EPID 7500 Final Project

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Data cleaning

You can also embed plots, for example: // remove this

Data summarization

Data Visualization

Utilizing Advanced R package: Prophet

EPID 7500 Final

Abstract

As the 1918 flu swept through America, New York was heavily impacted by the pandemic. We must continue to watch over the incidence of influenza in New York. Through this, we can draw future predictions to use mitigating strategies for the citizens of New York.

Background

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Influenza has affected the world for over a century. With the start of the 1918 influenza pandemic, the

To understand the gravity of Influenza, one must know the history of Influenza . In fact, Influenza has
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Therefore, influenza is a global threat. With this threat being acknowledged, there are also areas that have higher cases of influenza. For example, in the United States, there are states that have high rates of influenza. According to the Centers for Disease Control and Prevention (CDC), some of the top states with higher incidence and mortality rates of influenza include Hawaii, Mississippi, Tennessee, and New York. (CDC, 2021a) . With New York being the fourth state with the highest rate of influenza related mortalities , it is important to understand the trends of the influenza virus. It is also important to monitor the flu in New York city to control and hopefully prevent a significant rate of mortalities.

Moreover, due to New York being one of the top states for travel and with the state being found as the epi-center of the COVID-19 pandemic, it is integral to understand how viruses such as the flu are affecting the state(ShareAmerica, 2019; James et. al, 2020). With this analysis, it can help to understand how the flu may affect other states. These analyses can depend on different factors. The flu season can vary

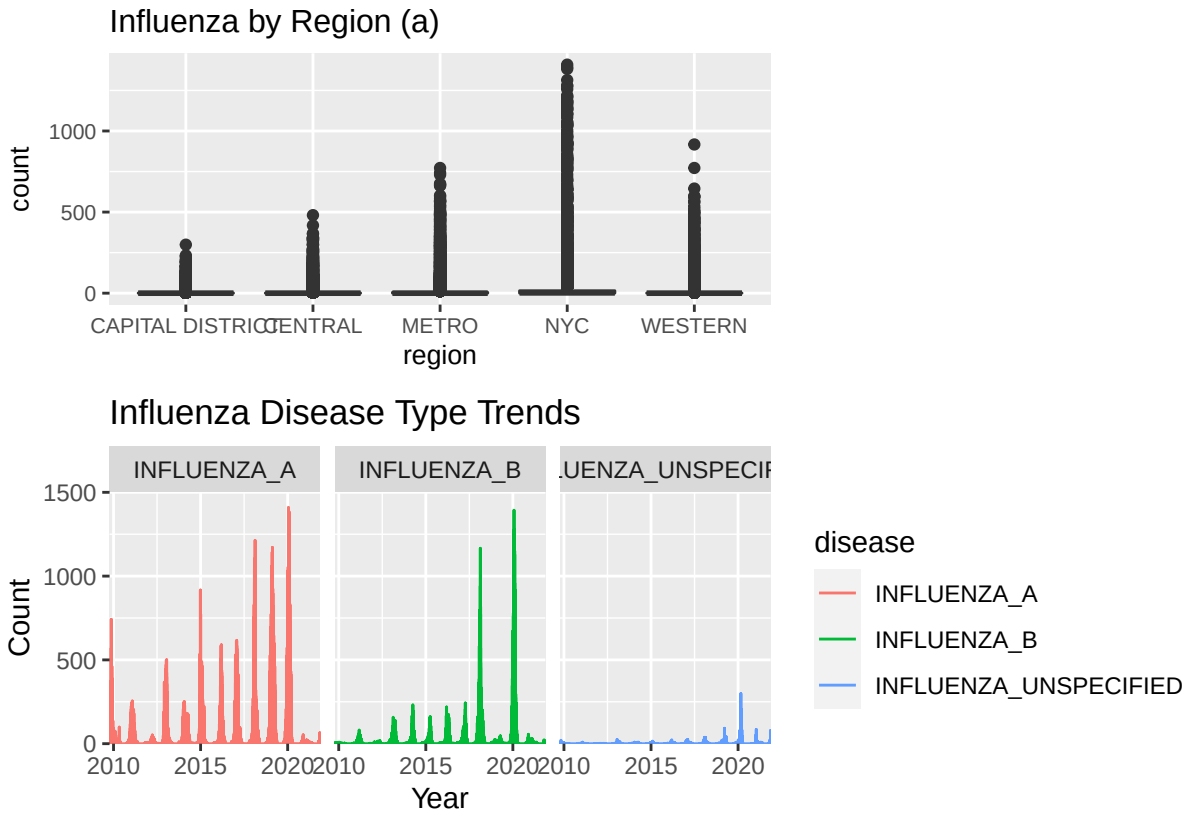
every year, and has been especially variant during the COVID-19 pandemic; there were record low numbers of COVID-19 cases, but this can leave individual's immune systems to not recognize the influenza strains and in turn cause the virus to produce more severe disease (World Health Organization, 2021; Kaushal, 2021). Thus, it is crucial to predict what the flu season will entail for this upcoming year in New York and thus other states in the United States of America.

