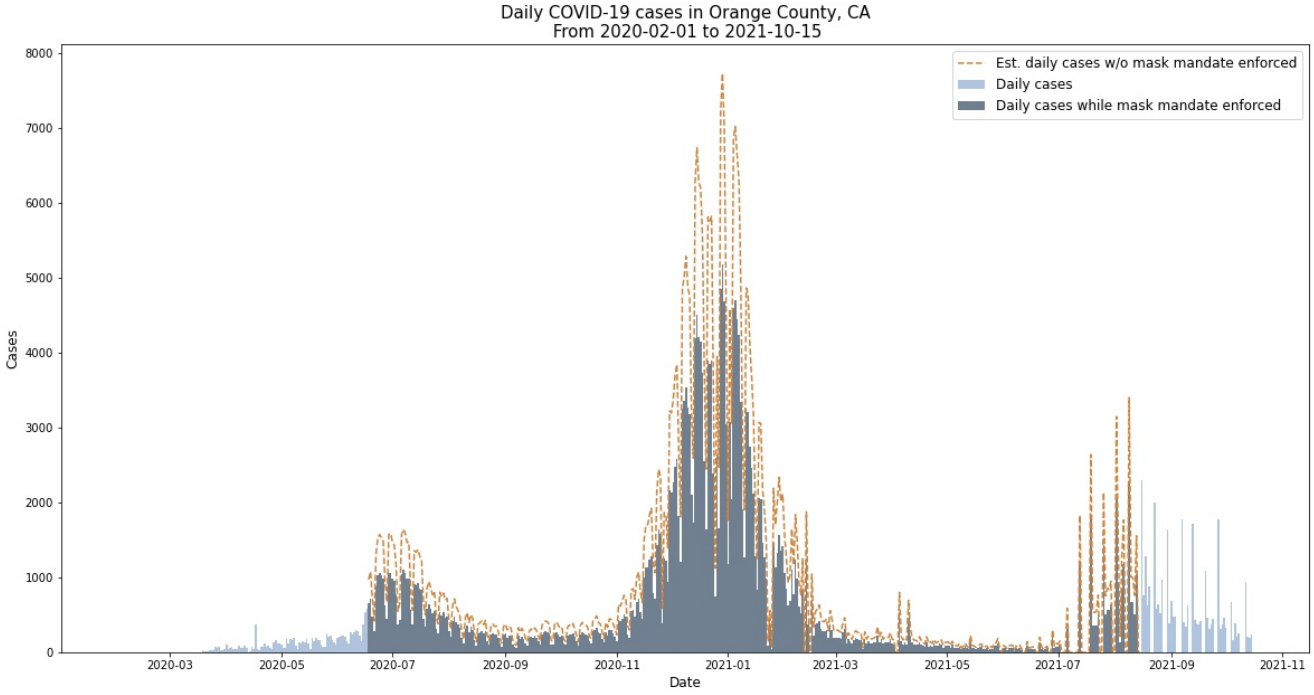

Figure 4: Daily COVID-19 Cases and Estimated Cases w/o mask mandate

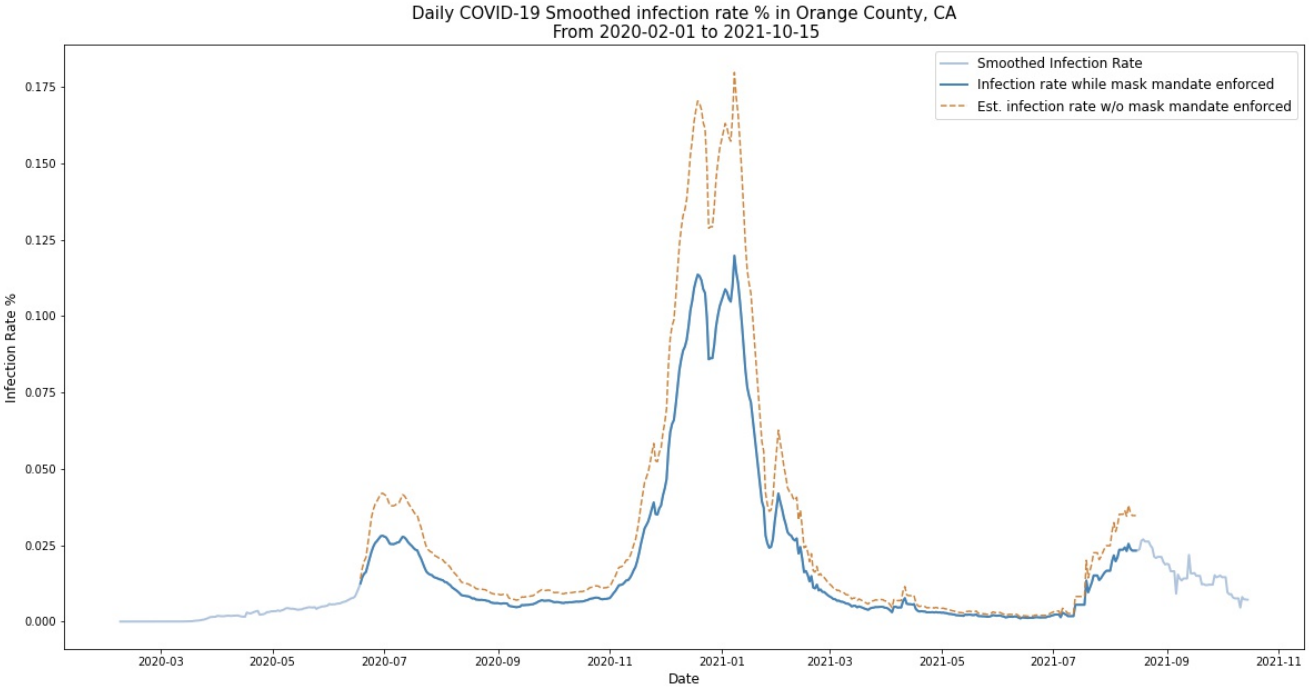

Figure 5: Daily COVID-19 Infection Rate and Estimated Rate w/o mask mandate

As for overall non-COVID deaths, the visuals tell a story that contradicts my hypothesis, which is further confirmed through two-sided unequal variance T-tests. First, overall deaths during the pandemic are found to be higher than pre-pandemic deaths in a statistically significant manner. Namely, deaths during the pandemic are almost 10% higher than pre-pandemic levels. There is more variance in the number of deaths during the pandemic and that deaths tend to spike when COVID cases also spiked during the holidays in 2020. This indicates that there may be an increase in accidents during the holidays.

Table 1: Non-COVID Deaths Unequal Variance T-Test Results

Variable	N	Mean	SD	SE	95% Conf. Interval	
Pre-Pandemic Deaths	74.0	1708.690196	95.794858	11.135926	1686.496327	1730.884064
Pandemic Deaths	20.0	1877.369508	305.572874	68.328172	1734.357001	2020.382016
combined	94.0	1744.579411	176.342637	18.188354	1708.460944	1780.697878

Accidents are up compared to pre-pandemic levels. Shockingly, accidents are up almost 45% during the pandemic, and the absolute value of the test statistic from this unequal variance T-test was over 8, indicating a large statistical difference. This was another surprising result since I hypothesized that fewer people being out due to remote work and reduced travel would yield fewer accidents.

