Covid-19 Vaccines

- Covid-19 is an infectious diseases that can cause serious illnesses and even death.
- The Covid-19 vaccines offer protection against the coronavirus. It works by increasing the body's natural immunity against the virus.
- Australia has 3 covid Vaccines Pfizer, AstraZeneca and Moderna.
- Although vaccines are safe, they can cause reactions.

What are the adverse reactions caused by the Pfizer vaccine in comparison to the Moderna vaccine?

Purpose: the results will **assist hospitals, doctors and nurses** to **prepare treating** the most common reactions caused by the new Moderna vaccine. Inform general public the chance of getting a reaction to the vaccine

Data Source and Additional Resources

https://www.kaggle.com/landfallmotto/covid19-vaccine-adverse-reactions-vaers-dataset

- The dataset is scrapped from the Vaccine Adverse Event Reporting System (US), it has **600,000+ records and 52 columns.**
- The dataset is **current and new** updated 11/08/2021 and contains information from **January to August 2021.**
- **Juptyer Notebooks** -> Pandas, Numpy, Matplotlib and seaborn
- Used python to plot bar graphs, pie charts and density distribution graphs
- **Cleaned** the data (by removing rows **with missing and duplicate information**).
- Categorised it by symptoms, hospitilisation and days spent in hospital

	VAERS_ID	VAX_MANU	AGE_YRS	SEX	SYMPTOM1
0	916600	MODERNA	33.0	F	Dysphagia
1	916601	MODERNA	73.0	F	Anxiety
2	916602	PFIZER\BIONTECH	23.0	F	Chest discomfort
3	916603	MODERNA	58.0	F	Dizziness
4	916604	MODERNA	47.0	F	Injection site erythema

