Do Trump Voting Counties in North Carolina have more COVID-19 Deaths?

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Abstract

There exist significant differences between Democrats and Republicans in attitudes towards how we should handle the spread of COVID-19 in the United States. Democrats tend to favor policies that err on the side of caution and are much more worried about catching the virus, while Republicans tend to oppose strict measures to control the spread of the virus and are more relaxed. This study examines how those differences played out across North Carolina counties. The findings indicate that the greater the percentage of the vote Donald Trump received in a county, the higher the rate of COVID-19 mortality the county had. Differences in vaccination rates can explain most of this disparity.

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Introduction

Throughout the COVID-19 pandemic, there have been many different attitudes towards risk and personal behavior surrounding the virus. At the onset of the pandemic in March of 2020, there were only small differences in how much Republicans and Democrats paid attention to news surrounding the virus. A March 2020 survey conducted by the Pew Research Center found that 53% of Democrats and 48% of Republicans said they followed the outbreak "very closely." However, as time went on, fewer Republicans started following the outbreak "very closely"; in November 2020, just 28% of Republicans said they followed the outbreak very closely, while Democrats maintained nearly the same percentage of 48%. Furthermore, Republicans tended to view the threat of the virus as much less serious than Democrats as time grew and the virus had taken hold in the United States. For instance, in November 2020, 38% of Republicans said that the Centers for Disease Control and Prevention (CDC) "exaggerated risks" about the threat of the virus, while just 11% of Democrats did. This is even despite Republicans having more confidence in the CDC during the onset of the pandemic (Pew Research Center, 2021).

Republicans in general tended to view the threat of COVID-19 as less severe compared to Democrats. Another Pew Research Center Survey conducted in June of 2020 found that, between April and June of 2020, the gap between Democrats and Republicans who said that they were "very or somewhat" concerned with the prospect of being infected and hospitalized by COVID-19 grew from 15 percentage points to 29 percentage points. Similarly, the gap for being "very or somewhat" concerned that they might unknowingly spread COVID-19 to others widened from 16 percentage points to 32 percentage points (Pew Research Center, 2020a).

As one would expect, these beliefs had profound effects on behavior as well. For example, when asked about what made their lives difficult during the pandemic, Republicans were significantly more likely to say that "masks" or "mask-wearing" was a key factor (Van Kessel and Quinn, 2020). One study that attempted to persuade both Democrats and Republicans to comply with mask wearing found that "Republicans had significantly more negative attitudes toward masks, lower intentions to wear them, and were less likely to sign or share pledges on social media than Democrats." The authors found that this difference between the groups could be explained by Republicans viewing the threat of COVID-19 as less severe compared to Democrats (Gelfand et al., 2022). Another study found that Republicans were less likely than Democrats to engage in behavior that could potentially protect themselves from being infected with the virus, such as wearing a mask, avoiding public spaces or crowds, avoiding high-risk individuals, and canceling travel (Bruine de Bruin, Wändi, and Goldman, 2020). Along with this, residents in majority-Republican counties were less likely to "completely stay at home after a state order has been implemented relative to those in Democratic counties" (Painter and Qiu, 2021).

Because Republicans were less likely to view the threat of COVID-19 as severe compared to Democrats, they were less concerned about the prospect of "reopening" the country in May 2020, after 42 states[2] had issued stay-at-home orders in 2020 (*New York Times*, April 8, 2020). One survey found that while 88% of Democrats were concerned that their state might open too quickly, just 46% of Republicans said the same (Bruine de Bruin, Wändi, and Goldman, 2020). Republicans were also much more likely to support the reopening of schools for in-person education in Fall 2020 compared to Democrats. Researchers found that local partisanship and

[2] The states that the *Times* listed as not issuing stay-at-home orders were North Dakota, South Dakota, Nebraska, Iowa, and Arkansas, all of which had Republican governors during the onset of the pandemic.

strength of teachers unions were more important to the decision to reopen than COVID-19 severity was. Since Republicans were more likely to support in-person education in Fall 2020, those districts opened before districts in places with more Democrats (Grossman et al., 2021).