Table 2: Accidental Deaths Unequal Variance T-Test Results

Variable	N	Mean	SD	SE	95% Conf. Interval	
Pre-Pandemic Accidents	74.0	76.310811	11.173508	1.298894	73.722119	78.899503
Pandemic Accidents	16.0	110.125000	14.741664	3.685416	102.269722	117.980278
combined	90.0	82.322222	17.551099	1.850048	78.646216	85.998229

The final hypothesis that proved to be incorrect, fortunately, was around suicides. There was not enough evidence from the T-tests to indicate that levels of suicide were higher during the pandemic compared to pre-pandemic. This was a result that I was satisfied did not support my hypothesis.

Table 3: Suicide-related Deaths Unequal Variance T-Test Results

Variable	N	Mean	SD	SE	95% Conf. Interval	
Pre-Pandemic Suicides	74.0	27.729730	5.954847	0.692237	26.350104	29.109356
Pandemic Suicides	16.0	26.000000	6.683313	1.670828	22.438714	29.561286
combined	90.0	27.422222	6.087338	0.641662	26.147254	28.697190

The only hypothesis that wound up having supporting evidence is around births. The overall number of births was shown to have declined in comparison to pre-pandemic births, by almost 15%. While the number of births overall in the U.S. have been declining in recent years, there is a statistically significant difference between the number of births in 2014-2020, compared to 2021 alone.

