

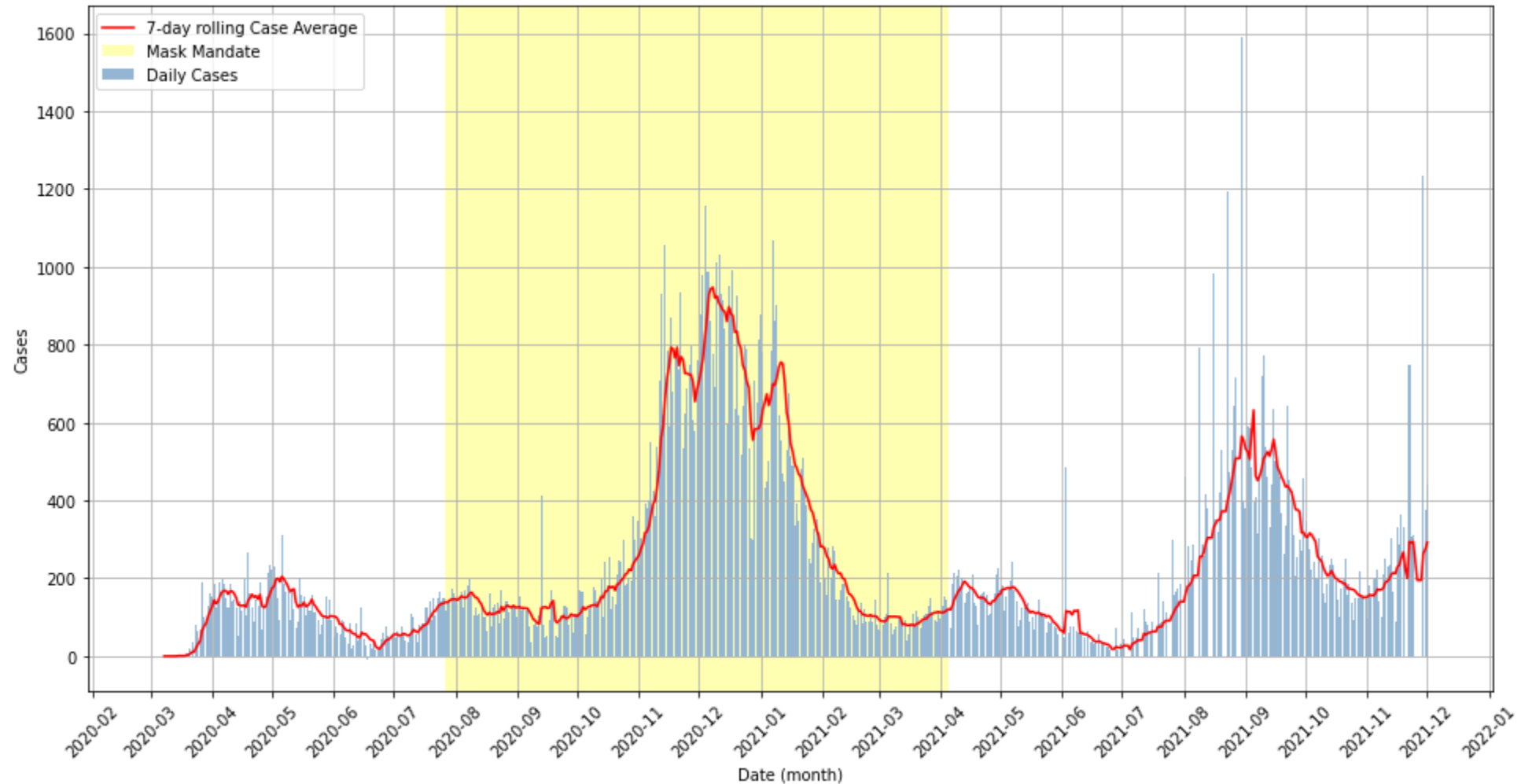


PREVALENCE & IMPACT OF COVID-19 IN MARION COUNTY, IN

NICOLE RIGGIO

COVID-19 CASES – MARION COUNTY, IN

MARCH 1, 2020 – DECEMBER 1, 2021

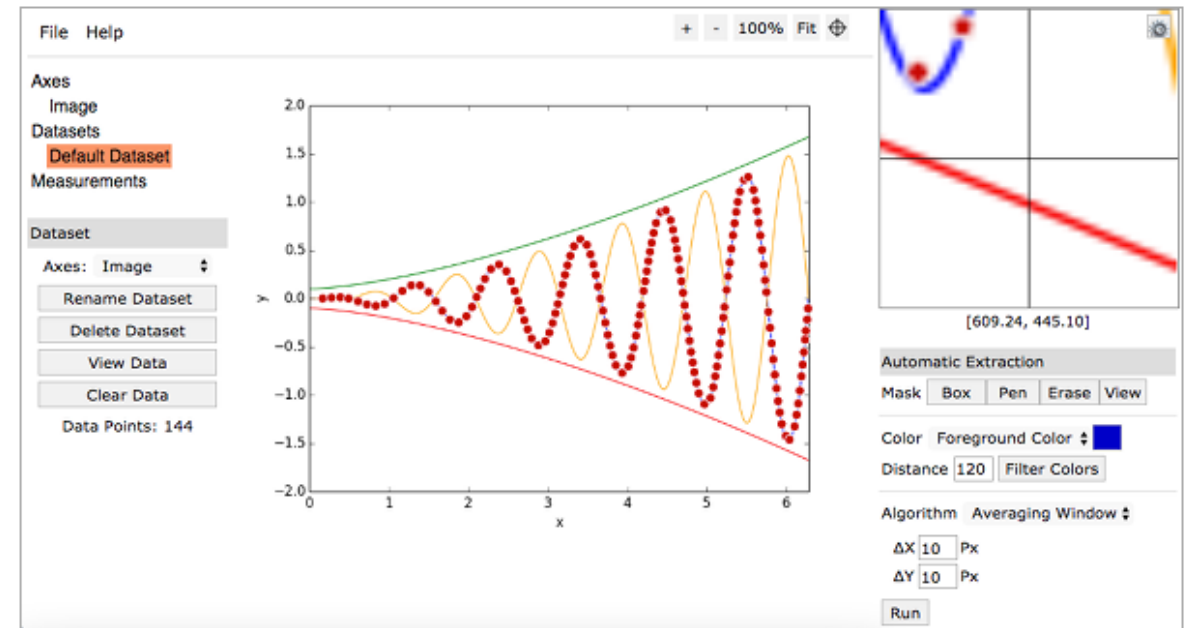


RESEARCH QUESTION & HYPOTHESIS

- Investigate how availability of ICU beds and ventilators impacted COVID-19 outcomes in Marion County, IN
- Specifically interested in any link between increased Case Fatality or Vaccination Rate after periods of peak hospitalizations
- Using hospitalizations as the baseline instead of cases because this is assumed to be a more robust metric