Background

From 2020 through 2022, North Carolina recorded 27,993 deaths where COVID-19 was the underlying cause of death (CDC WONDER).[3] The state fell below the U.S. average in death rate, with the U.S. average being 96.1/100,000 deaths per year and the North Carolina death rate being 87.4/100,000 per year. As one would expect, these deaths were not uniformly distributed across counties. Northampton County averaged over 200 deaths per 100,000 population over the period 2020-2022. Meanwhile, Orange County averaged just 30 per 100,000 population. The median North Carolina county averaged 120 deaths per 100,000 per year. Trump counties had an average of 122.377 deaths/100,000 per year, while Biden counties had an average of 99.664 deaths/100,000 per year. This difference is statistically significant in a two-tailed t-test ($t = 2.139$). However, these counties differ economically, demographically, and culturally, so it's important to see how various factors interact with higher or lower death rates and whether they can explain differences between Trump and Biden counties.

Methods

This study seeks to explain the extent to which partisan differences in county populations can explain differences in death rates across counties. I use R Statistical Software Version 4.2.1 to run correlation matrices, run linear regressions, calculate test-statistics, and check model assumptions.

[3] The CDC WONDER website lists deaths in 2022 as provisional.

I use the percentage of the population that voted for Donald Trump in 2020 as my target independent variable and median income, percentage of the population over the age of 65, population density, vaccination rate, and percentage of the population that is African-American as my confounding variables.

Median income is used as a control variable because the literature has identified that lower income people face barriers to social distancing, which increases the risk of infection and therefore death (Jay et al., 2020). The percentage of the population that is above the age of 65 is used because older individuals face a far greater risk of death following infection than those below age 65. Meta-analytic estimates find a mean infection fatality rate (IFR) of roughly 0.01% for 25 year-olds and 4.6% for 75 year-olds, a 460-fold difference (Levin et al., 2020). Population density is used because prior studies have found an association between population density and spread of COVID-19 (Sy et al., 2020, Bhadra et al., 2021). I use the percentage of the population that is fully vaccinated because studies have shown that vaccination reduces the risk of mortality following COVID-19 infection both at the individual and state level (Wu et al., 2022; Barro, 2022).[4] Lastly, I use the percentage of the population that is African-American because counties with higher percentages of the population that are African-American also had higher COVID-19 mortality rates (Yancy, 2020).

The data for the percentage of the population that voted for Trump comes from Politico. The data for percentage of the population that is fully vaccinated (at least 1 dose of the Johnson and Johnson vaccine and at least 2 doses of the Moderna or Pfizer-BioNTech vaccine) come

[4] Moreover, in the present study, the correlation between vaccination rates and death rates is strong and negative at -0.745 (t = -10.945).

from the Asheville Citizen Times. The rest of the variables come from the U.S. Bureau of the Census.

Table 1 shows the correlations between my independent variables and the percentage of the population that voted for Donald Trump in 2020. The data indicates that counties where a higher percentage of people that voted for Trump tend to be slightly poorer, have more elderly people, have less population density, have lower vaccination rates, and have a smaller African-American population.

I use an Ordinary Least Squares (OLS) regression model to estimate the relationship between the percentage of people who voted for Trump in a given county and the COVID-19 mortality rate. The equation is as follows:

$$Y_c = \beta_0 + \beta_1 X + \varepsilon_c$$

Y is the dependent variable, the average COVID-19 mortality rate in the years 2020 through 2022 in a given county, X is the vector of independent variables, and ε is the error term.

I present two models: one which uses vaccination rate as a control variable and one that does not. I use an OLS estimation for the model without the control for vaccination because there is no evidence of significant heteroskedasticity or multicollinearity present in the model.[5] However, the OLS estimation for the model that includes a control for vaccination rates shows evidence of significant heteroskedasticity ($p = 0.013$). To fix this, I use a Weighted Least Squares (WLS) regression model and give counties with lower variance more weight. This fixes things entirely, and there is no longer any evidence of significant heteroskedasticity in the model.[6]

[5] $p = 0.186$ on a Breush-Pagan test; no variables had a variance inflation factor (VIF) > 5.
[6] $p = 0.999$ on a Breush-Pagan test; no variables had a variance inflation factor (VIF) > 5; the residual standard error was 21.69 in the original OLS model and 1.3 in the WLS model.

Although there are 100 counties in North Carolina, I regress variables on death rates for 98 of them since the number of deaths for both Hyde and Tyrrell County are deemed "unreliable" in the CDC WONDER database due to their small size.

Results

The results from the OLS regression model (not controlling for county vaccination rates) show that a 1 percentage point increase in the percentage of people who voted for Trump in 2020 was associated with a 1.641/100,000 increase in the average COVID-19 mortality rate over the period 2020 through 2022. This effect is statistically significant at the 1% level.

