**COVID-19 Case Study**

                 From World Health Organization – On 31 December 2019, WHO was alerted to several cases of Pneumonia in Wuhan City, Hubei Province of China. The virus did not match any other virus. It raised concern because when a virus is new, we do not know how it affects people. Coronavirus disease (COVID-19) is an infectious disease. These virus cases in the U.S. are stacking up higher and higher. Understanding this virus is crucial to stop it’s spread. In this case study, we will be exploring ways to prevent the spread of this virus by using vaccines. The goal is to find which states need urgent vaccinations and medical services. Vaccinations of COVID-19 in the U.S. will begin on Dec.14, 2020. By the end of this case study, vulnerable Age Groups and States will be identified for vaccinations. My task will be to prove that if the States with the highest number of vulnerable populations gets vaccine timely the total death cases will decrease. The Key analyses are the following:

1. Explore the change in Confirmed and Death Cases of COVID-19 by States.
2. Explore the time series of Confirmed and Deaths Cases of COVID-19 by months.
3. Does Gender play a rule in Death Cases of COVID-19?
4. Which age groups are the vulnerable populations in COVID-19 Cases.
5. What are the top 10 states with the highest number of vulnerable populations?
6. Understand the relationship between Confirmed Cases and Deaths Cases by State.
7. What further strategies should be used to stop spreading the COVID-19 cases?

Overall, it was a learning process. I started searching for the right data. I used three data sources and had over 10 Excel datasheets. My data included the Time Series of COVID-19 in the U.S., Confirmed and Deaths cases of COVID-19 in the U.S. and the world, and data of COVID-19 by age groups, sex, and States. I ended up using only a portion of these data. To get the data in the right format for my analyses, I did lots of cleaning, merging, grouping, aggregating, and more with the data. Using Python and Tableau, I experiment with many different analyses and visualizations to better explore the data.

During this project, I got to explore many new libraries in python and new techniques in Tableau. Since it was my first time working with Time Series data, it took me some time to better understand the data. I had to make lots of changes to Time Series data, such as melting the columns, merging two data, changing the types of columns, and much more to get the right result needed. All these analyses helped me reach the following conclusion:

1. The Confirmed and Death Cases of COVID-19 differ in each States of the U.S.
2. Starting January and ending September, both Confirmed and death cases increased. The average number of death cases increased by each month. However, the number of Confirmed cases reached 7000k, and death cases exceed 200k.
3. Yes, Gender does play a role in Death Cases of COVID-19. Male populations have higher Death Cases compare to women. However, this comparison changes by each age group.
4. Males and females above 65 years-old are at high risk of COVID-19 Deaths. And they are considered vulnerable populations. However, Female over 85 years old and Male between 75-84 years has comparatively higher death rates than other age groups.
5. The top 10 states with a higher number of vulnerable populations are New Jersey, New York, Massachusetts, Pennsylvania, California, Florida, Illinois, Texas, Connecticut, and Michigan.
6. As the total Confirmed Cases of COVID-19 increased, Death cases increase as well. However, it differs in each state.
7. The first crucial strategy to stop the spread of COVID-19 data is prioritizing the top 10 states and the vulnerable populations in vaccinations.

As I mentioned in step 7, that my recommendation is to start the vaccinations with the top 10 states identified. Priorities the vulnerable populations in the top 10 states identified and all other states. The next steps should be measuring the deaths caused by the COVID-19 after ending the vaccinations. It should be done as quantitative monitoring to see the impact of recommendation. Lastly, surveying the top 10 states identified after vaccinations to measure the changes.

Link to Tableau: <https://public.tableau.com/profile/morwarid.najafizada#!/vizhome/USDeathsbyState/Covid-19CaseStudyDashboard>