

A Comprehensive Analysis of Mortality Trends Across Nations

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1 INTRODUCTION

This comprehensive analysis endeavors to meticulously examine shifts in mortality patterns amid the COVID-19 pandemic. Our primary objective is to examine data sourced from diverse countries with varying geographical profiles, aiming to provide clear insights into whether COVID-19 has a perceptible influence on mortality rates. By conducting a thorough assessment of trends before, during, and after the onset of the pandemic, we aim to ascertain the extent to which COVID-19 has impacted global mortality trends.

This analysis aims to examine changes in mortality patterns in relation to the COVID-19 pandemic. We will assess data from various countries to determine if COVID-19 has influenced mortality rates. We seek to determine if there is a noticeable correlation between the pandemic and changes in death rates. The goal is to provide insights into the pandemic's impact on global mortality trends.

2 ANALYSIS

2.1 GERMANY

The bar and line graph below represent the overall deaths and quarter-wise deaths per capita respectively.

2.1.1 Overall Deaths

In Germany, since the beginning of the pandemic, a total of 38,249,060 cases have been reported. At least 1 in 492 residents have died from the coronavirus, a total of 168,935 deaths. The line graph provided illustrates the total number of deaths in Germany from Jan 2017 to Oct 2023.

A huge spike was observed in the month of March 2018 with a total deaths of 107104 recorded. Then again a huge spike is observed in the Dec 2020 and Jan 2021 mostly due to the pandemic. We can also notice that the spikes in Jan 2017 and Dec 2021 are almost the same meaning that the number of deaths in both these months is almost the same. But the interesting thing is that in

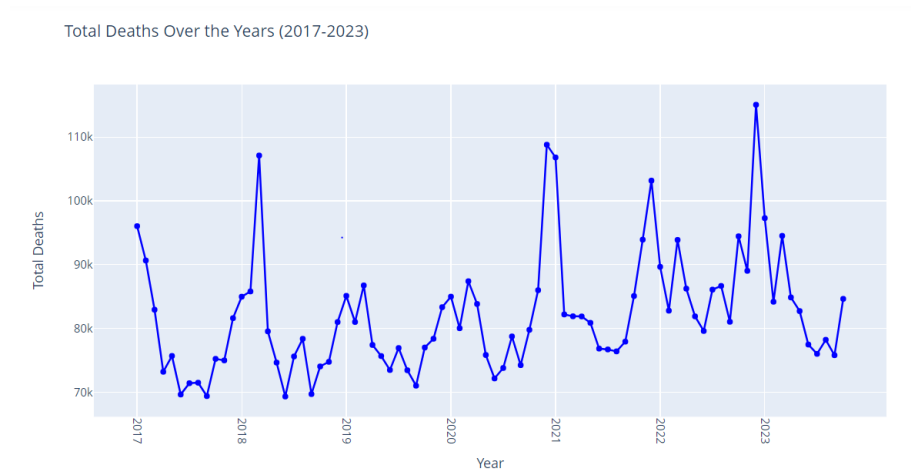


Figure 1: Total Deaths in Germany (Jan 2017 - Oct 2023)

Dec 2022 the deaths have increased than in any other month of the year. The percent increase in deaths between Dec 2020 and Dec 2022 is approximately 5.76%. While the percent increase in deaths between Mar 2018 and Dec 2020 is just approximately 1.58%.