The results from the WLS regression model, which controls for county vaccination rates, show that a 1 percentage point increase in the percentage of people who voted for Trump in 2020 was associated with a 0.534/100,000 increase in the average COVID-19 mortality rate over the period 2020 through 2022. However, this effect is not statistically significant at the conventional 5% level, and is barely statistically significant at the 10% level ($p = 0.096$).

These results imply that differences in vaccination rates can explain a large portion of the difference in COVID-19 mortality rates across counties that differ substantially in terms of partisanship.

Robustness Check

In this section, I offer a robustness check to the results in the previous section. Instead of looking at the Trump vote on a continuous scale, I create a dummy variable for counties with greater than 50% of the population voting for Trump in 2020. Similar to the previous section, I

use OLS estimates for the model with no control of the vaccination rate and WLS estimates for the model with a control for the vaccination rate.

The results from both regressions are shown in Tables 4 and 5. The results are somewhat similar to those in Tables 2 and 3. In Table 4, the results suggest that Trump counties, on average, had around 23.131 deaths per 100,000 per year compared to Biden counties. This result is significant at the 1% level. In Table 5, after I control for the vaccination rate, the effect size drops to 6.716 deaths per 100,000. This result is not statistically significant at any level of significance ($p = 0.325$).

I then use an alternative measure of economic standing in each county, the percentage of the population that lives below the federal poverty line, to see if results differ. The results from the OLS regression indicate that a 1 percentage point increase in the percentage of the population that voted for Trump is associated with an additional 2.14 COVID deaths per 100,000 population. However, this model is subject to heteroskedasticity, identified in a Breush-Pagan test and shown visually in Panel A of Figure 4 via a partial residual plot. To solve this problem, I log the dependent variable, deaths, which gets rid of the heteroskedasticity present in the original model. The results from this regression imply that a 1 percentage point increase in the population that voted for Trump is associated with a 2.5% increase in COVID deaths per capita. This regression is shown visually (Figure 4, Panel B) and in the regression table (Table 6).

Conclusion

This study sought out to test whether counties where a greater percentage of people voted for Trump had higher rates of COVID-19 mortality over the period 2020 through 2022. The results suggest that while Trump counties have more deaths per capita compared to Biden

counties, this disparity is mostly due to differences in vaccination rates. The percentage of the population that voted for Trump was moderately, negatively correlated with vaccination rates (Table 1), and thus is the main reason for why those counties experienced higher COVID-19 mortality.

References

Bruine de Bruin, Wändi, Htay-Wah Saw, and Dana P. Goldman. "Political polarization in US residents' COVID-19 risk perceptions, policy preferences, and protective behaviors." *Journal of risk and uncertainty* 61 (2020): 177-194.

Centers for Disease Control and Prevention (CDC). 2023. WONDER website at http://wonder.cdc.gov/mortSQL.html.

Gelfand, Michele, et al. "Persuading republicans and democrats to comply with mask wearing: An intervention tournament." *Journal of Experimental Social Psychology* 101 (2022): 104299.

Grossmann, Matt, et al. "All states close but red districts reopen: The politics of in-person schooling during the COVID-19 pandemic." *Educational Researcher* 50.9 (2021): 637-648.

Jay, Jonathan, et al. "Neighbourhood income and physical distancing during the COVID-19 pandemic in the United States." *Nature human behaviour* 4.12 (2020): 1294-1302.

Levin, Andrew T., et al. "Assessing the age specificity of infection fatality rates for COVID-19: systematic review, meta-analysis, and public policy implications." *European journal of epidemiology* 35.12 (2020): 1123-1138.

Painter, Marcus, and Tian Qiu. "Political beliefs affect compliance with government mandates." *Journal of Economic Behavior & Organization* 185 (2021): 688-701.

Pew Research Center. "Republicans, Democrats move even further apart in coronavirus concerns." *Pew Research Center* (2020).

_____. "Republicans' views on COVID-19 shifted over the course of 2020; Democrats' hardly budged." *Pew Research Center* (2021).

Sy, Karla Therese L., Laura F. White, and Brooke E. Nichols. "Population density and basic reproductive number of COVID-19 across United States counties." *PloS one* 16.4 (2021): e0249271.

Van Kessel, Patrick, and Dennis Quinn. "Both Republicans and Democrats cite masks as a negative effect of COVID-19, but for very different reasons." *Pew Research Center* (2020).