DATA DICTIONARY & SOURCES

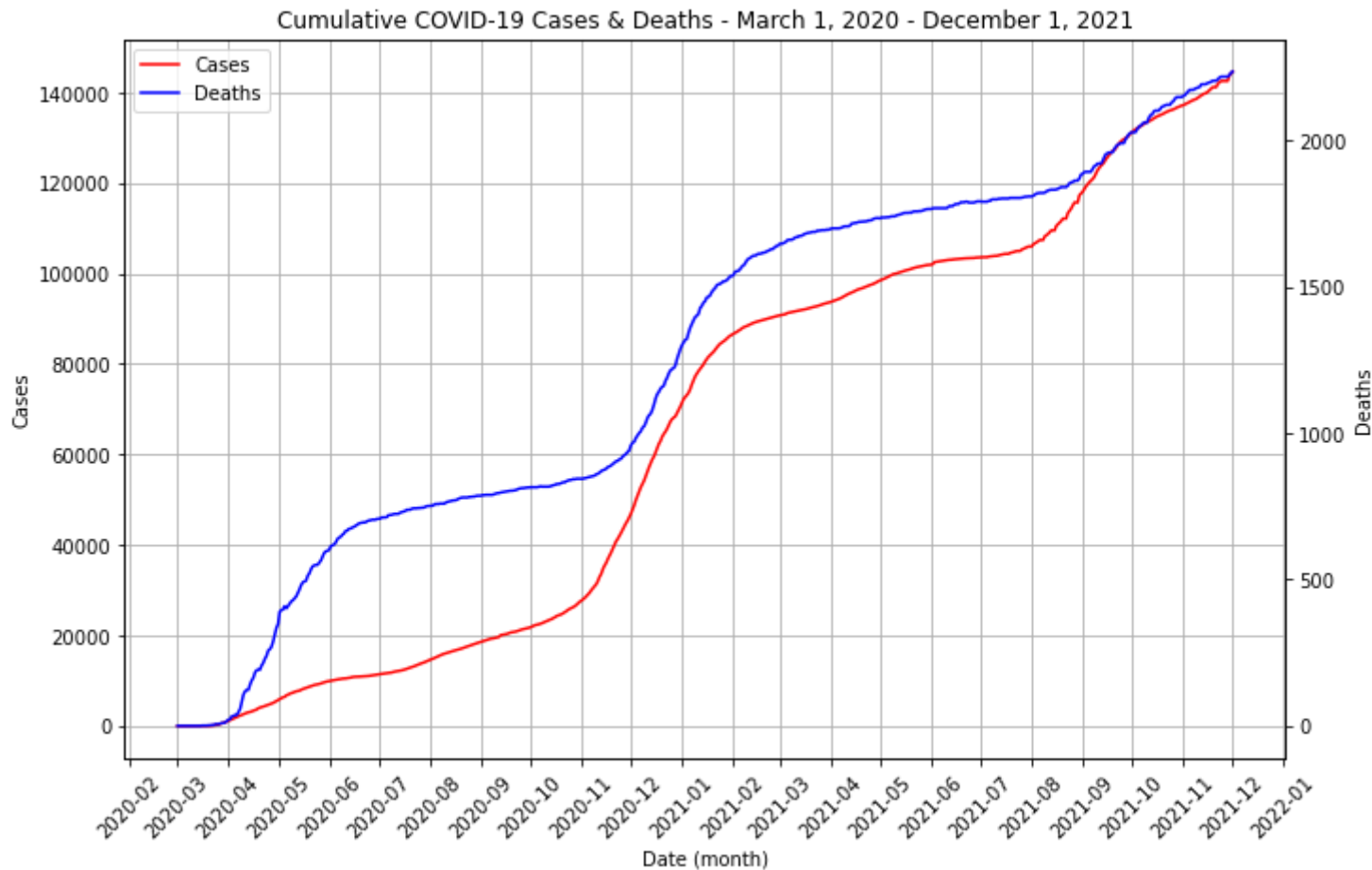
- Daily COVID-19 cases & deaths from JHU
- Vaccination data & occupancy rates from the Indiana Department of Health (IDOH)
- Hospitalizations from Marion County Health Department dashboard



DEFINITIONS

- Case Fatality Rate: proportion of people diagnosed with a certain disease who end up dying of it
- $CFR = \frac{\text{Deaths at day } X}{\text{Cases at day } (X - a)}$ where a is some constant lag value
- Potential Problems: very sensitive to choice of a

INVESTIGATING a AND CASE FATALITY RATE



- Non-constant a during the pandemic
- If a was constant, we would expect to see consistent separation
- Potentially indicative of early testing shortages

NOTE: plot has a double y-axis.