2.1.2 Quarter-wise Deaths

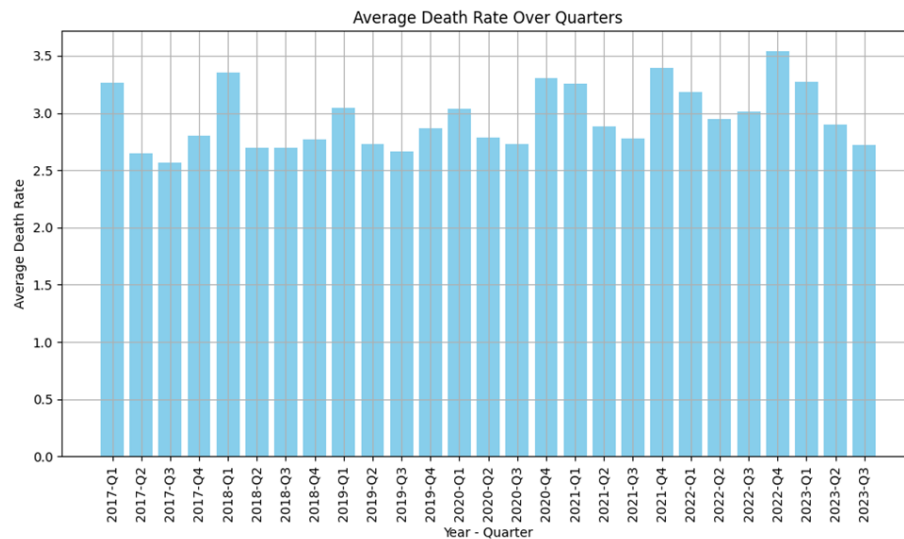


Figure 2: Quarter-wise Deaths per capita

2.1.3 Age-wise Deaths

The bar chart below shows all-cause deaths in different age groups from 2017 to 2022. As we can observe in the graph, people over 60 have the highest number of deaths. On the other hand, those under 40 have much fewer deaths. Deaths for those under 20 are so low that they could be considered natural. The number of deaths for under-20s remains almost the same every year. Surprisingly, there were more deaths in the under-20 group in 2017 and 2018 compared to 2020 and 2021, suggesting vaccination may not have been as urgent for this age group then. Additionally, in 2022, both the 20-40 and 80+ age groups saw their highest number of deaths.

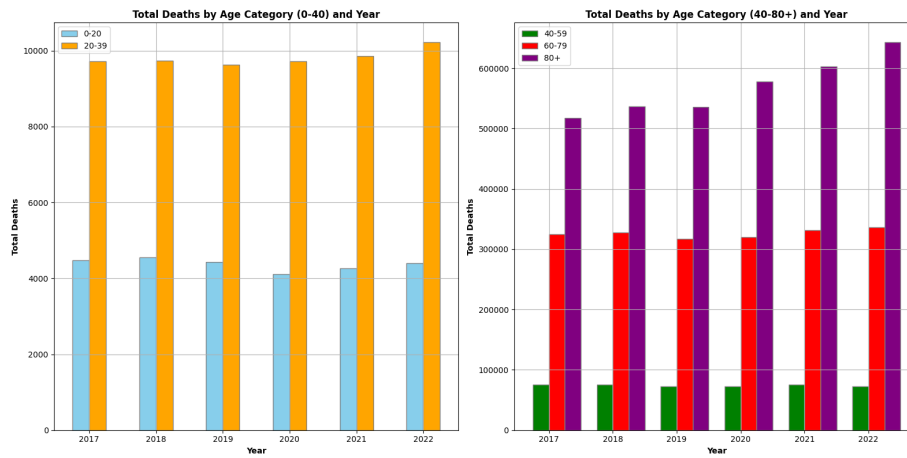


Figure 3: Age-wise Trends in All-Cause Deaths (2017-2022)

2.2 FRANCE

2.2.1 Weekly Deaths

The line graph below illustrates the total number of weekly deaths spanning from 2020 to 2023. Here we can observe that there are some kind of cyclic patterns repeated from Jun 2020 to Jun 2022. The peak in fatalities was recorded in March 2020, with 18,805 deaths, while another surge occurred around December 2022, totaling 16,893 deaths. Upon examining the annual data, it becomes apparent that the number of deaths in 2022 surpasses those in 2020. Specifically, there was a 0.73% increase in deaths between 2020 and 2022.