Wu, Nana, et al. "Long-term effectiveness of COVID-19 vaccines against infections, hospitalisations, and mortality in adults: findings from a rapid living systematic evidence

synthesis and meta-analysis up to December, 2022." *The Lancet Respiratory Medicine* 11.5 (2023): 439-452.

Yancy, Clyde W. "COVID-19 and African Americans." *JAMA* 323.19 (2020): 1891-1892.

Table 1

Correlation Matrix

Percentage Voted for Trump in 2020

Variable	Correlation Coefficient
Median Income	-0.097
Percentage Elderly	0.339***
Population Density	-0.423***
Vaccination Rate	-0.368***
Percentage Black	-0.694***

Notes:

Pearson correlation coefficients

***p < 0.01

Table 2

OLS Regression Estimates

COVID-19 Deaths per 100,000

Variable	Coefficient	Test Statistic
Percentage Trump	1.641***	5.328
Median Income	-0.002***	-6.040
Percentage Elderly	1.609**	2.586
Population Density	0.010	0.969
Percentage African-American	0.940***	3.577

Notes:

**p < 0.05, ***p < 0.01

DF = 92

Adj. R^2: 0.636

F-Statistic: 34.84

Table 3

WLS Regression Estimates

COVID-19 Deaths per 100,000

Variable	Coefficient	Test Statistic
Percentage Trump	0.534*	1.680
Median Income	-0.001***	-3.143
Percentage Elderly	2.370***	4.138
Population Density	0.011	1.382
Percentage African-American	0.314	1.259
Percentage Fully Vaccinated	-1.833***	-4.912

Notes:

*p < 0.1, **p < 0.05, ***p < 0.01

DF = 91

Adj. R^2: 0.734

F-Statistic: 45.54

Table 4

OLS Regression Estimates

COVID-19 Deaths per 100,000

Variable	Coefficient	Test Statistic
Trump Dummy	23.131***	2.716
Median Income	-0.002***	-6.770
Percentage Elderly	1.418**	2.074
Population Density	0.0003	0.0276
Percentage African-American	0.274	1.155

Notes:

*p < 0.1, **p < 0.05, ***p < 0.01

DF = 92

Adj. R^2: 0.559

F-Statistic: 25.55

Table 5

WLS Regression Estimates

COVID-19 Deaths per 100,000

Variable	Coefficient	Test Statistic
Trump Dummy	6.716	0.991
Median Income	-0.0009***	-2.809
Percentage Elderly	2.419***	4.257
Population Density	0.009	1.161
Percentage African-American	0.112	0.574
Percentage Fully Vaccinated	-2.005***	-6.759

Notes:

***$p < 0.01$

DF = 91

Adj. R^2: 0.757

F-Statistic: 51.32

Table 6

OLS Regression Estimates (Poverty instead of Median Income)

Log of COVID-19 Deaths per 100,000

Variable	Coefficient	Test Statistic
Percentage Trump	.0246***	9.066
Poverty	.0369***	5.512
Percentage Elderly	.0249***	4.635
Population Density	.0001	0.998
Percentage African-American	.0130***	5.544

Notes:

***p < 0.01

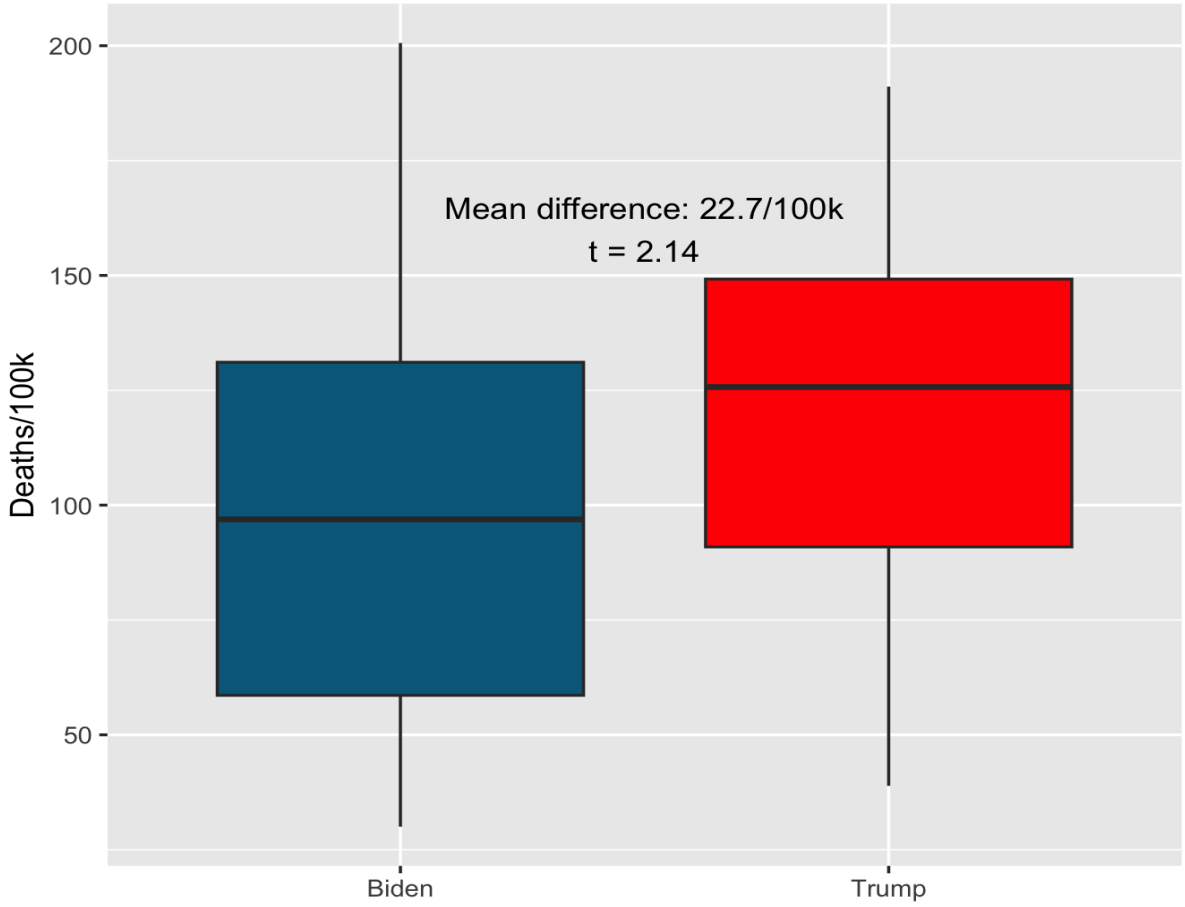
DF = 92

Adj. R^2: 0.698

F-Statistic: 45.73

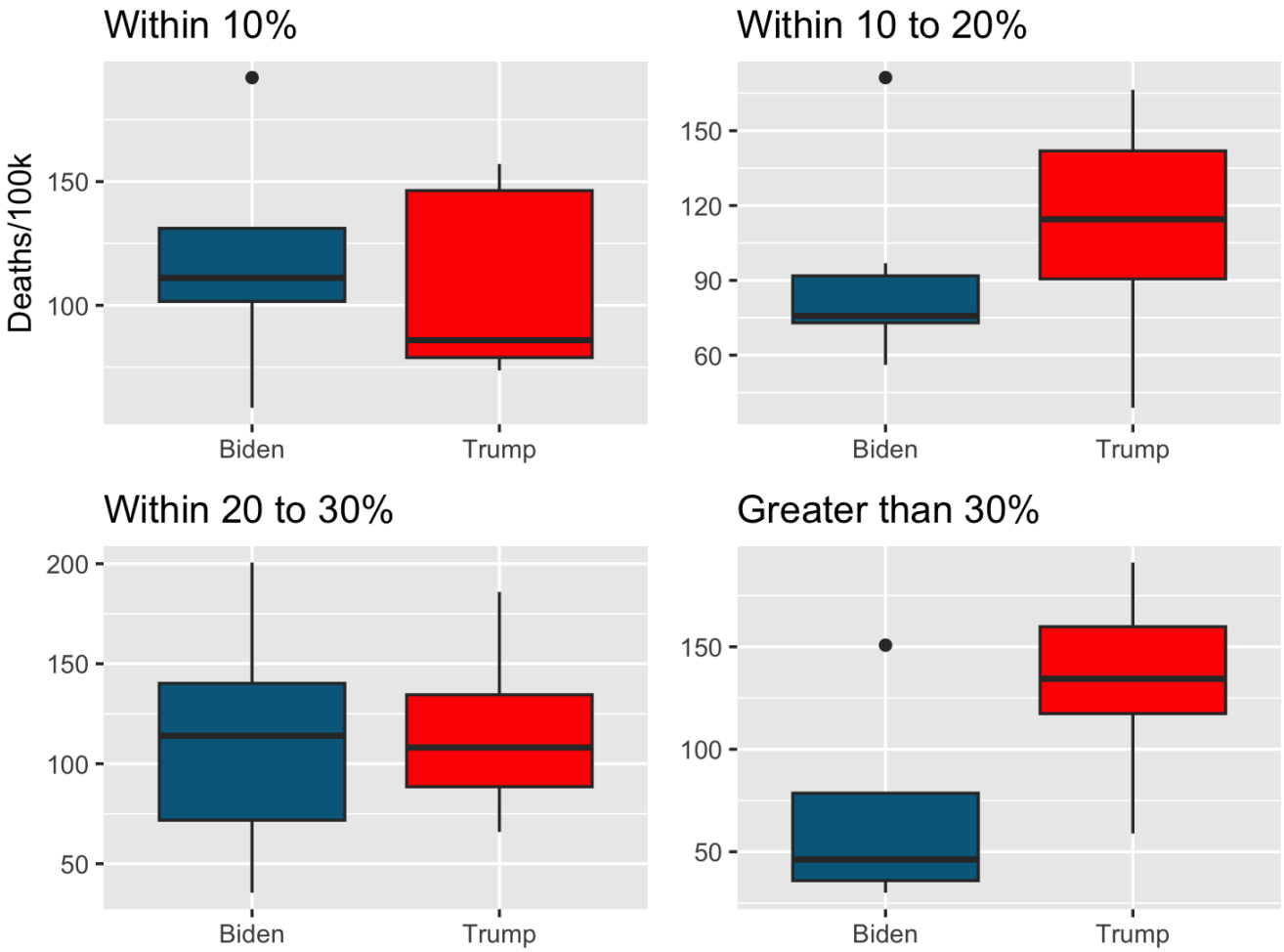
Figures

Figure 1: Boxplots of deaths in Trump and Biden Counties