Table 4: Births Unequal Variance T-Test Results

Variable	N	Mean	SD	SE	95% Conf. Interval	
Pre-Pandemic Births	84.0	3262.390691	242.134339	26.419022	3209.844318	3314.937064
Pandemic Births	10.0	2765.599407	131.251388	41.505333	2671.707820	2859.490994
combined	94.0	3209.540555	278.759029	28.751798	3152.445181	3266.635928

V. Discussion/Implications

There are a number of reasons why there were unexpected results to the hypotheses put forth earlier. As for overall deaths, my primary suspicion is around the categorization of "COVID-related death" from Johns Hopkins, and from Orange county. It is likely that individuals who pass as a result of active COVID are counted as a COVID-related death, while an individual who recovers from COVID and later passes due to the many long-term side effects of the disease is not counted as a "COVID-related" death. In this sense, the true number of COVID-related deaths may be underrepresented in the data, which would also explain why the time series of non-COVID-related deaths and COVID deaths is so similar.

A possible explanation as to why Orange county experienced higher accidents during the pandemic could be due to more reckless behavior on the part of its residents. Auto-accidents specifically have seen an unprecedented rise in the U.S. during the pandemic, jumping almost 18% in just the first six months of 2021 according to an article in the LA Times [7]. Another explanation is that due to the higher number of hospital and ICU beds being taken up by COVID-19 patients, accidents have become deadlier. While media articles tend to promote the former as the reasoning, it would certainly not be the first time that prevailing media theories are incorrect. As for why suicides are unchanged, this was a pleasantly surprising result. It is possible that the COVID-19 pandemic, while leading to a mental health crisis for many people who became increasingly isolated and anxious, did not have a drastic effect on suicidal indivduals. Since this analysis is limited to just Orange county, it is difficult to say if there is something to be said about mental health access in Orange county, or just the sunny weather keeping peoples' spirits up, or that generally people in Orange county have higher income or socioeconomic status and were not as negatively affected by the pandemic as others. Comparison across the country to counties is necessary to understand the underlying cause. Ultimately, more research is needed to conclude which is the true cause for both accident- and suicide-related deaths.

As for fertility, it is not difficult to surmise why there would be fewer births in 2021 compared to the prior years. While pets are easy to acquire during the initial stages of loneliness in a pandemic, children are a larger responsibility to take on. Many people lost their jobs, and so that may have been a contributing factor to push off family planning, and many may simply felt too much uncertainty otherwise to feel comfortable having a baby. Whatever the reason, more time is necessary to understand if this is a temporary reaction to the pandemic as predicted by the United Nations [6] or if the pandemic simply marked an inflection point for overall births. In the case of the former, this could have great implications for the future of fertility in the U.S. if the pace of births continues to decline as it is.

VI. Limitations

Both analyses have many limitations. The analysis of mask mandates on limiting the spread of COVID-19 indicates that there could have been thousands more daily cases at the peak of spread in the winter. This is likely an overestimate because of the simplistic calculation and the fact that masks were likely not used indoors during family gatherings, so compliance was likely much likely. The introduction of vaccines after the holidays drastically changes the impact of masking on the infection rates in 2021 by making the virus harder to spread. However, if there had been no mask mandate being enforced at all whether in grocery stores or during travel, there would have been more cases. The question is more so to what extent.

The second major limitation of this analysis is the number of COVID-19 cases. The data relies on reported cases after being tested, so it is really the number of cases confirmed through tests. At the beginning of the pandemic there was a known testing shortage, so the true number of cases could be much higher. Since as many as 40% of all COVID-19 cases may be completely asymptomatic, throughout the pandemic the true number of confirmed cases is underrepresented [8]. Over time, the world becomes more complex in its responses to the pandemic and capturing those responses in real time in a fixed model is incredibly challenging, and something that epidemiologists spend much time studying.

Third, a major limitation in measuring responses to different kinds of deaths during the pandemic is challenging due to data interpretation issues. As mentioned in the prior section, the definition of a "COVID-related" death is crucial to understand, and can change the interpretation of the results. There may be individuals who recover from COVID-19 but suffer long-term effects of the disease that ultimately contribute to their passing. How that death is categorized will indubitably affect the estimate of non-COVID-related deaths for years to come after the pandemic has "ended".

One aspect of data that is not controlled for adequately is population. Given the monthly nature of the data, it was difficult to find accurate county-level monthly population statistics in order to control for population changes over time. The pandemic itself found a number of individuals moving out of cities, particularly amongst younger people. Without controlling for population, it's difficult to know if the

number of deaths, accidents and suicides is changing. These effects may be rolled into the death counts for another county.

Similarly, with the popularization of remote work, many families may have moved out of Orange county, a county with historically high living expenses, into cheaper areas in order to start families there [9]. So while the data indicates that births in Orange county are declining, that is not necessarily evidence that births are actually declining - it is simply evidence that births within Orange county are declining. Finally, because of the known trend of declining fertility in the U.S., using simple seasonal adjustment may not be adequate to know the true levels of births in Orange county. There are more complex methods of seasonal adjustment, but each have their own challenges and caveats. This paper used simple multiplicative seasonal adjustment which has both the benefit and detriment of simplicity.

