Project Proposal

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Load Packages

Load Data

Introduction and Data, including Research Questions

We are choosing to study a data set about Measles Vaccination rates in schools across the country. This data set pulls from 46,412 schools across 32 states in the years of 2017-2019. The data comes from a Wall Street Journal article published in October 2019 called "What's the Measles Vaccination Rate at Your Child's School?". The article discusses how increasing rates of unvaccinated people caused a high number of measles cases in the beginning of 2019. The Wall Street Journal compiled the data by reaching out to state health departments for kindergarten rates for individual schools across the country. Thus, our overarching research question is: How do measles vaccination rates vary across the country and different types of schools?

To answer this question, we will examine trends between state and type of school and the school's overall vaccination rate. Additionally, we will look at the reasons why students are exempted from being vaccinated, such as religious, medical or personal reasons, and determine if there are any trends between reason and geographic location or type of school. For our analysis, we will mostly be using the variables state, type of school, vaccination rate, percentage of students with religious exemptions, percentage with personal exemptions, and percentage with medical exemptions. Since this data is a pre-COVID demonstration of vaccination rates, we can use it to help us tackle the current problem of COVID-19 vaccination. We can look at the vaccination trends of measles to target the geographic areas and types of schools which are less likely to be vaccinated. Furthermore, the rates of different measles vaccine exemptions can shed light on the reasoning behind lagging Covid-19 vaccination rates. We hypothesize that there will be a lower vaccination rate in private and religious schools rather than other types of schools. We also hypothesize that religious schools will rely on religious exemptions more than other types of schools.

Glimpse

```
## Rows: 66,113
## Columns: 16
## $ index    <dbl> 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 10, 11, 12, 13, 14, 15, 15, 16~
## $ state    <chr> "Arizona", "Arizona", "Arizona", "Arizona", "Arizona", "Arizo~
## $ year     <chr> "2018-19", "2018-19", "2018-19", "2018-19", "2018-19", "2018-~
## $ name     <chr> "A J Mitchell Elementary", "Academy Del Sol", "Academy Del So~
## $ type     <chr> "Public", "Charter", "Charter", "Charter", "Charter", "Public~
## $ city     <chr> "Nogales", "Tucson", "Tucson", "Phoenix", "Phoenix", "Phoenix~
## $ county   <chr> "Santa Cruz", "Pima", "Pima", "Maricopa", "Maricopa", "Marico~
## $ district <lgl> NA, NA, NA, NA, NA, NA, NA, NA, NA, NA, NA, NA, NA, NA, NA, N~
## $ enroll   <dbl> 51, 22, 85, 60, 43, 36, 24, 22, 26, 78, 78, 35, 54, 54, 34, 5~
```

```
## $ mmr     <dbl> 100, 100, 100, 100, 100, 100, 100, 100, 100, 100, 100, 100, 1~
## $ overall <dbl> -1, -1, -1, -1, -1, -1, -1, -1, -1, -1, -1, -1, -1, -1, -1, -~
## $ xrel    <lgl> NA, NA, NA, NA, NA, NA, NA, NA, NA, NA, NA, NA, NA, NA, NA, N~
## $ xmed    <dbl> NA, NA, NA, NA, 2.33, NA, NA, NA, NA, NA, NA, 2.86, NA, 7.41,~
## $ xper    <dbl> NA, NA, NA, NA, 2.33, NA, 4.17, NA, NA, NA, NA, NA, NA, NA, N~
## $ lat     <dbl> 31.34782, 32.22192, 32.13049, 33.48545, 33.49562, 33.43532, 3~
## $ lng     <dbl> -110.9380, -110.8961, -111.1170, -112.1306, -112.2247, -112.1~
```

Data Analysis Plan

Overall, our data analysis will seek to answer how vaccination rates and exemptions vary across states and the type of school. To accomplish this, we will examine the relationship between several variable pairs: overall vaccination status vs. state, overall vaccination status vs. type of school, each type of exemption (personal, religious, and medical) vs. state, and each type of exemption vs. type of school. To analyze vaccination and exemption rates by states, we will use spatial data to show the change in these rates across the country. Then, we can use two-sample t-tests to test for significance of vaccination and exemption rates between different types of schools. If there are significantly lower vaccination rates in private schools vs. other types of schools, this will support our main hypothesis.

A preliminary look at the data shows us that private and charter schools tend to have lower rates of vaccination against measles than other types of schools. Our t-tests will inform us whether this difference is statistically significant. In terms of exemptions, although they make up a very small portion of exemptions across all schools, religious exemptions tend to be higher at private schools and schools that don't fall under a category. We can conduct further two-sample t-tests to test whether this difference is significant as well.

Measles Vaccination Rates Across Different School Types

Religious Exemption Rates Across Different School Types