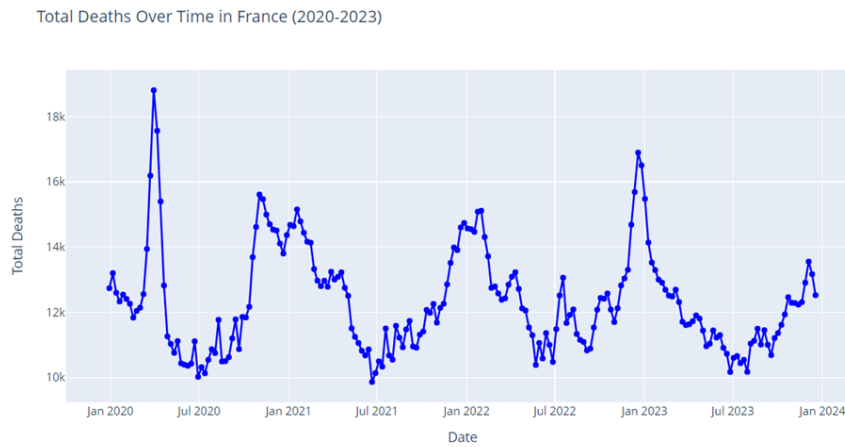


Figure 4: Trends in Total Deaths in France (2020-2023)

2.2.2 COVID Deaths VS Non-COVID Deaths

The grouped bar graph below illustrates the comparison between COVID and non-COVID deaths in France from 2020 to 2023. As we can observe the year 2022 stands out with a notable increase in non-COVID deaths compared to other years. Moreover, it's evident that COVID-19-related fatalities are considerably lower than non-COVID deaths, with the highest number of COVID-19 deaths recorded in 2020. In statistical terms, in the year 2020, COVID-19 deaths accounted for 11.16% of all non-COVID deaths. Additionally, the non-COVID deaths in 2020 and 2023 appear to be identical.

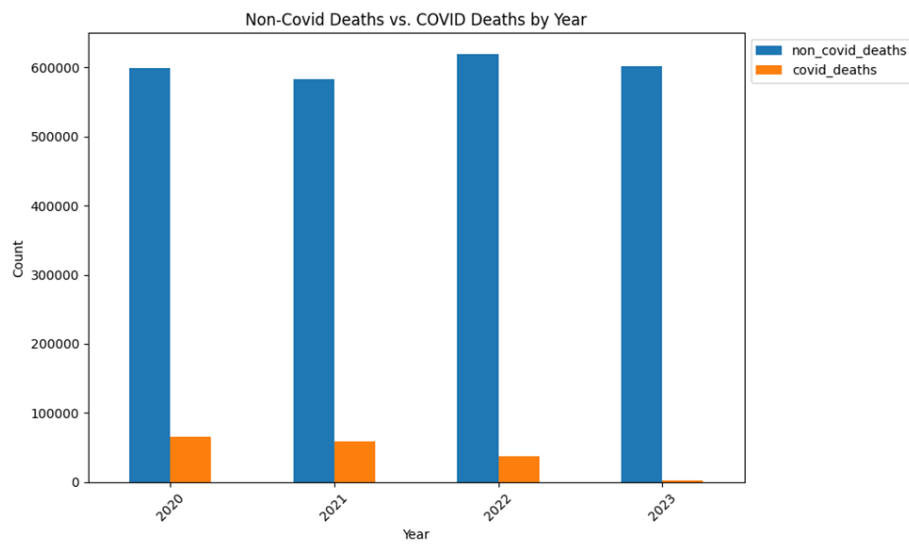


Figure 5: COVID vs. Non-COVID Deaths in France (2020-2023)

2.3 UNITED KINGDOM (WALES AND ENGLAND)

2.3.1 Monthly Overall Deaths

The line graph below depicts the total monthly deaths recorded in the UK from 2018 to 2023. Notably, significant spikes occur in January 2018, April 2020, January 2021, and January 2023, with death tolls of 64,020, 88,038, 73,217, and 67,407 respectively. The highest spike is observed in the April of 2020. Moreover, January 2023 shows a nearly identical number of deaths compared to January 2021. Specifically, there was a 7.9% decrease in deaths between January 2021 and January 2023.

