# Adverse events of the COVID-19 vaccine in people with underlying medical conditions

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In hope of ending the global COVID-19 pandemic, multiple vaccines have been rapidly developed around the world. However, vaccine hesitancy due to safety concerns is hindering its usage. Phase 2 and 3 clinical trials showed promising results regarding both efficacy and adverse effects, also in people with underlying medical conditions1.

In this project, the effect of two different vaccines, namely Pfizer-BioNTech and Oxford/AstraZeneca, on people with different comorbidities will be analysed, aiming to shed more light on their safety. Specifically, the following questions will be answered:

* **Is the mortality the same in vaccinated vs. non-vaccinated people? Is it the same when comparing vaccinated and non-vaccinated people with the same comorbidities?**
* **How common are adverse events? Are they more common in people with (specific) underlying medical conditions?** Medical events after the second vaccine will be considered and compared to unvaccinated people in a similar time frame. If more adverse events occur in a vaccinated population compared to the non-vaccinated population, the time course of adverse events will be plotted.

If time permits, the following points may also be investigated:

* Comparison of relevant adverse events (e.g. myocarditis or lymphadenopathy) after vaccination vs. after a natural COVID-19 infection
* Is the mortality the same in people with a history of myocarditis (and related diseases) with the vaccination compared to without vaccination?
* Is the preventive effect of the vaccines on getting COVID-19 the same for people with and people without underlying medical conditions? What about specific groups of comorbidities (diseases of the circulatory vs. respiratory system)?
* Is number of hospitalization the same in vaccinated vs. non-vaccinated populations? Is it the same when comparing vaccinated and non-vaccinated people with the same comorbidities?
* What is the effect of the covid vaccine on children?

For retrieving the comorbidities, the **TPP GP clinical** dataset from the UK Biobank (UKBB) will be used and ic-10 codes used to classify the diseases into broader categories. To get the vaccination status, the **Covid-19 TPP GP Scripts** dataset will be used and different vaccines called using their SNOMED codes. For the mortality data, the **Death Linkage** dataset will be used, as also done by Xiang et al.2. Bar plots of the different groups will be created and the data will be statistically analysed using the Chi-squared test. A line plot would be used for time-related data. Euler will be used, as it is a large dataset.

**References**

1 Choi, W. S. & Cheong, H. J. COVID-19 Vaccination for People with Comorbidities. *Infect Chemother* **53**, 155-158, doi:10.3947/ic.2021.0302 (2021).

2 Xiang, Y., Feng, Y., Qiu, J. & So, H.-C. Association of COVID-19 vaccination with risks of hospitalization due to cardiovascular and other diseases: A study of the UK Biobank. *medRxiv*, 2021.2008.2015.21262097, doi:10.1101/2021.08.15.21262097 (2021).