
THE UNIVERSITY *of* NORTH TEXAS
HEALTH SCIENCE CENTER *at* FORT WORTH

# HSC COVID-19 Report #6 – July 27, 2020

hsc

# State of COVID-19 in Texas

## Efficacy of statewide mask mandate, hotspot counties and mortality projections

# Conclusions from our last report in July 20

- The states with an early mask mandate have been mostly able to protect against the June surge
- In Dallas and Tarrant counties with mask mandates effective in the third week of June showed a reversal of trend in the $R_0$ values and the raw daily hospitalization and ER visits data for suspected COVID patients showed stabilization
- The results provided evidence for the efficacy of the mandate although other factors such as reduced retail mobility (including closure of bars) also likely contributed
- Although the number of daily new hospitalizations in the four DFW metroplex counties have stabilized, the hospitals have been operating at close to 80% capacity with little headroom to handle another surge

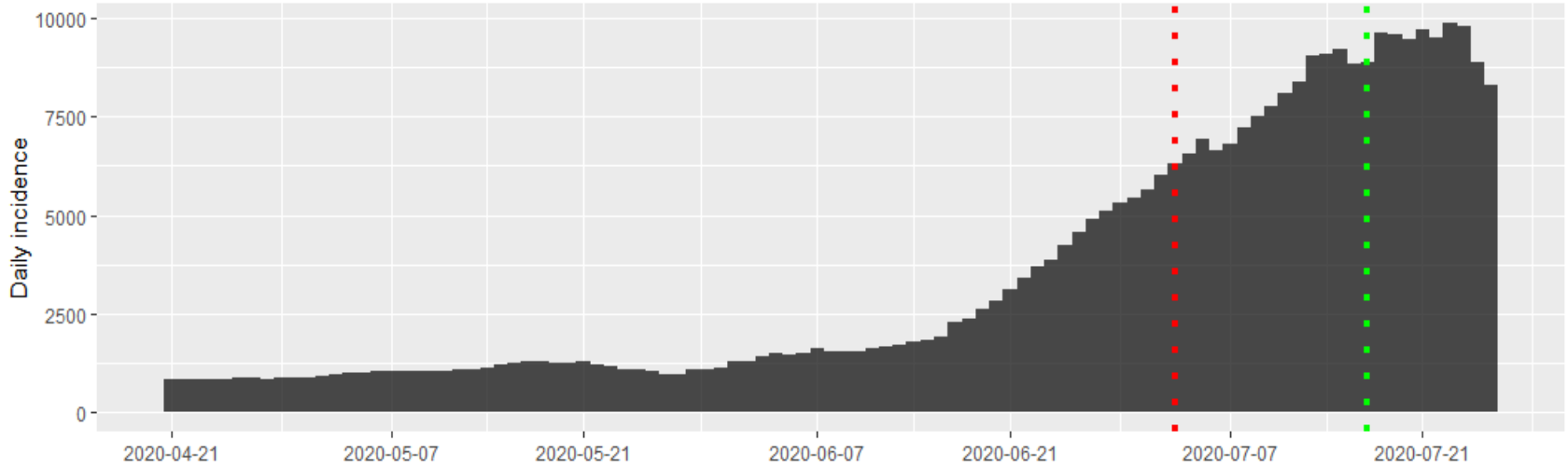
# Key questions looming currently

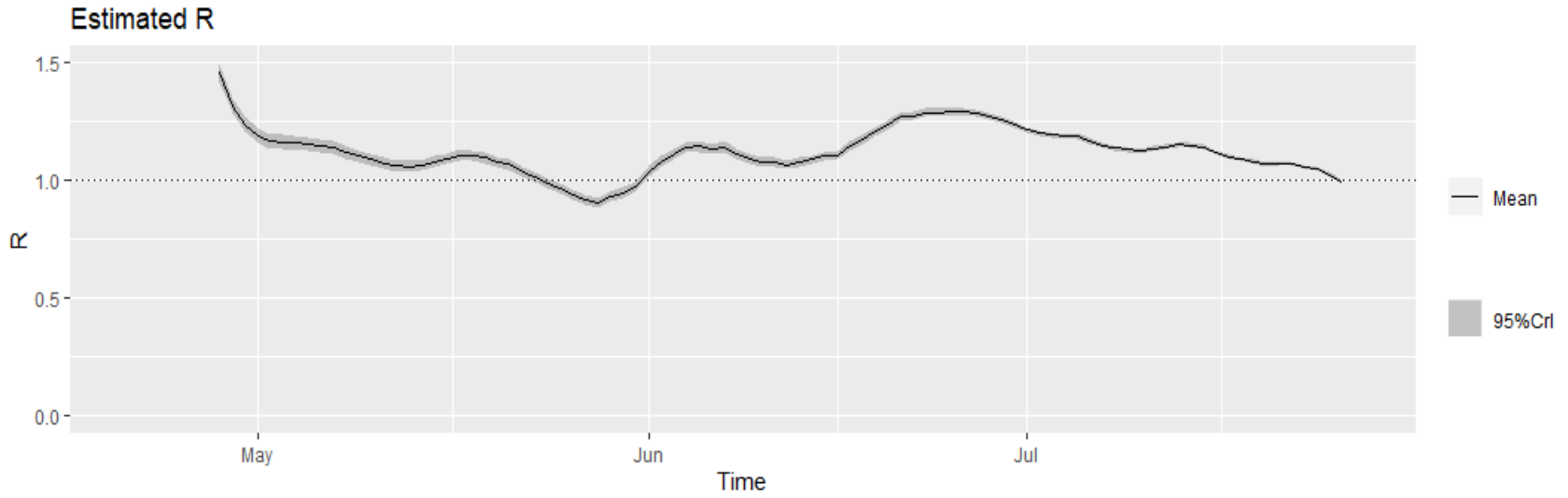
- Since the statewide mask mandate was effective July 3, it was too early to observe any impact of the mandate at the time of the last report
- Since enough time has passed after the mandate has been issued, it is time to ask if the mandate has been effective statewide, not just in specific counties
- What are the current hot spots in Texas?
- Are there counties that need special attention?
- How alarming is the current COVID-19 related mortality trend?
- What is the path forward?

# How to assess the efficacy of mask mandate?

- We will attempt to assess the efficacy of state mask mandate using multiple approaches
- First, we will analyze the combined statewide data and estimate the time varying $R_0$ values to study the impact of the mandate
- Second, for each county, we will compare the $R_0$ values at the time the mandate was issued with the current time period
- Next, we will identify the counties with $R_0$ value greater than 1 indicating growth in the number of daily new cases
- Finally, we will identify the counties currently at highest risk for increased transmission (hot spots)