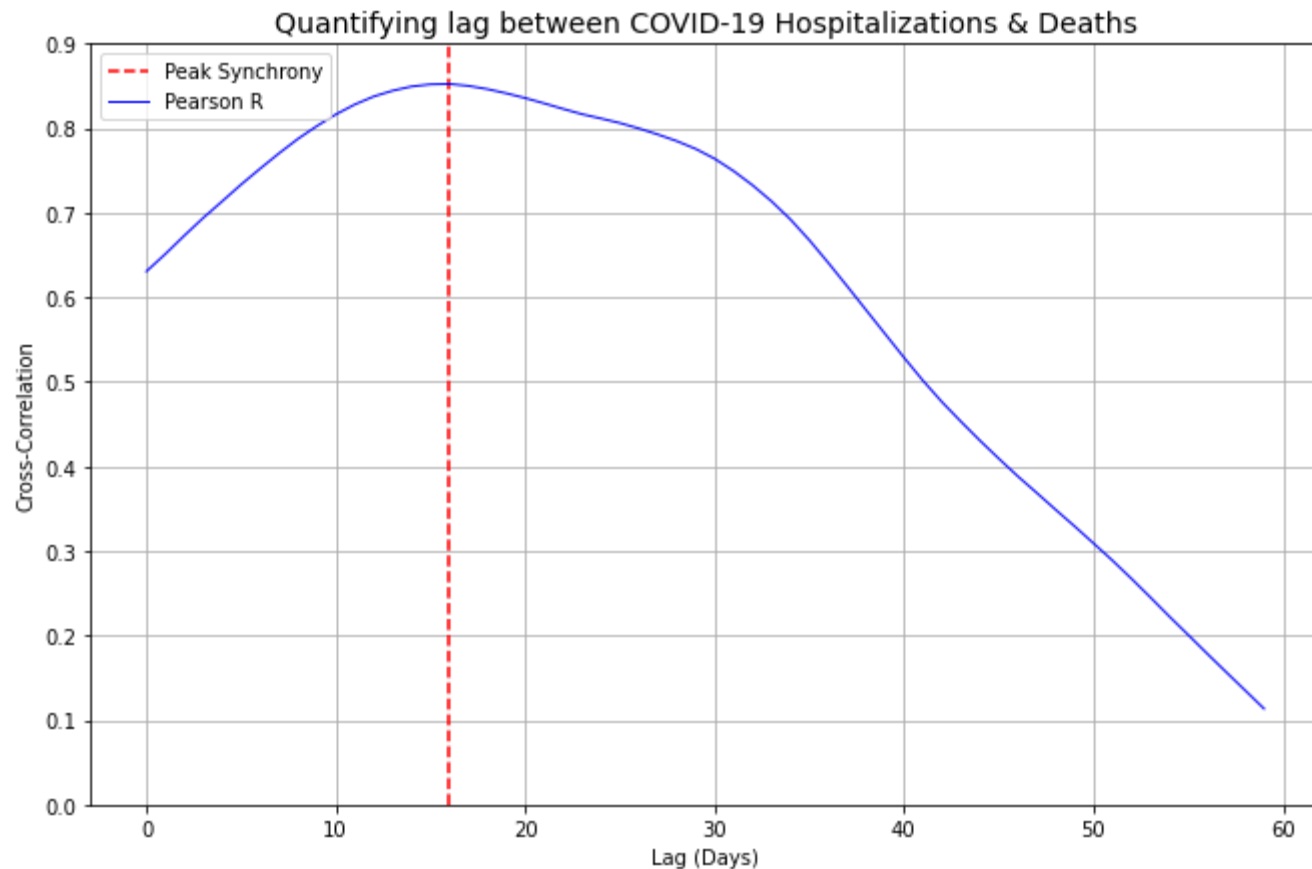
STATIONARITY & PEARSON R

- Augmented Dickey-Fuller test – reject H_0 if stationary
- 7-day rolling average helps correct for seasonality
- Hospitalizations are a stronger predictor of COVID-19 deaths than case count

	Daily Count p-value	Rolling Avg. p-value
Cases	0.231	0.097
Hospitalizations	N/A	0.037
Deaths	0.184	0.030