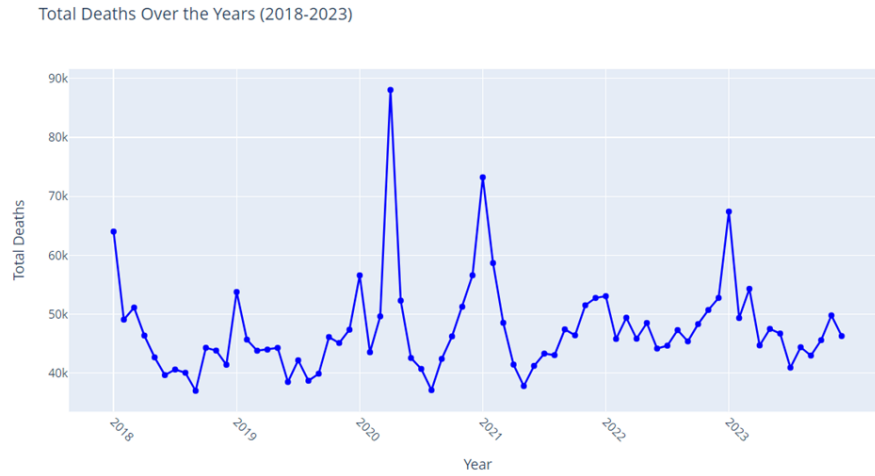


Figure 6: Total Monthly Deaths in the UK(2018-2023)

2.3.2 Quarter-Wise Deaths

The bar graph below illustrates the quarter-wise average death rates per capita. Notably, the death rate in 2018 Q1 and 2023 Q1 appears to be nearly the same.

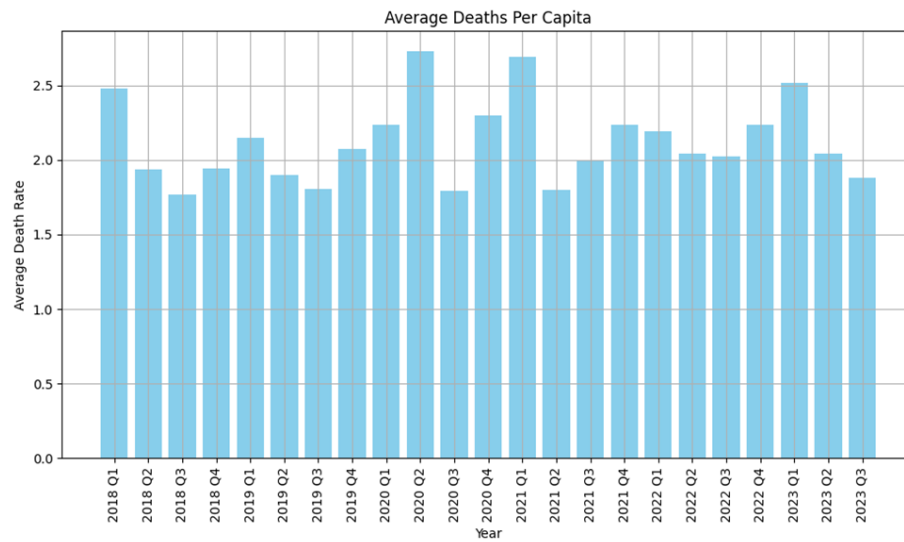


Figure 7: Quarter-wise Deaths in the UK

2.3.3 Age-wise Deaths

The grouped bar graph below provides a comprehensive overview of deaths categorized by age groups spanning from 2018 to 2023. A predominant trend emerges, indicating that the number of deaths is notably higher among age groups exceeding 45 years, with the highest recorded fatalities observed in age groups surpassing 85.