# The statewide efficacy of the mask mandate



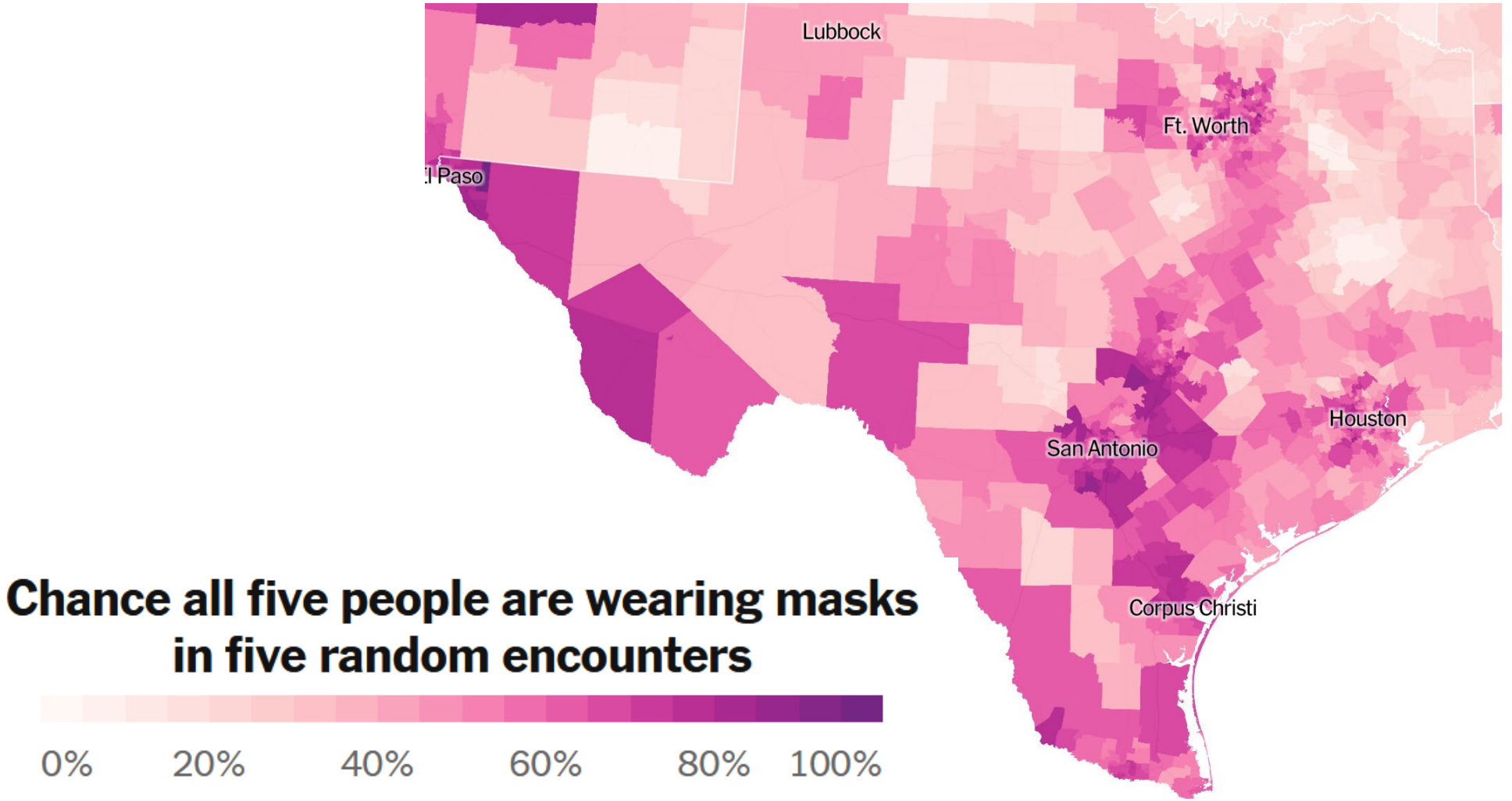

Red line – mandate effective