	Pearson R	p-value
Cases-Deaths	0.533	<0.001
Hospitalizations-Deaths	0.631	<0.001

TIME-LAGGED CROSS CORRELATION

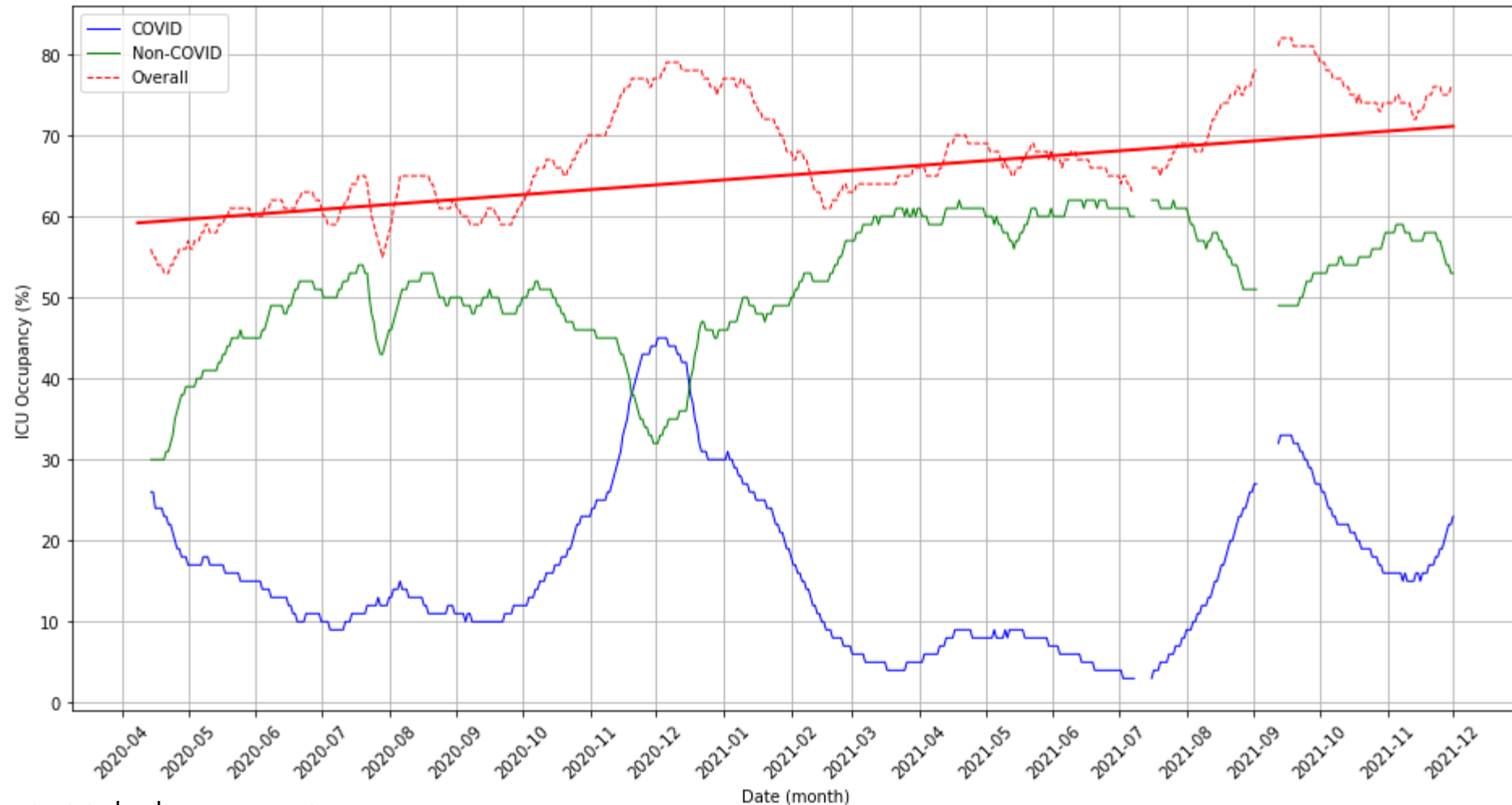


- Correlation is maximized at 0.852 with a 16-day lag between COVID-19 hospitalizations & deaths
- Can help to inform disease progression & hospital occupancy rates