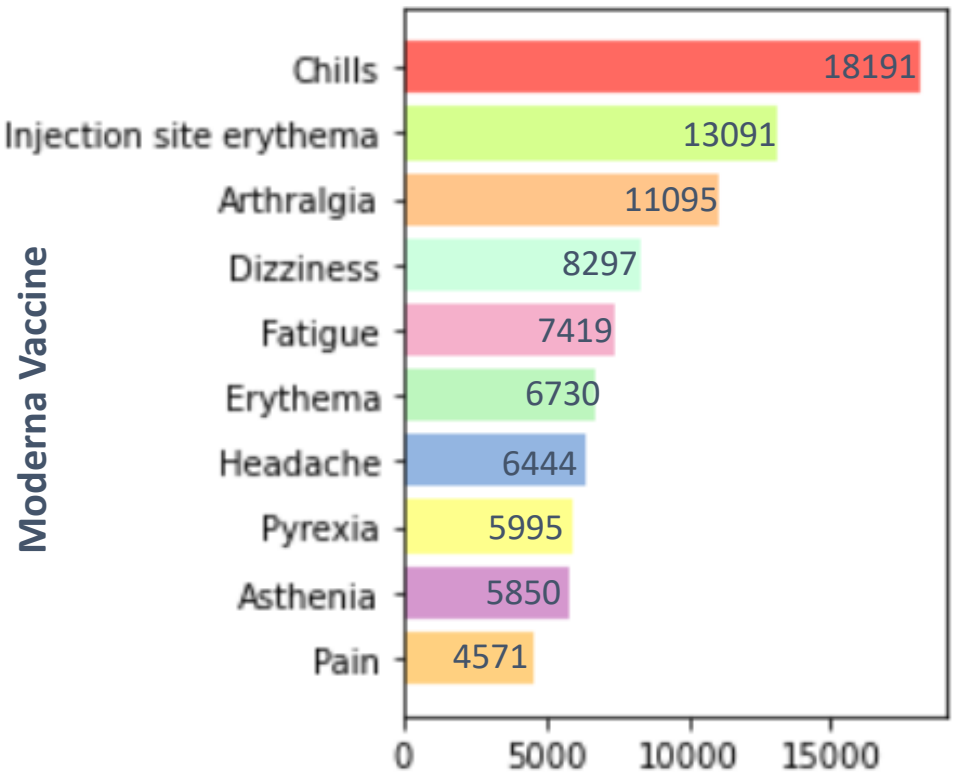
Figure 1: Extract from the dataset

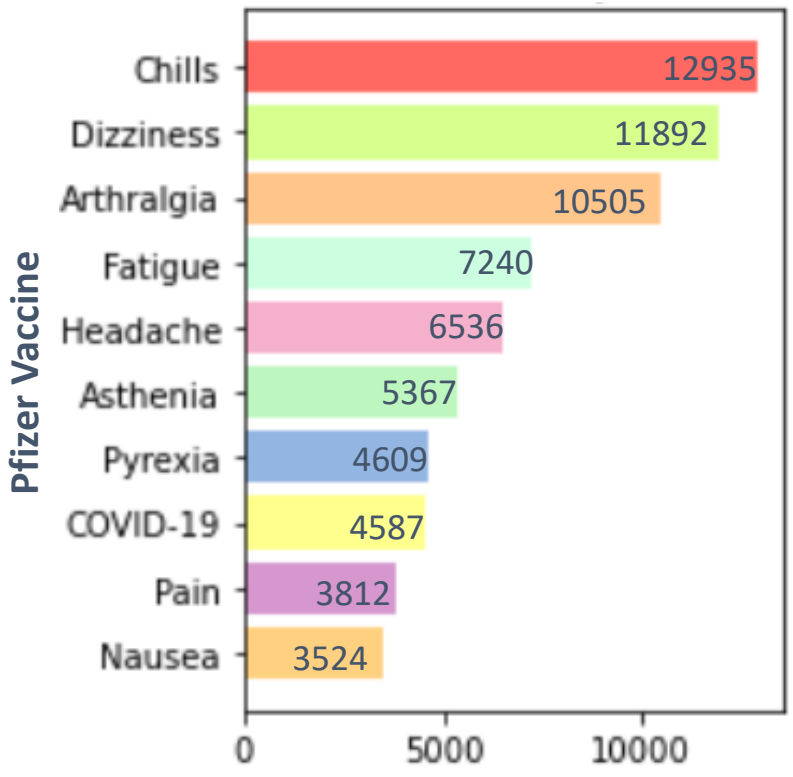
```
#drop rows with null values in age
df_covid_new.dropna(subset=['Age'],inplace = True)

#Keep rows containing dose 1 only
delete_dose2 = df_covid_new[df_covid_new['VAX_DOSE_SERIES']=='1'].index
df_covid_new.drop(delete_dose2,inplace = True)
```

```
#deleteing repeated rows
df_covid.drop_duplicates(keep = 'first')
```

Figure 2: Extract of code utilised to clean data

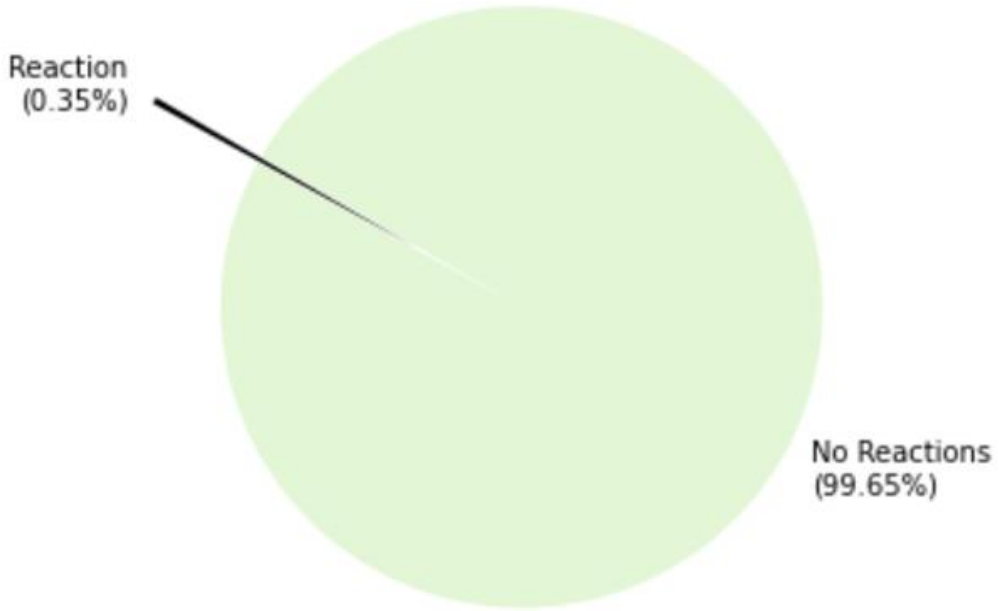
Most common Adverse Reactions Caused by the Moderna and Pfizer Vaccine