VII. Conclusions

It can certainly be said that the pandemic has changed lifestyles around the world in a permanent way. Even as economies continue to reopen, it seems some behaviors are permanently changed. California is soon reinstating masking policies despite booster vaccine doses in light of rising cases and a new variant detected within the country. Despite prior research showing that masks are effective and that the mandates may have prevented great loss of life, the ever changing nature of the virus certainly raises some questions as to if mask effectiveness against it will change. For many, a new variant means further delayed plans to return to office, further time spent indoors potentially with worsening mental health, and fewer drivers on the road. While it seems that staying indoors did not seem to negatively impact the number of suicide-related deaths in Orange county, that is no excuse to reduce vigilance towards the people in our lives. More people staying indoors and off the roads is also certainly not an excuse to drive recklessly, and yet accident-related deaths are up much higher during the pandemic.

Nevertheless, one important understanding to come out of the analyses in this paper is that is difficult to make predictions about the future in such uncertain times. Our lives are forever changing, and only time will tell what good aspects about the pandemic such as remote work we choose to keep, and which ones such as reckless driving and fewer births can reverse for the better.

VIII. References

[1] Derek K Chu, Elie A Akl, Stephanie Duda, Karla Solo, Sally Yaacoub, Holger J Schünemann, Derek K Chu, Elie A Akl, Amena El-harakeh, Antonio Bognanni, Tamara Lotfi, Mark Loeb, Anisa Hajizadeh, Anna Bak, Ariel Izcovich, Carlos A Cuello-Garcia, Chen Chen, David J Harris, Ewa Borowiack, Fatimah Chamseddine, Finn Schünemann, Gian Paolo Morgano, Giovanna E U Muti Schünemann, Guang Chen, Hong Zhao, Ignacio Neumann, Jeffrey Chan, Joanne Khabsa, Layal Hneiny, Leila Harrison, Maureen Smith, Nesrine Rizk, Paolo Giorgi Rossi, Pierre AbiHanna, Rayane El-khoury, Rosa Stalteri, Tejan Baldeh, Thomas Piggott, Yuan Zhang, Zahra Saad, Assem Khamis, Marge Reinap, Stephanie Duda, Karla Solo, Sally Yaacoub, Holger J Schünemann,
Physical distancing, face masks, and eye protection to prevent person-to-person transmission of SARS-CoV-2 and COVID-19: a systematic review and meta-analysis,
The Lancet,
Volume 395, Issue 10242,
2020,
Pages 1973-1987,
ISSN 0140-6736,
https://doi.org/10.1016/S0140-6736(20)31142-9.

[2] Sarah Almukhtar, Aliza Aufrichtig, Anne Barnard, Matthew Bloch, Weiyi Cai, Julia Calderone, Keith Collins, Matthew Conlen, Lindsey Cook, Gabriel Gianordoli, Amy Harmon, Rich Harris, Adeel Hassan, Jon Huang, Danya Issawi, Danielle Ivory, K.K. Rebecca Lai, Alex Lemonides, Allison McCann, Richard A. Oppel Jr., Jugal K. Patel, Kirk Semple, Julie Walton Shaver, Anjali Singhvi, Charlie Smart, Mitch Smith, Albert Sun, Derek Watkins, Timothy Williams, Jin Wu and Karen Yourish. Reporting was

