

# STAT 3494W Proposal

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November 7, 2022

## Introduction

I will be researching the effects of the Covid-19 pandemic on influenza vaccination rates within the United States. This topic is important because research has shown that "Vaccinated patients testing positive for COVID-19 were less likely to require hospitalization (odds ratio, 0.58, 95% CI 0.46-0.73;  $P < .001$ ), or mechanical ventilation (odds ratio, 0.45, 95% CI 0.27-0.78;  $P = .004$ ) and had a shorter hospital length of stay (risk ratio, 0.76, 95% CI 0.65-0.89;  $P < .001$ )" (Conlon et al., 2021). Thus, by determining if there are decreases in vaccination rates, medical and public health professionals may be able to implement strategies for increasing the rate, so that there is less severity in covid infections. However, there has only been one study that has calculated the difference in influenza vaccination proportions prior to and after the pandemic and it only focuses on a state level (Leuchter et al., 2022). Other studies focus on how the attitudes towards receiving the vaccine have changed, if the COVID-19 pandemic was an incentive for the influenza vaccine, and how the pandemic has shifted parents' intentions to vaccinate their children. As a result, I would like to analyze the proportions on an age and race basis to determine if there are any discrepancies.

## Specific Aims

I hypothesize that the influenza rates among children ages 6+ months-17 years, adults ages 18-64 years, and the elderly ages 65+ increased during the pandemic (2020-2021) and will continue to after (2022). Research has shown that there is a statistically significant increase in vaccination rates from before the pandemic to during among healthcare and non-healthcare workers (Conlon et al., 2021). Additionally, in a study conducted in Italy, the majority interviewed agreed that vaccines are crucial to public health and should be mandatory. These attitudes can influence whether a person receives the influenza vaccine and because this study indicates that people have a positive view on it, they would be more likely to get it during the pandemic (Domnich et al., 2020). Additionally, in another study, "21% of parents whose children did not receive the 2019-2020 influenza vaccine reported that the COVID-19 pandemic made them more likely to have their child receive the 2020-2021 influenza vaccine" (Sokol and Grummon, 2020).

## Data Description

The data I will be using for this research project comes from the Center for Disease Control and Prevention Website called, "Influenza Vaccination Coverage for All Ages (6+ Months)". The dataset was collected using the National Immunization Survey-Flu and Behavioral Risk Factor Surveillance System at the national, regional, and state levels by age and race. The dataset is updated monthly and includes the name of the influenza vaccine distributed, the state, the year, the age group, the percent estimate of those vaccinated, the 95% confidence interval for the estimate, and the sample size. I am interested in analyzing the data at a race, age, and year level. This dataset contains 169,293 observations. I will also be using the CDC's, "Vaccine Coverage Among Health Care Personnel" dataset, which contains the same variables as the first dataset mentioned except for age and is only based on healthcare workers. The data was collected using the influenza vaccination performance measurement from the National Healthcare Safety Network. I am interested in analyzing this dataset on a yearly level. This dataset contains 1456 observations.

## Research Design and Methods

To begin my research, I will first compile a literature review to have a better understanding of existing results. I plan on only analyzing the, "Influenza Vaccination Coverage for All Ages" dataset on a year, race, and age basis and the, "Vaccine Coverage Among Health Care Personnel" dataset on a year basis. However, these variables of interest are subject to change if I find confounding variables or others that are associated with receiving the influenza vaccination based on my literature review. I will analyze the two datasets by using the two sample z test for proportions. I will first compare the proportions of the general population who received the influenza vaccine prior to the COVID-19 pandemic defined as 2018-2019 and during the pandemic defined as 2020-2021. I will then compare the proportions of the general population who received the influenza vaccine during the pandemic (2020-2021) to those who did in 2022. I will repeat these steps for the, "Vaccine Coverage Among Health Care Personnel" dataset. The steps above will be repeated for the "Influenza Vaccination Coverage for All Ages" dataset, but this time not only comparing before, during, and after the pandemic, but different races, so the z test will be conducted two times for each race (white, black, asian, hispanic, and other). The Z test will again be repeated for before, during, and after the pandemic, but for different age groups defined by 6 months-17 years, 18-49 years, 50-64 years, and greater than 65 years of age. All of these tests will allow me to determine if there is statistically significant evidence in favor of an increase in influenza vaccination rates during and after the Covid-19 pandemic and if race has an association among these results.

## Discussion

As stated in the specific aims section of this proposal, I expect to find an increase in influenza vaccination rates among each age group during and after the pandemic. However, I do expect there to be a difference in vaccination rates among each racial group. This is

because one study found that patients who recieved the vaccine tended to be Caucasian and the multivariable logistic regression model found that significant independent predictors of influenza vaccination included race (Conlon et al., 2021). Similarly, another study found that "more U.S.-born than foreign-born individuals and more non-Hispanic Whites than non-Hispanic Blacks and Hispanics took the flu vaccine. Considering nativity and Hispanic ethnicity, foreign-born Hispanics were less likely to take the flu vaccine than their U.S.-born and non-Hispanic White counterparts" (Jang and Kang, 2021). This is most likely due to health care access disparities, language barriers, and hesitancy.

## Conclustion

Research has shown that recieving the influenza vaccine may be associated with less severe covid-19 cases. Thus, it is important to have high influenza vaccination rates, but this is only possible if there is equal access to health care among all racial groups regardless of socioeconomic status. Currently, this is not the case within the United States. By studying how the influenza vaccination rates have changed before, during, and after the pandemic among different age groups, race, and healthcare versus non-healthcare workers, I hope to have a better understanding of how each group has been effected by the pandemic. If there are discrepancies among the racial groups, this information can be used among researchers to implement new polices or strategies, so that these groups can have equal access to the vaccine.

## References

- Conlon, A., C. Ashur, L. Washer, K. A. Eagle, and M. A. H. Bowman (2021). Impact of the influenza vaccine on covid-19 infection rates and severity. *American journal of infection control* 49(6), 694–700.
- Domnich, A., M. Cambiaggi, A. Vasco, L. Maraniello, F. Ansaldi, V. Baldo, P. Bonanni, G. E. Calabrò, C. Costantino, C. de Waure, et al. (2020). Attitudes and beliefs on influenza vaccination during the covid-19 pandemic: Results from a representative italian survey. *Vaccines* 8(4), 711.
- Jang, S. H. and J. Kang (2021). Factors associated with influenza vaccination uptake among us adults: Focus on nativity and race/ethnicity. *International Journal of Environmental Research and Public Health* 18(10), 5349.
- Leuchter, R. K., N. J. Jackson, J. N. Mafi, and C. A. Sarkisian (2022). Association between covid-19 vaccination and influenza vaccination rates. *New England Journal of Medicine* 386(26), 2531–2532.
- Sokol, R. L. and A. H. Grummon (2020). Covid-19 and parent intention to vaccinate their children against influenza. *Pediatrics* 146(6).