Green line – 2 weeks later

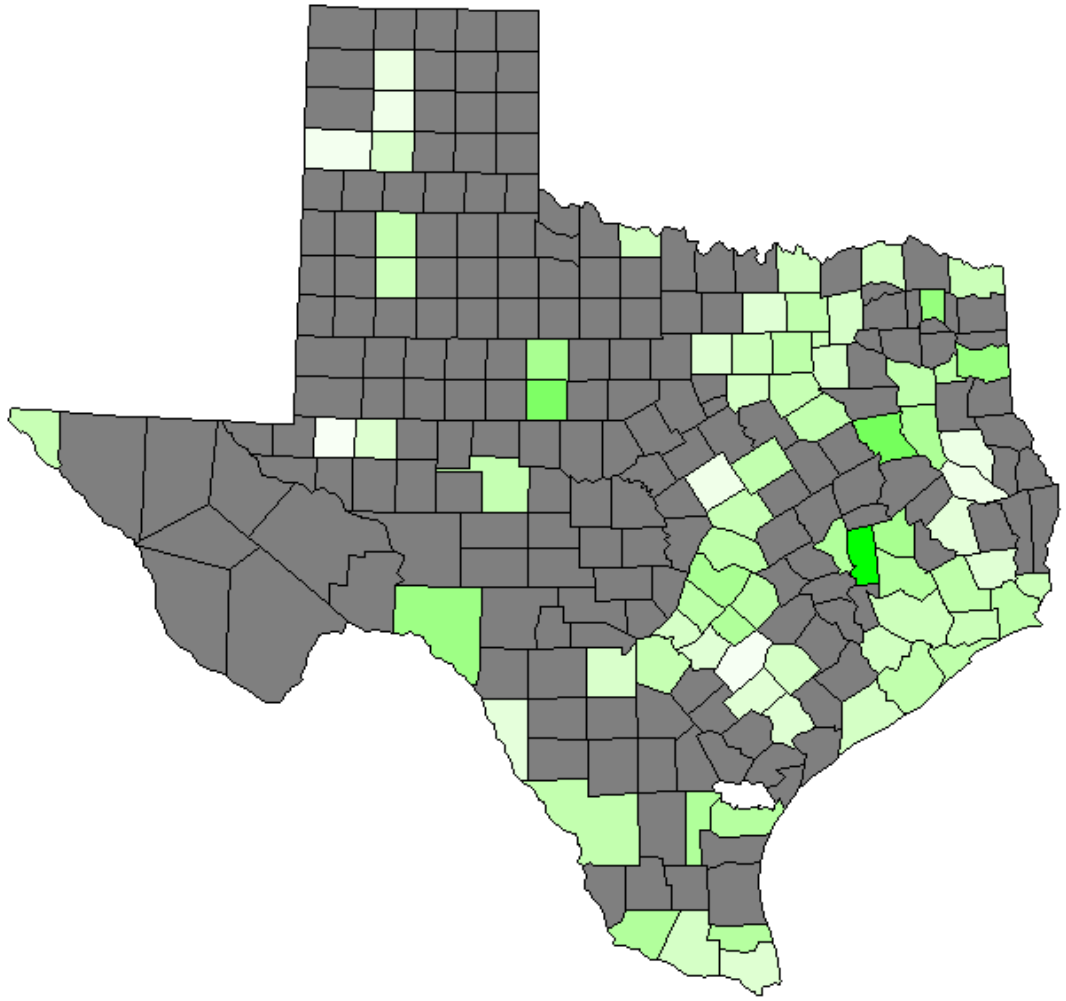
# Assessing the efficacy of the state mandate

