Effects of public health measures on the spread of COVID-19

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Introduction

Before the discovery and widespread availability of the coronavirus vaccine, local, state, and federal agencies tried to rely on various nonpharmaceutical interventions to slow down the spread and lower mortality from the pandemic. Initially, these interventions were implemented with great variability and vigorousness until the Centers for Disease Control began to coordinate preventative efforts. Consequently, various actions drew criticism and raised questions about the efficacy of these procedures. With minimal research focused on the impact of different states' policies on COVID-19 infection rates, this research aims to determine the relative success of the different nonclinical interventions in lowering incidence rates.

Figure Analysis

The figures displays the state data we extracted and inputted into R studio for graphical analysis. Red trendlines represent policy measures that elicited an increase in the weekly rates of COVID-19, yellow trendlines represent 'neutral policies' that did not increase or decrease infection rates, and green trendlines represent policies that were 'beneficial,' as they decreased the amount of infections. Blue trendlines are policies not directly related to curtailing the pandemic. Despite variations, each state experienced a surge of green trendlines during a similar time period.

Figure 1 represents Missouri, Figure 2 represents Illinois, Figure 3 represents Minnesota, Figure 4 represents Iowa, and Figure 5 represents Kansas.

Methods

To achieve our objective, we utilized the raw data archived at the repository for the 2019 Novel Coronavirus Visual Dashboard operated by the Johns Hopkins University Center for Systems Science and Engineering (JHU CSSE). Relevant data were extracted to compare five Midwestern states: Iowa, Minnesota, Missouri, Kansas, and Illinois. into R studio and converted to graphical models. Trend lines were superimposed onto the graph to show how the policy measure affected the total number of COVID-19 cases on a weekly basis.

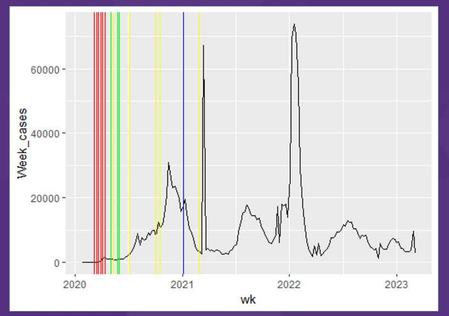

Figure 1

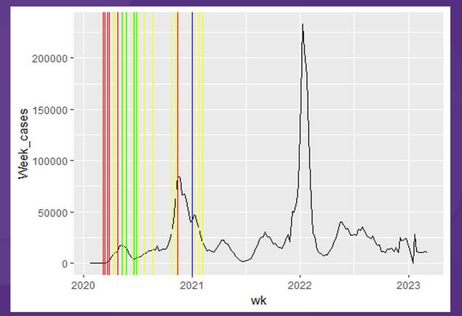

Figure 2

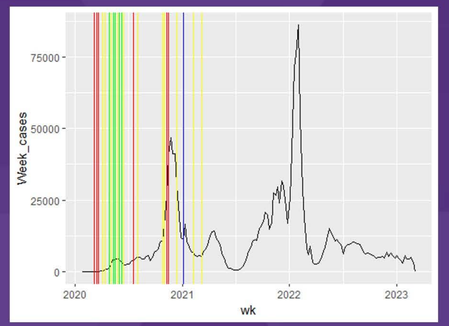

Figure 3

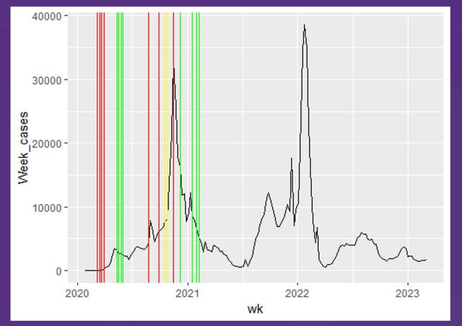

Figure 4

Results

We found that of the five midwestern states analyzed, cases first peaked in April 2020 despite policy variations. Furthermore, cases stabilized during July 2020 across all states. Lastly, when looking at a resurgence in COVID infection rates, the period was once again similar occurring during late fall and early winter of 2020. Therefore, we put forth that seasonal variations contributed to the spread of COVID-19 prior to the vaccine rollout, rather than specific policy measures.

Conclusion

In conclusion, the project's analysis demonstrates that while midwestern states varied in their policy measures and implementation periods, the rates of COVID-19 were quite similar. These trends are hypothesized to be due to weather patterns. In the event of future pandemics, the authors hope that the analysis performed in this project will prove helpful for public health advisors in deciding which measures to implement.

Acknowledgments

We thank Johns Hopkins University Center for Systems Science and Engineering for operating the Novel COVID-19 Dashboard, whose data was used for this research project.

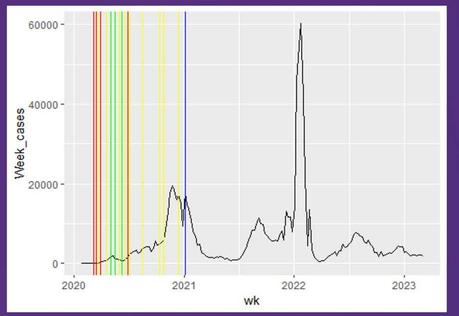

Figure 5