**Discussion**

*National Trends from Election Results*

From our preliminary analysis of the 2012–2016 election data, we observed several key trends in the political landscape across U.S. counties:

1. Republican Dominance: More counties have the Republican Party as the majority party compared to those with a Democratic majority. As shown in Figure 1, Republican-leaning counties dominate the U.S. geography, particularly in the Midwest and South. This trend is consistent with historical voting patterns, where these regions have traditionally favored the Republican Party.
2. Strong Republican Support: In addition to a larger number of Republican-majority counties, there is a higher concentration of counties with strong Republican support compared to Democratic counties, which tend to be more evenly split or less firmly aligned with the Democratic Party.
3. Shift Toward Republicanism: Comparing the 2012 and 2016 data, we observed that the proportion of Democratic-leaning counties decreased. This suggests a general shift towards the Republican Party across more counties over the four-year period.

There are regional factors that may explain these trends. The Midwest and South have long been strongholds for the Republican Party. Changes in economic conditions, cultural shifts, or issues like immigration and healthcare may have further entrenched this political divide. Areas that experienced economic hardship, such as the decline of manufacturing in certain regions, might have shifted politically towards the Republican Party due to its promises of job creation and protectionism. Furthermore, there could be a broader realignment of voters based on issues like race, education, and income, which have become more pronounced in recent elections. These trends align with findings from other studies that suggest a growing rural-urban divide, where rural areas have increasingly supported Republicans, while urban areas have leaned Democratic.

*Health Metrics and Election Results*

We examined several key health metrics at the county level to explore whether they correlate with political views. The health metrics analyzed include the number of physicians, premature death rates, preventable hospital stays, and flu vaccination rates. Initial analysis revealed no definitive relationship between the health metrics (physicians, premature death, preventable hospital stays, and flu vaccinations) and the political outcomes across all counties. This suggests that these health metrics alone do not directly predict political behavior at the county level. A plot comparing premature death and preventable hospital stays showed a positive relationship, meaning that counties with higher rates of premature death also tended to have higher rates of preventable hospital stays (Figure 2). This could indicate that areas with poor health outcomes face systemic issues related to healthcare access or quality.

When examining health metrics by political party, we found that counties with more physicians tended to lean Republican (Figure 3). This may seem counterintuitive at first, but it could be explained by the fact that counties with more physicians might also have wealthier or more urban populations, which tend to lean Republican. Similarly, counties with higher rates of premature death also tended to have a stronger Republican vote share. This might be linked to regions facing economic hardship or healthcare challenges, which often vote Republican in search of policies to address these issues.

*Regression Analysis*

To better understand the relationships between health metrics and political preferences, we conducted a regression analysis using covariates such as premature death, number of physicians, preventable hospital stays, and flu vaccinations to predict the percentage of Republican votes in each county (Table 1).

* Premature Death: For every 1 standard deviation increase in premature deaths, the Republican vote share increased by 0.025% (p < 0.005). Counties with higher premature death rates might face higher levels of economic distress, which could drive voters to support the Republican Party in hopes of economic recovery and healthcare reforms.
* Number of Physicians: For every 1 standard deviation increase in the number of physicians, the Republican vote share increased by 0.078% (p < 0.005). Wealthier, more urban counties with better healthcare access (i.e., more physicians) may lean Republican due to broader political and socioeconomic factors in these areas.
* Flu Vaccinations: Interestingly, for every 1 standard deviation increase in flu vaccinations, the Republican vote share decreased by 0.016% (p < 0.005). The negative correlation between flu vaccinations and Republican vote share may reflect demographic differences, where counties with higher vaccination rates could be more urban and liberal-leaning, or it could reflect regional differences in attitudes towards healthcare policies.

To assess the overall strength of the correlation, we calculated the regression coefficients for the percentage of Republican votes in counties. The overall U.S. dataset had an R-squared value of 0.125, indicating significant variation in the data (Table 2). This suggests that while health metrics have some impact, they do not fully explain the variation in voting behavior. When we stratified the data by election years (2012 and 2016), we found that the variations remained large, suggesting that the relationship between health metrics and political views is not constant over time. Focusing specifically on New York counties, we observed a higher R-squared value of 0.387. This indicates that there is less variation in the data for New York counties compared to the overall U.S. dataset. This was expected, as New York has a more homogenous population with fewer extreme rural-urban divides than the national data, leading to a stronger correlation between health outcomes and voting behavior.

A map of the united states

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Figure 1. National trends of political party affiliations by county from 2012 to 2016.

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Figure 2.

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Figure 3.

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Table 1. Regression

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Table 2. Correlation Coefficients

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