Interestingly, an intriguing pattern unfolds across the years 2021, 2022, and 2023, where the number of deaths remains relatively consistent across all age groups, with a notable exception in the 15-44 age group, where a slight variance is observed between 2022 and the surrounding years.

Further analysis reveals a notable surge in deaths among the age group above 45 in the year 2020.

Surprisingly, there was a 4.2% decrease in deaths between 2020 and 2023 among age groups above 45, while a modest 2.6% increase was noted between 2021 and 2023 within the same demographic. Overall, there has been a slight decrease of approximately 3.77% in deaths between 2020 and 2023 and a 2.5% increase in deaths between 2021 and 2023.

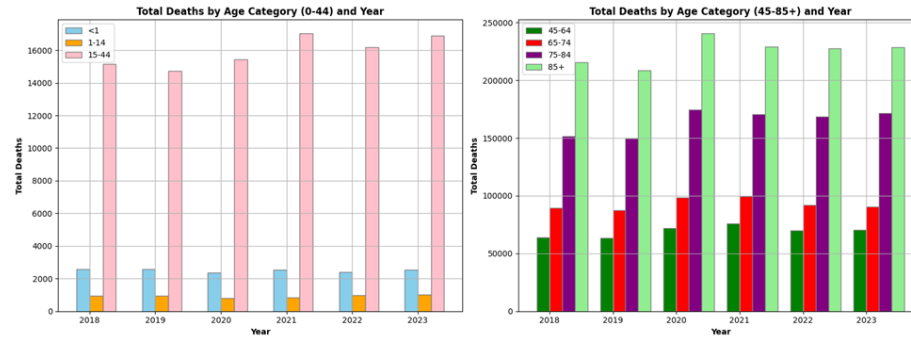
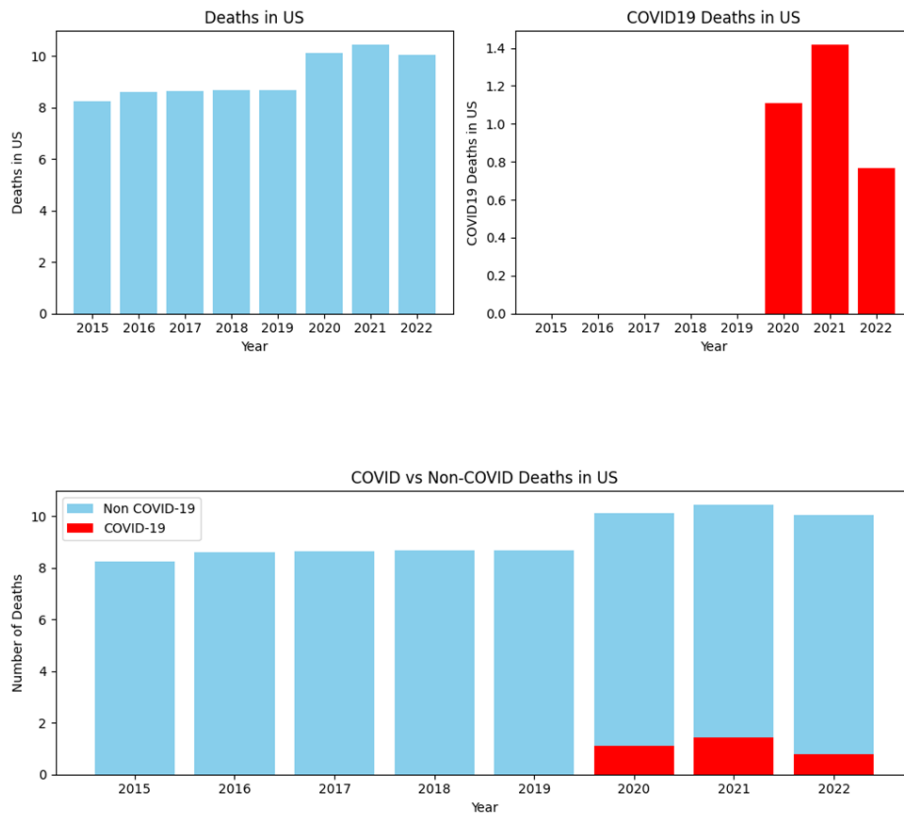