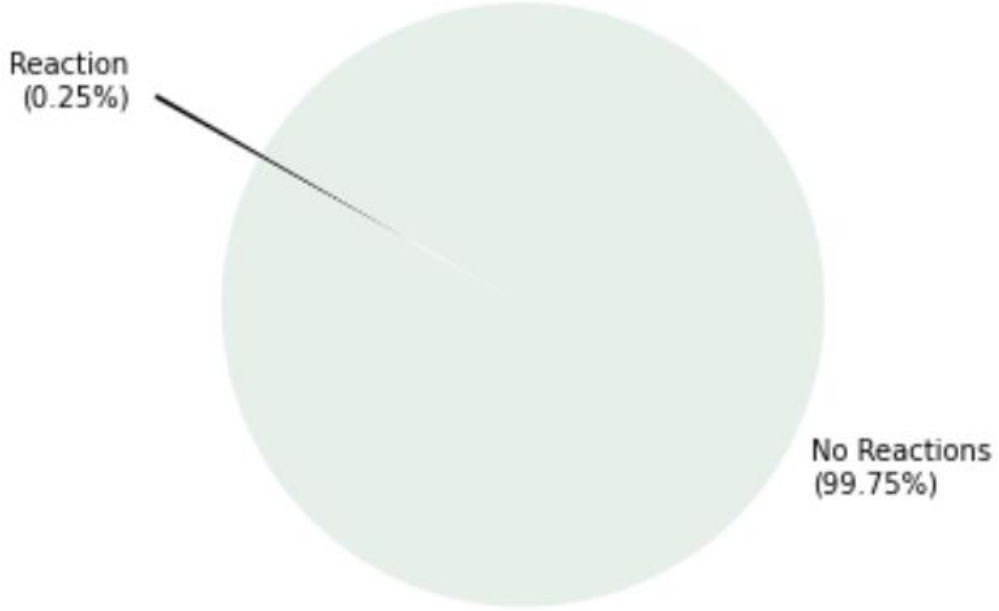


- Most of the common reactions are similar among the two vaccines such as chills, headache, arthralgia (joint pain) , fatigue and dizziness. However, there is a difference in volume.
- Much more likely to get chills from the Moderna vaccine then the Pfizer.
- For the Pfizer vaccine, there is a 1.69% chance of being infected by Covid-19, for which the vaccine was taken against.