contributed by Jordan Allen, Jeff Arnold, Ian Austen, Mike Baker, Ellen Barry, Samone Blair, Nicholas Bogel-Burroughs, Aurelien Breeden, Elisha Brown, Emma Bubola, Maddie Burakoff, Alyssa Burr, Christopher Calabrese, Sarah Cahalan, Zak Cassel, Robert Chiarito, Izzy Colón, Matt Craig, Yves De Jesus, Brendon Derr, Brandon Dupré, Melissa Eddy, John Eligon, Timmy Facciola, Bianca Fortis, Matt Furber, Robert Gebeloff, Matthew Goldstein, Grace Gorenflo, Rebecca Griesbach, Benjamin Guggenheim, Barbara Harvey, Lauryn Higgins, Josh Holder, Jake Holland, Jon Huang, Anna Joyce, Ann Hinga Klein, Jacob LaGesse, Alex Lim, Alex Matthews, Patricia Mazzei, Jesse McKinley, Miles McKinley, K.B. Mensah, Sarah Mervosh, Jacob Meschke, Lauren Messman, Andrea Michelson, Jaylynn Moffat-Mowatt, Steven Moity, Paul Moon, Thomas Gibbons-Neff, Anahad O'Connor, Ashlyn O'Hara, Alice Park, Azi Paybarah, Elian Peltier, Sean Plambeck, Laney Pope, Elisabetta Povoledo, Cierra S. Queen, Savannah Redl, Scott Reinhard, Thomas Rivas, Frances Robles, Natasha Rodriguez, Jess Ruderman, Alison Saldanha, Kai Schultz, Alex Schwartz, Emily Schwing, Libby Seline, Sarena Snider, Brandon Thorp, Alex Traub, Maura Turcotte, Tracey Tully, Lisa Waananen Jones, Amy Schoenfeld Walker, Jeremy White, Kristine White, Bonnie G. Wong, Tiffany Wong, Sameer Yasir and John Yoon. Data acquisition and additional work contributed by Will Houp, Andrew Chavez, Michael Strickland, Tiff Fehr, Miles Watkins, Josh Williams, Shelly Seroussi, Rumsey Taylor, Nina Pavlich, Carmen Cincotti, Ben Smithgall, Andrew Fischer, Rachel Shorey, Blacki Migliozzi, Alastair Coote, Steven Speicher, Hugh Mandeville, Robin Berjon, Thu Trinh, Carolyn Price, James G. Robinson, Phil Wells, Yanxing Yang, Michael Beswetherick, Michael Robles, Nikhil Baradwaj, Ariana Giorgi, Bella Virgilio, Dylan Momplaisir, Avery Dews, Bea Malsky and Ilana Marcus.
Coronavirus (Covid-19) Data in the United States.
https://github.com/nytimes/covid-19-data

[3] IHME COVID-19 Forecasting Team. Modeling COVID-19 scenarios for the United States. Nat Med 27, 94–105 (2021). https://doi.org/10.1038/s41591-020-1132-9

[4] Jianhe Du, Hesham A. Rakha, Fethi Filali, Hoda Eldardiry,
COVID-19 pandemic impacts on traffic system delay, fuel consumption and emissions,
International Journal of Transportation Science and Technology,
Volume 10, Issue 2, 2021,
Pages 184-196,
ISSN 2046-0430,
https://doi.org/10.1016/j.ijtst.2020.11.003.

[5] Richtel, M. (2021, December 8). Surgeon General Warns of Youth Mental Health Crisis. *The New York Times*. https://www.nytimes.com/2021/12/07/science/pandemic-adolescents-depression-anxiety.html

[6] United Nations. (2021, August). *The impact of the COVID-19 pandemic on fertility*. UN Department of Economic and Social Affairs.
https://www.un.org/development/desa/pd/sites/www.un.org.development.desa.pd/files/files/documents/2021/Aug/undesa_pd_egm_feretility_2020_key_messages_23aug.2021.pdf

[7] Baumgaertner, E., & Mitchell, R. (2021, December 10). Why car crash deaths have surged during COVID-19 pandemic. *Los Angeles Times*.
https://www.latimes.com/world-nation/story/2021-12-08/traffic-deaths-surged-during-covid-19-pandemic-heres-why

[8] Gao W, Lv J, Pang Y, Li L. Role of asymptomatic and pre-symptomatic infections in covid-19 pandemic BMJ 2021; 375 :n2342 doi:10.1136/bmj.n2342

[9] Wu, Y., & Melgar, L. (2021, May 11). Americans Up and Moved During the Pandemic. Here's Where They Went. *WSJ*. https://www.wsj.com/articles/americans-up-and-moved-during-the-pandemic-heres-where-they-went-11620734566

IX. Data Sources

Johns Hopkins Daily COVID-19 Cases
https://www.kaggle.com/antgoldbloom/covid19-data-from-john-hopkins-university?select=RAW_us_confirmed_cases.csv
Johns Hopkins Daily COVID-19 Deaths
https://www.kaggle.com/antgoldbloom/covid19-data-from-john-hopkins-university?select=RAW_us_deaths.csv
California Health & Human Services Deaths 2014 - 2021 October by Occurrence and Cause
https://data.chhs.ca.gov/dataset/death-profiles-by-county/resource/2e546f88-bba8-4d77-846a-7fb77846cac6
California Health & Human Services Births 2014 - 2021 October by Occurrence and Method
https://data.chhs.ca.gov/dataset/live-birth-profiles-by-county/resource/94a186da-7184-427b-b0b5-224bb0a05cd8