Figure 8: Age-wise Mortality Trends in the UK(2018-2023)

2.4 UNITED STATES

2.4.1 COVID VS Non-COVID Deaths

The bar graph and stacked bar graph below depict the total deaths attributed to COVID and non-COVID causes in the United States, scaled by population. Upon observation, it is evident that the years 2020, 2021, and 2022 exhibit the highest number of recorded deaths. Interestingly, while 2021 stands out with the highest total deaths, the figures for 2022 closely resemble those of 2020, with only a marginal 0.7% decrease in scaled deaths between 2020 and 2022. Another observation is that the COVID deaths in 2021 are the highest but when compared to non-COVID deaths, COVID deaths accounted for approximately 11.95% of the total scaled deaths. And in 2020 COVID deaths accounted for only 9.89% of total scaled deaths.



2.4.2 State-wise Deaths

The grouped bar graph below provides insight into deaths recorded in various US states, scaled by population, spanning the years 2018 to 2021. Notably, the graph highlights the top 10 states with the highest total recorded deaths. As we can see Ohio based on its population is the state with the highest number of deaths recorded followed by Pennsylvania. Interestingly, both states exhibit a consistent trend with similar numbers of deaths across most years, particularly evident in 2018 and 2019. Remarkably, the death toll in the years 2018 and 2019 for each and every state was near 2020 and 2021.

Analyzing 2021 data, Ohio, Florida, Pennsylvania, and Michigan stand out as states with the highest number of deaths, a pattern mirrored in 2020. Additionally, the deaths in 2018 and 2019 collectively account for approximately 85.12% of the total deaths in 2020 and 2021 across all states