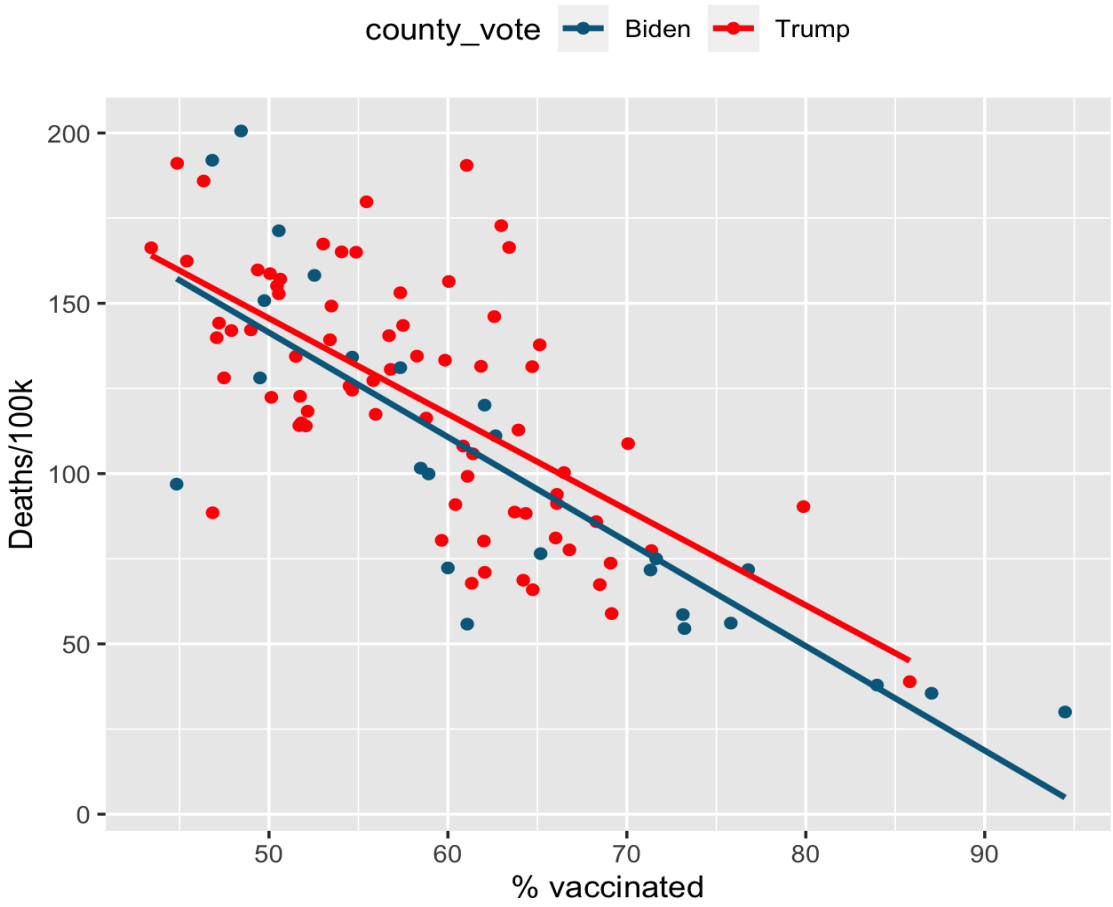
Note: A "Biden" county is defined as less than 50% of the population of that county voting for Joe Biden. T-test for a difference in means is performed.