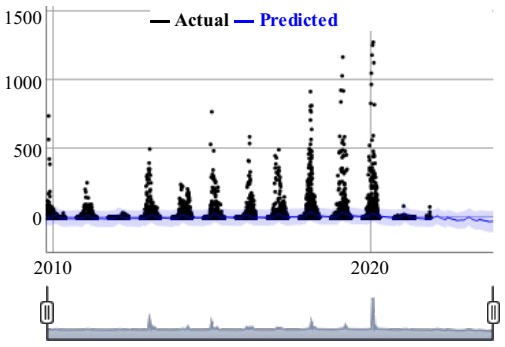
Results

By epidemiological analysis via an epidemic curve, figure 1's first plot (a) shows that the region with the most cases was New York city with over 1,000 cases. The metro and western districts have similar incidences of cases while the capital district has the least amount of cases. The bottom of figure 1 (b) shows the incidence of cases in New York based on the influenza type. The figure depicts that the type of influenza that is the most prominent in New York is tied between influenza A and Influenza B overall. However, every flu season differs. The number of flu cases was higher for the majority of the years for Influenza A, but Influenza B and influenza A were closely tied in 2020.

As for figure 2, it depicts a future prediction of the influenza seasons. The figure is an interactive model that shows the actual and predicted number of cases in New York from 2009-2020. Then the model predicts the influenza seasons for 2021- 2022 and 2022-2023. According to the model, the influenza season for 2021-2022 will be similar to 2020-2021 with a peak in cases happening around late January and early February.

`Therefore, figure 2 can help to make decisions on how to handle the upcoming influenza season, but also`





Conclusion

Being able to predict the upcoming influenza seasons for New York can help to better understand how to protect the citizens of New York along with the rest of the United States. Influenza has affected the world for centuries, and has continued to impact various parts of the world including the United States. There are states that have higher incidence of influenza such as New York. The state of New York is particularly important when monitoring the influenza season due to its high travel volume as well as being the epicenter for transmission of other viruses such as SARS-COV-2. By plotting the incidence of cases in various regions of New York along with the prediction model, a prediction can be made that influenza should still be a virus to monitor in New York especially in regions with higher incidences of cases such as New York city. With this monitoring, the influenza season can hopefully be controlled before it affects a large number of Americans.

References

S. A., By, -, & ShareAmerica. (2019, October 21). Top 3 U.S. states international tourists visit.

ShareAmerica. Retrieved from

https://share.america.gov/top-3-u-s-states-international-tourists-visit/.

Centers for Disease Control and Prevention. (2021a, February 11). Stats of the states - influenza/pneumonia mortality. Centers for Disease Control and Prevention. Retrieved from https://www.cdc.gov/nchs/pressroom/sosmap/flu_pneumonia_mortality/flu_pneumonia.htm.

Centers for Disease Control and Prevention. (2021b, November 2). Types of influenza viruses. Centers for Disease Control and Prevention. Retrieved December 7, 2021, from https://www.cdc.gov/flu/about/viruses/types.htm.

James, M. K. ., Kishore, M., & Lee, S.-W. (2020, October 22). Demographic and socioeconomic characteristics of COVID-19 patients treated in the Emergency Department of a New York City Hospital - Journal of Community health. SpringerLink. Retrieved from https://link.springer.com/article/10.1007/s10900-020-00937-2.

Kaushal, N. (2021, September 16). Southern hemisphere seasonal influenza. Outbreak Observatory. Retrieved from https://www.outbreakobservatory.org/outbreakthursday-1/9/16/2021/southern-hemisphere-seasonal-influenza.

Pappas, G., Kiriaze, I. J., & Falagas, M. E. (2008, February 21). Insights into infectious disease in the era of Hippocrates. International Journal of Infectious Diseases. Retrieved December 7, 2021, from https://www.sciencedirect.com/science/article/pii/S1201971207002123.

PHMC. (2021). 1918 influenza epidemic. Pennsylvania Historical & Museum Commission. Retrieved from https://www.phmc.pa.gov/Archives/Research-Online/Pages/1918-Influenza-Epidemic.aspx.

Ritchie, H., Mathieu, E., Rodés-Guirao, L., Appel, C., Giattino, C., Ortiz-Ospina, E., Hasell, J., Macdonald, B., Beltekian, D., & Roser, M. (2020, March 5). Coronavirus pandemic (COVID-19) - statistics and Research. Our World in Data. Retrieved from https://ourworldindata.org/coronavirus.

World Health Organization. (2021, November 22). Current influenza update. World Health Organization. Retrieved from https://www.who.int/teams/global-influenza-programme/surveillance-and-monitoring/influenza-updates/current-influenza-update#:~:text=Influenza%20Update%20N%C2%B0%20406&text=Globally%2C%20despite%20continued%20or%20even,activity%20remained%20at%20interseasonal%20levels.