EVIDENCE FOR OVERCROWDING

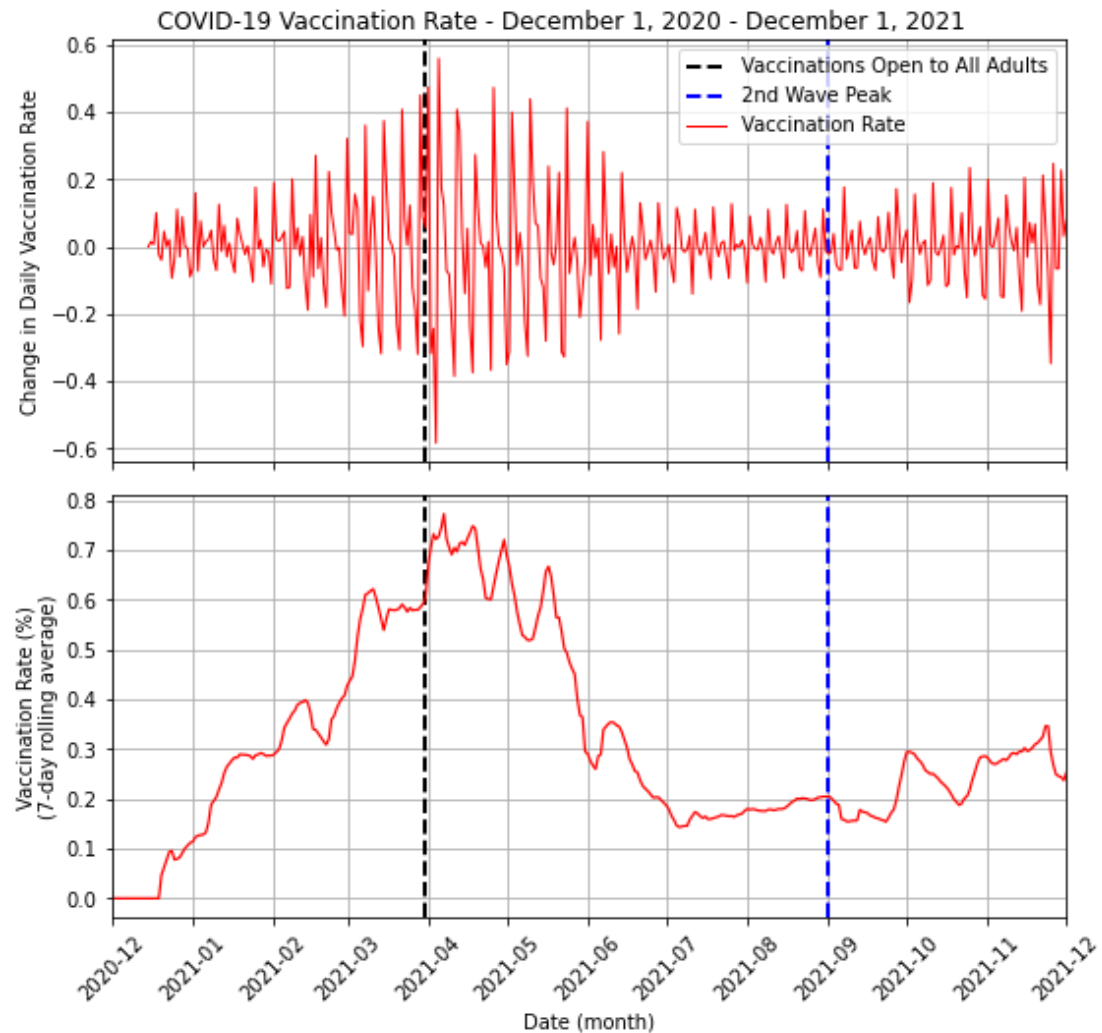
- Emergency room diversion statistics are not public
- Local news stories on diversions begin appearing in late-August 2021, right as Marion County is entering a second wave of COVID-19 infections due to the Delta variant
- Area hospitals delayed elective procedures through September 2021

COVID-19 CAUSED SPIKES IN ICU OCCUPANCY



NOTE: represents state-level occupancy rate.

DID THIS DRIVE A CHANGE IN BEHAVIOR?



- Second wave peaked during late August, this surge in cases has driven a slight uptick in vaccination rate
- Difficult to tell if this trend holds without further data
- Indiana has tried to limit enactment & enforcement of vaccine mandates

IMPLICATIONS & FURTHER ANALYSIS

- Too many unknowns to measure change in Case Fatality Rate over time with only aggregate data
- After initial rush on vaccinations, some evidence that subsequent increases in vaccination rate followed COVID-19 infection waves
- Can be used to influence public messaging on vaccinations & better anticipate ICU staffing needs