- To reduce the weekly periodic fluctuation in reported data, a seven-day moving average of newly reported cases is taken
- For the smoothed data, it is evident that the number of daily new cases stabilize approximately two weeks after the mandate was effective, the expected timeframe to observe any impact
- The $R_0$ value also dropped from a peak value of 1.29 at end of June to 0.99
- The combined statewide data does offer clear evidence in favor of efficacy of the mandate and other measures such as closure of bars
- The mask usage map offered by New York Times (see next slide) indicate moderate to high compliance in mask usage at public places (stronger in metro areas)

# Self-reported mask usage in Texas

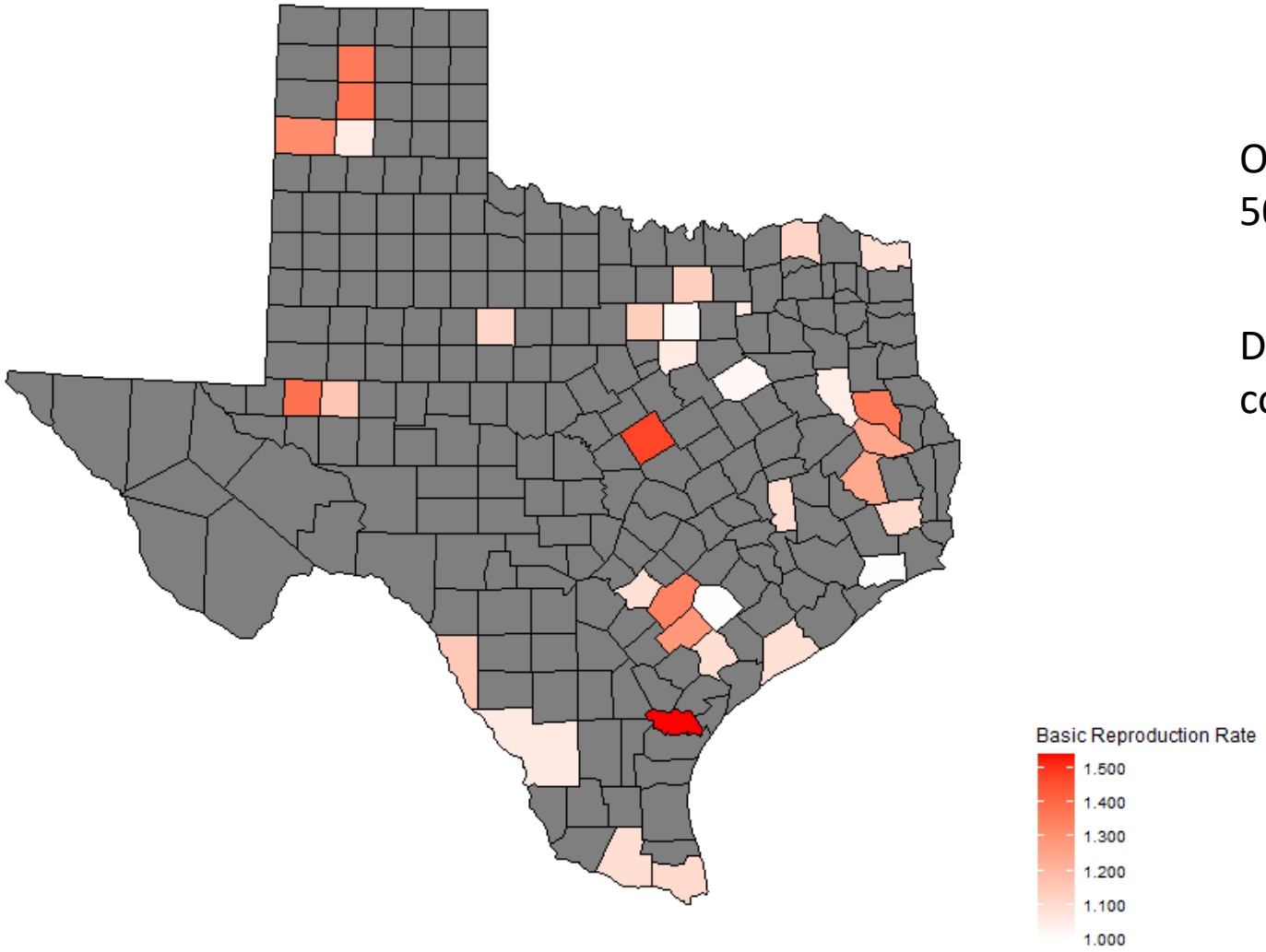


# Change in $R_0$ values since July 1




Only counties with total more than 500 cases are considered

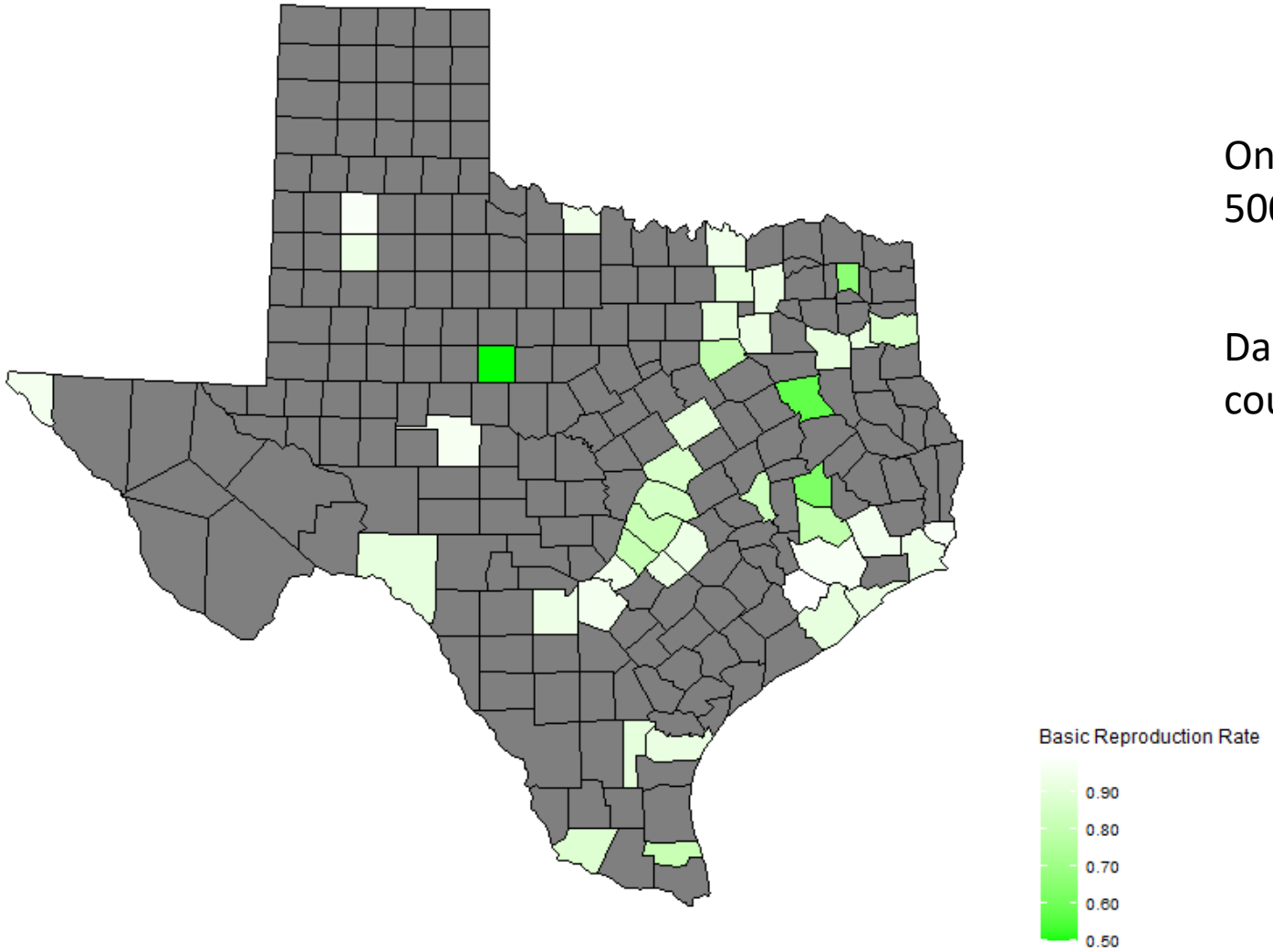
# Counties with current $R_0$ values at 1 or more