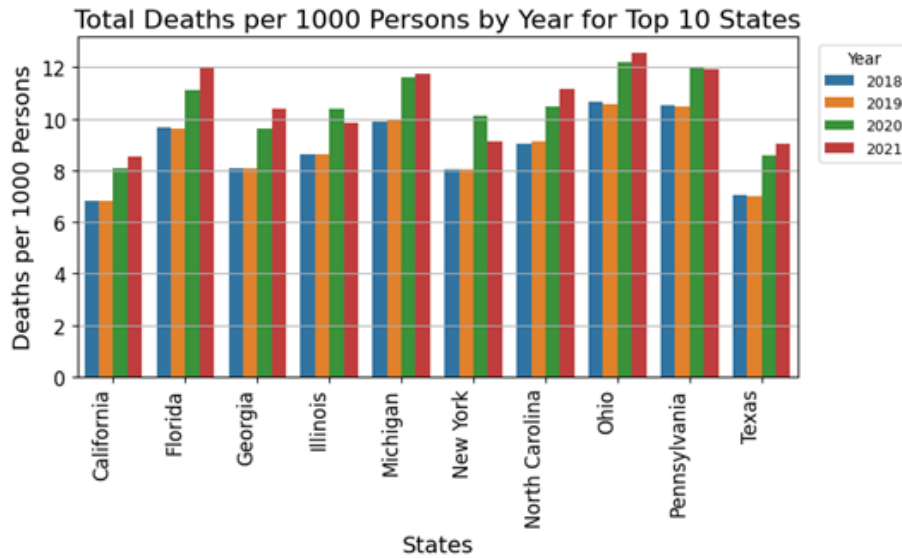


Figure 9: State-wise Death in the US

2.5 ISRAEL

2.5.1 Monthly Overall Deaths

In this graph, we delve into the death rate per thousand individuals in Israel from January 2018 to August 2022. Noteworthy spikes are evident in several months, including January 2018, January 2019, January 2020, October 2020, January 2021, and January and February 2022. Remarkably, the highest death rate is observed in January 2022, followed closely by January 2021. We can observe that the month of January across all the years emerges as a month with the highest number of deaths. Examining the year-over-year changes in death rates reveals compelling insights. Between January 2021 and January 2022, there was approximately a 2.12% increase in death rates, while the increase between January 2020 and January 2021 was notably higher at approximately 17.92%. Moreover, intriguing trends emerge when comparing January 2018 and 2019 to January 2020. There was approximately a 1.98% decrease in scaled deaths in January 2020 compared to January 2018 and a more significant decrease of approximately 6.69% in January 2020 compared to January 2019. In analyzing total deaths, a 3.88% increase is noted for 2020 compared to 2019.

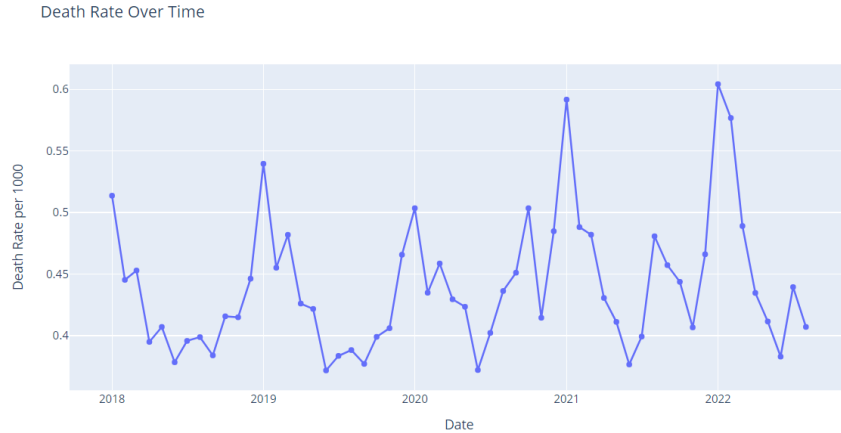


Figure 10: Overall Death rates in Israel(2018-2022)

2.5.2 Quarter-wise Deaths

This bar graph depicts the quarter-wise death rates spanning from 2018 to the second quarter of 2022. Notably, a consistent trend emerges where the death rates consistently rise in the first quarter of each year. Remarkably, the death rate in the first and last quarters of 2020 remains identical, suggesting a unique pattern for that year. Additionally, the highest death rate is recorded in the first quarter of 2022, highlighting a significant peak in mortality during that period.

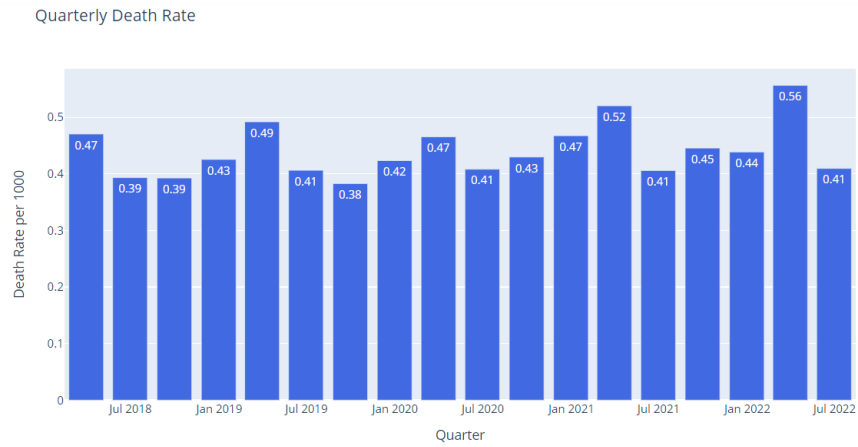


Figure 11: Quarter-wise Death Rates (2018-2022 Q2)