Comparing the Impact of Respiratory Viruses: Analyzing Weekly Death Trends of COVID-19, Influenza, and Respiratory Syncytial Virus (RSV) in the US

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Introduction

This research aims to analyze the weekly death trends for COVID-19, Influenza, and RSV from 2023 to 2025. It will investigate whether the mortality rates for COVID-19 are higher than Influenza and RSV and how vaccination efforts have potentially contributed to changes in these trends

Hypothesis: It predicted that during the 2023-2025 period, COVID-19 will have the highest average and median percentage of deaths compared to Influenza and RSV on a weekly basis. Deaths from Influenza will follow this trend, with RSV anticipated to have the lowest overall number of deaths per week.

Methods

Data Source: CDC Provisional Death Percentages for COVID-19, Influenza, and RSV 2023-2025.

A comparative analysis was conducted using CDC provisional data on the weekly percentage of deaths attributed to each virus to evaluate and compare the mortality impact of COVID-19, Influenza, and RSV in the US from 2023 to 2025. This analysis focused on identifying trends over time and calculating average and median weekly death percentages. Time series plots were used to visualize fluctuations, seasonal spikes, and periods of decline. Finally, to further understand variability and anomalies, a box plot was constructed to display outliers, particularly from influenza.

Results and Discussion

First, a comparative analysis examined the statistically significant difference in the percentage of deaths across different pathogens.

Covid-19 had a significant impact on mortality over the time period. There was a consistent impact of COVID-19 mortality

- Covid-19, on average, had 1.72% of deaths each week due to COVID-19.

Influenza had significant spikes in mortality compared to COVID-19, though still contributing to a smaller fraction of death overall.

- Influenza, on average, had 0.401% of deaths each week due to influenza.

RSV remained low throughout the observed period with very slight increases.

- On average, 0.0462% of deaths each week were due to RSV, the lowest among the three.

COVID-19

•Patients with Covid-19 in fall/winter of 2023-2024 had an increase in hospitalizations and had a 60% higher chance of death.[2] As shown in Fig 1, in the early years of 2024, there was an increase of covid-19 deaths. In the week of January 6, 2024, COVID-19 was attributed to 3.74% of deaths; in the week of January 13, 2024, COVID-19 was attributed to 3.82% of deaths. COVID-19 had a dramatic decrease during the weeks of February 2024 and steadily decreased; the lowest cases of deaths from COVID-19 were during the week of June 8, 2024.

