

## **Final Project – Project Idea**

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**Title:** Covid-19 Vaccine (Pfizer and Moderna) adverse event reports in the USA

**Abstract:** We have an interest in the reported risks of currently used Covid Vaccinations

– What are the possible adverse symptoms and whether there is any pattern in terms of who is more likely to suffer the side effects. For this project, we got our hands on a data set provided by the VAERS (Vaccine Adverse Event Reporting System), where self-reported side effects cases of various vaccinations are recorded. Taking advantage of the dataset, we plan to explore the following questions:

- How do the number of side effect cases and report rates differ from region to region?  
Maybe they are related to the locations and other attributes (e.g. political inclination, etc.) of the regions.(map)
- How are the adverse reactions related to age and gender? Are the elderly and children more susceptible to side effects? Do men and women differ in the chance of suffering it?
- When do side effects kick in? What's the time lag between the vaccination and the onset of side effects?
- Which manufacturer reported a higher adverse reaction rate? Pfizer or Moderna?  
Currently, three vaccines are authorized and recommended to prevent COVID-19 by CDC : Pfizer-BioNTech, Moderna and Johnson & Johnson's Janssen. Pfizer and Moderna are both mRNA vaccines, while Janssen is viral vector vaccine. What is the difference between different types of vaccines in the distribution of vaccines by jurisdiction?

- How does the health condition relate to the adverse reactions? What are the most common pre-existing conditions that may touch off adverse reactions?(text analysis)
- How does the type of vaccination facility affect the adverse reaction rate? Perhaps fewer cases of adverse reactions come from people who have received vaccines from military facilities, because soldiers are physically better than ordinary people.
- What are the most commonly mentioned feelings for those who suffer Covid-19 vaccine side effects? How professional are the symptom descriptions in terms of word choices, concreteness, etc.?(text analysis)

### **Techniques:**

ggplot2, ggmap, Shiny, text mining

### **Datasets**

- <https://www.kaggle.com/ayushggarg/covid19-vaccine-adverse-reactions>

This Kaggle dataset is originated from the Vaccine Adverse Event Reporting System (VAERS)<sup>1</sup> established by the Food and Drug Administration (FDA) and the Centers for Disease Control and Prevention (CDC). It records self-reported adverse events of the Covid-19 vaccinations between 2020/12/01 and 2021/2/11, including age and gender of reported patients, their health condition and medical history, vaccine manufacturer, place and date of vaccination date, adverse reaction descriptions, etc.

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<sup>1</sup> <https://vaers.hhs.gov/data/datasets.html>

- <https://data.cdc.gov/Vaccinations/COVID-19-Vaccine-Distribution-Allocations-by-Juris/saz5-9hgg>  
<https://data.cdc.gov/Vaccinations/COVID-19-Vaccine-Distribution-Allocations-by-Juris/b7pe-5nws>

These two datasets include data of the allocations of Covid-19 vaccines produced by Pfizer and Moderna into different States. They are used here to calculate the rate of side effects.