Figure 2: Difference in deaths in Trump and Biden counties by margin of vote



Note: "Within x%" denotes the margin of vote won by either candidate in a given county. For example, if candidate A won 54% of the vote in a particular county and candidate B won 46%, the margin would be 8%, and thus would be placed in the "Within 10%" subset of counties.

Figure 3: Vaccination rates and death rates by county partisanship

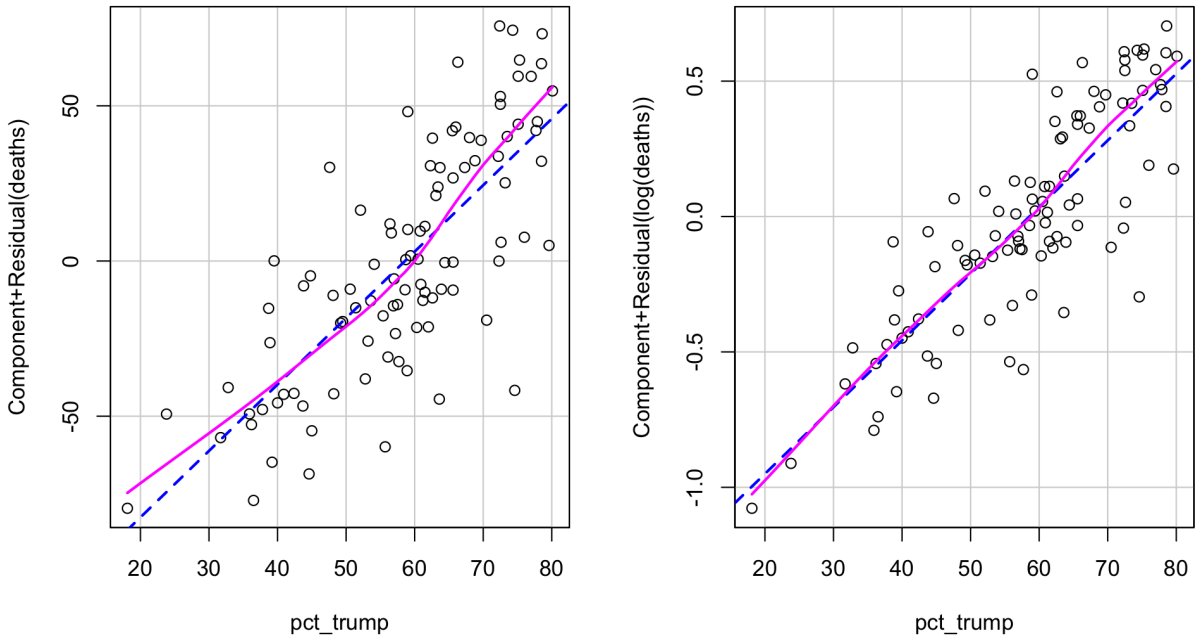


Note: The effects of vaccination on death are virtually the same in Trump counties as they are in Biden counties.

Figure 4: Partial Residual Plots for the Regression in Table 6

Panel:

(A) (B)



Note: These plots show the departures from linearity in each model for the variable "pct_trump". As one can see in panel (B), there is a lot less departure from the pink line to the dotted blue line compared to the model in panel (A). The model in (A) shows significant heteroskedasticity (p = .0174), whereas the model in (B) does not (p = .0935) .