Results

Fig 1

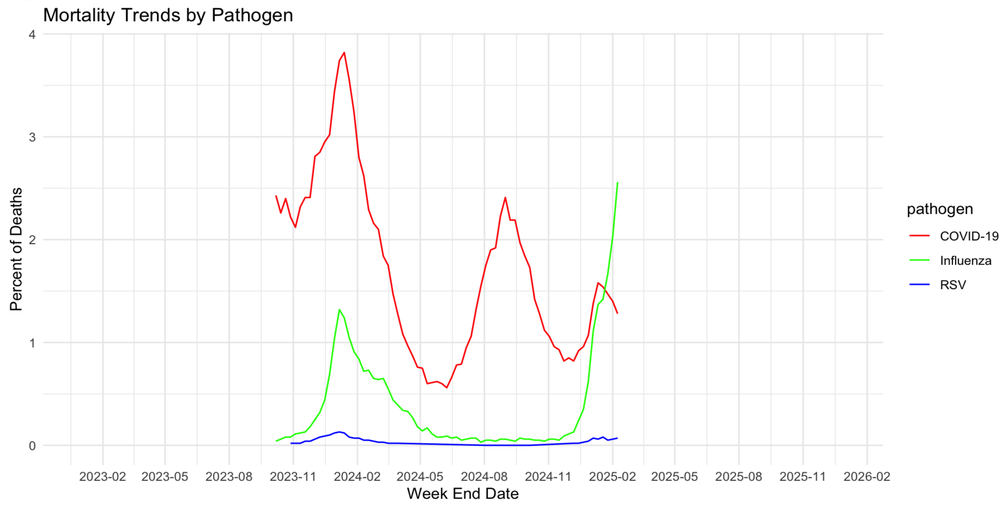
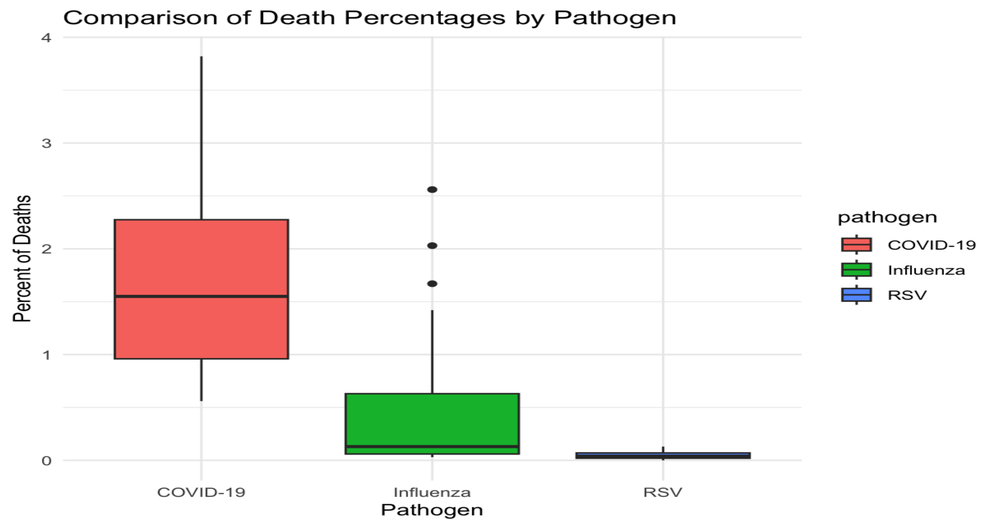


Fig 2



Results and Discussion

- There was a sharp increase in deaths from influenza during the week of December 12, 2023, and it continued until January 20, 2024. Influenza deaths then started to decline in mortality, with another dramatic peak at the beginning of 2025, specifically during the week of February 1, 2025. Similar to influenza, COVID-19 hospitalizations and deaths peak during the traditional winter viral respiratory season (November through April) across all years since the pandemic, which can also be seen in Fig 1.[3]

Influenza

- Spikes in death from influenza can also be clearly seen in Fig 2 as the outliers. There were zero outliers for COVID-19, zero outliers for RSV, and three outliers for influenza, meaning that percentages of deaths over the period of 2023-2025 were consistent except for influenza. The outlier in influenza can be attributed to a seasonal peak where the influenza virus is most stable at certain levels of humidity and temperature. The virus is most stable at very low humidity (10-40%) and cold temperatures (5 ºC), making the cold dry seasons ideal for aerosol transmission.[1] Considering that death from influenza peaked every winter season there was especially a high rate of death in the beginning of 2025. This could be due to changes in behaviors, getting a covid-19 vaccine but not one for the flu, along with how mutation in the virus.[2] The hypothesis predicted that COVID-19 would consistently have higher mortality rates; the outlier analysis reveals that despite generally having lower average deaths, influenza experienced occasional spikes, suggesting that seasonal variation could play a major role along with vaccine uptake.

RSV

- Studies have shown that among adults, there is a higher mortality rate among COVID-19 patients compared to influenza and RSV. This can be seen in Fig 1, where compared to the flu and COVID-19, RSV had a low mortality throughout the study period, followed by influenza. There were also no significant spikes in deaths like influenza during the time of the study.[4]

Conclusion

This analysis concludes that COVID-19 had the highest average and median percentage of death, followed by influenza. COVID-19 accounted for 1.72% of deaths per week, reflecting a consistent impact on overall mortality, particularly during the traditional winter seasons. These findings highlight the varying mortality profiles of respiratory pathogens and underscore the importance of seasonal factors in influencing influenza mortality.

References

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