The Chance of Getting an Adverse Reaction to the Vaccines

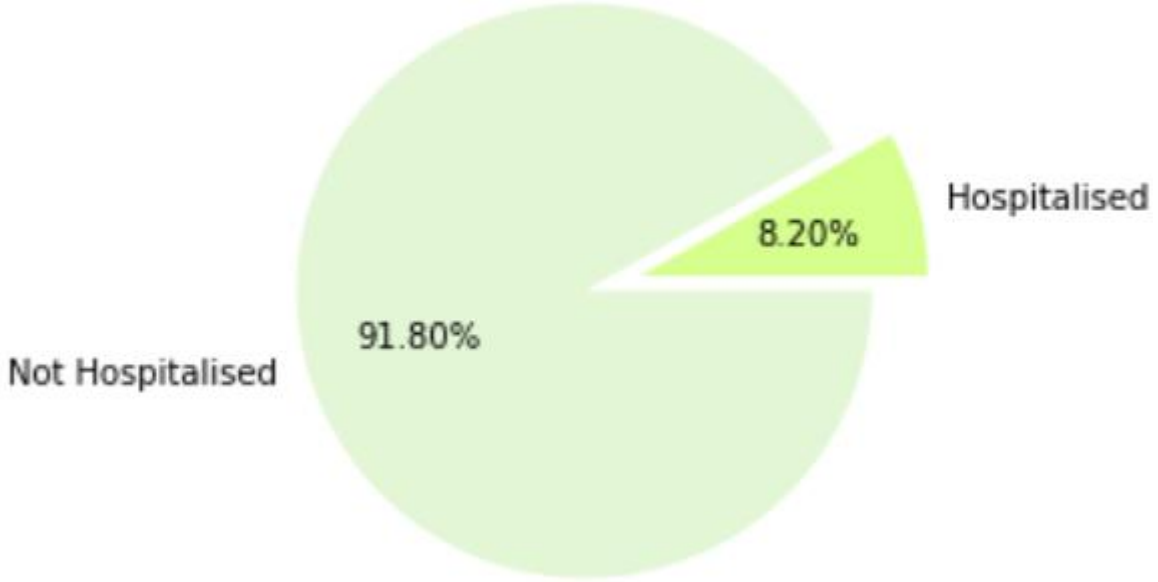


Moderna Vaccine

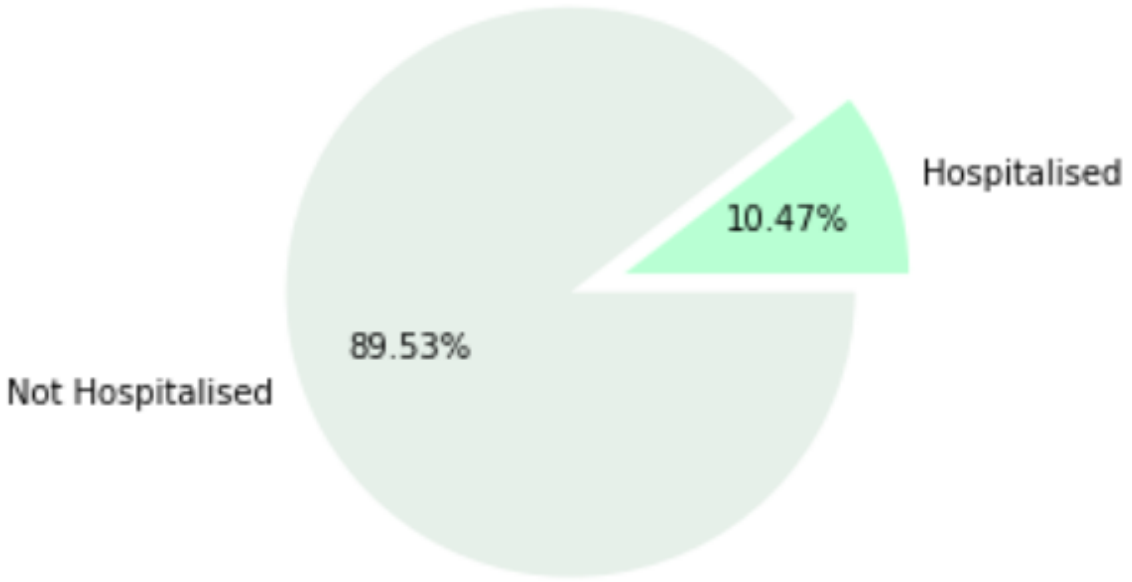


Pfizer Vaccine

The Chance of being Hospitalised from an Adverse Reaction to the Vaccines



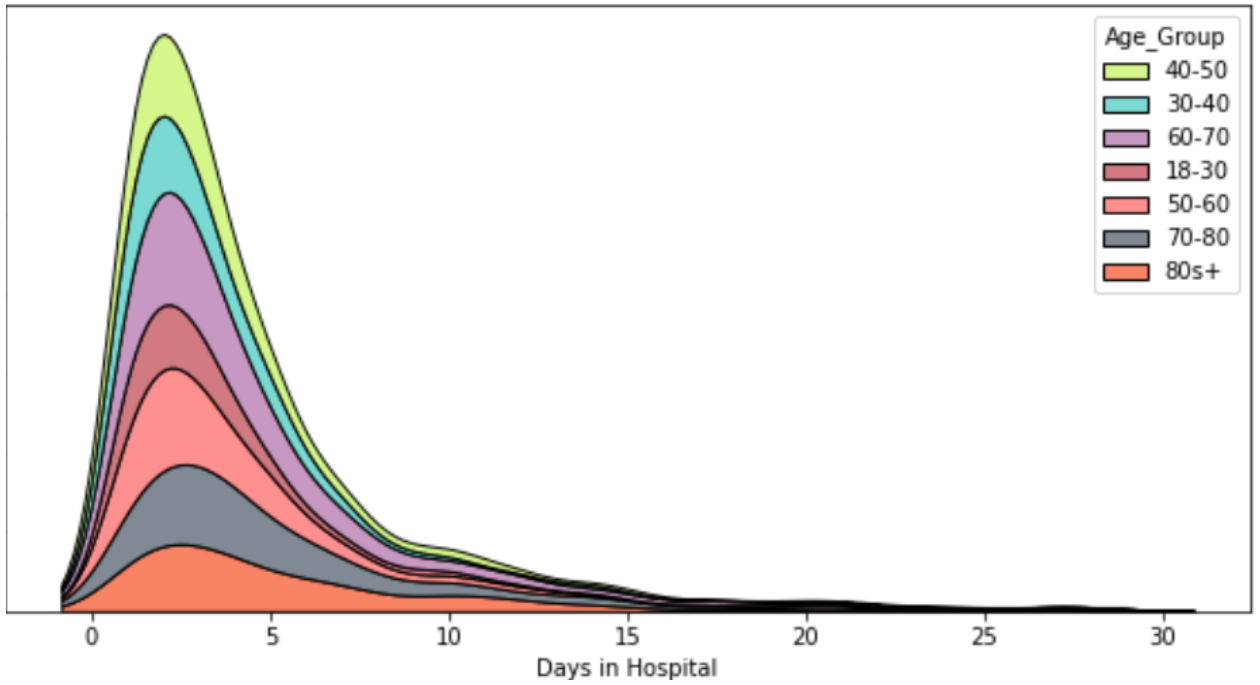
Moderna Vaccine



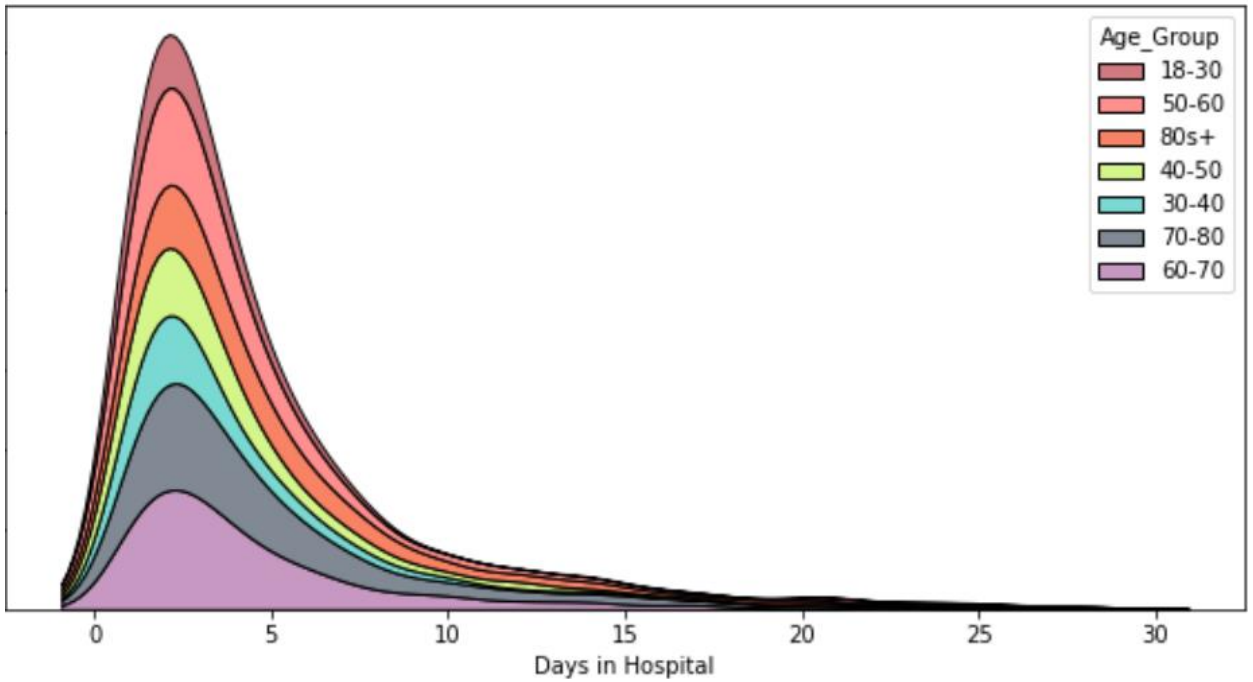
Pfizer Vaccine

- The chance of hospitalization from an adverse reaction for those who received the Pfizer vaccine is 10.47% whereas for the Moderna vaccine it is 8.20%

Moderna Vaccine



Pfizer Vaccine



Density Distribution of Days Hospitalized

- 3 days is the mean time spent hospitlised.
- Whereas those aged between 40-50 that received the Moderna vaccine have the highest chance of being hospitalised.
- Those that received the Pfizer vaccine and are between 18 -30 years old have a higher chance of being hospitalised and spending the most days in hospital.

Conclusion

- The vaccines cause similar reactions such as chills, headache, arthralgia (joint pain) , fatigue and dizziness. However, there is a slightly higher chance of getting a reaction from the Moderna vaccine.

- There is a higher chance of being hospitalised for an adverse reaction after receiving the Pfizer vaccine than the Moderna vaccine. The mean time spent at hospital is roughly 3 days.

- Let's say 1 million people in Adelaide get vaccinated with the Pfizer vaccine, according to the results only 2500 will get a reaction and from this 250 people will get hospitalised.

- Given the given the evidence from this data, the chance of getting a reaction from either the vaccines isn’t significant enough to cause harm or cease COVID-19 vaccinations.

Data and Resources References

Data:

Dataset : https://www.kaggle.com/landfallmotto/covid19-vaccine-adverse-reactions-vaers-dataset

Number of vaccinations: https://ourworldindata.org/covid-vaccinations?country=AUS

Dataset description: https://vaers.hhs.gov/docs/VAERSDataUseGuide_November2020.pdf

Resources:

- Dataset was processed in python
- Graphing was done using matplotlib and seaborn libraries