Final Project

Sidharth Bhakth, Seth Edmunds, Sha Liu

12/1/2020

Executive summary

The governor of Kansas issued an executive order requiring wearing masks in public spaces, effective July 3, 2020, which was subject to county authority to opt out. After July 3, COVID-19 incidence decreased in 24 counties with mask mandates but continued to increase in 81 counties without mask mandates. In order to analyze the transmission trend, we gathered COVID-19 case surveillance data and mobility data, and calculated effective reproduction numbers based on the case data.

CDC has reported that countywide mask mandates are effective interventions for reducing COVID-19 transmission in a community. Given that masking has been shown to reduce transmission via reduction in respiratory aerosol droplets, it would probably be a safe assumption that mandated wearing of masks in a community does play a significant role in the reduction of COVID-19 transmission. However, simply wearing a mask is only part of the overall strategy to reduce transmission. We want to know how a statewide optional mask mandate intervention impacts the effective reproduction numbers of COVID-19 between counties that opted into the mask mandate and those that didn't. We also explored how mobility may have had more significant influence on the increase or decrease of disease transmission in the counties.

We concluded that the effective reproduction number, R(t), was trending downward before the executive order requiring wearing masks in public spaces, effective July 3, 2020 in Kansas. This raises the question of whether the intervention had an impact on reducing the effective reproduction numbers of COVID-19. When comparing counties with a mask mandate and without a mask mandate in place, we observe that the R(t) of mask-mandated counties is lower than non-mask-mandated counties. However, this is due to the confounding effect of when the counties are categorized into two groups with different mobility levels to start with. We gained some insight into how mobility affects the rate of spread by including mobility data into our model. Mobility is calculated using anonymized and/or de-identified mobile device locations to measure how much distance a typical member of a given population moves in a day. We selected the variable mobility `m50` and calculated the mean of mobility `m50` for these two groups of counties. We observed that the decrease in mean of mobility `m50` has a dampening effect on the R(t) and that the counties with a higher mobility have a higher R(t). Therefore, our model suggests that reduced mobility had a larger impact than introducing a mask mandate in Kansas.