Only counties with total more than 500 cases are considered

Daily new cases growing in these counties

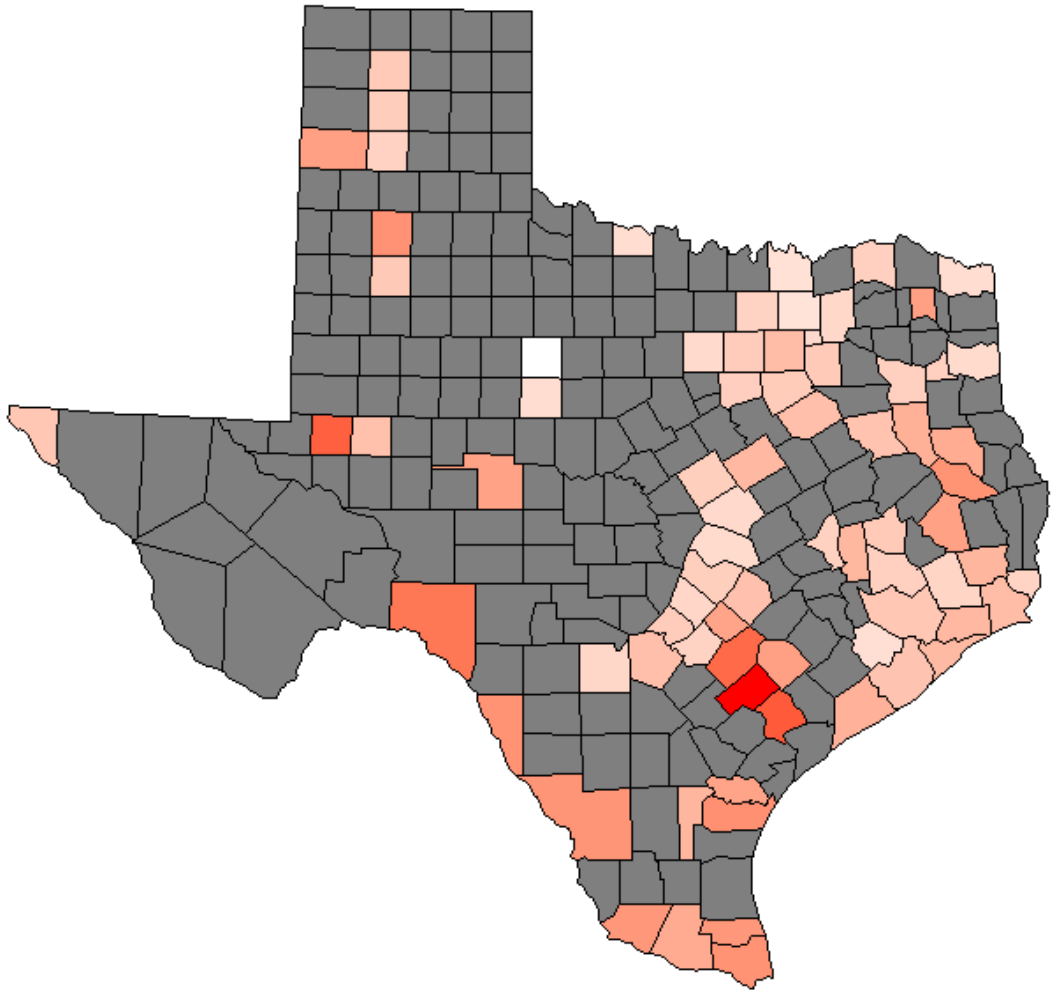
# Counties with current $R_0$ values less than 1




Only counties with total more than 500 cases are considered

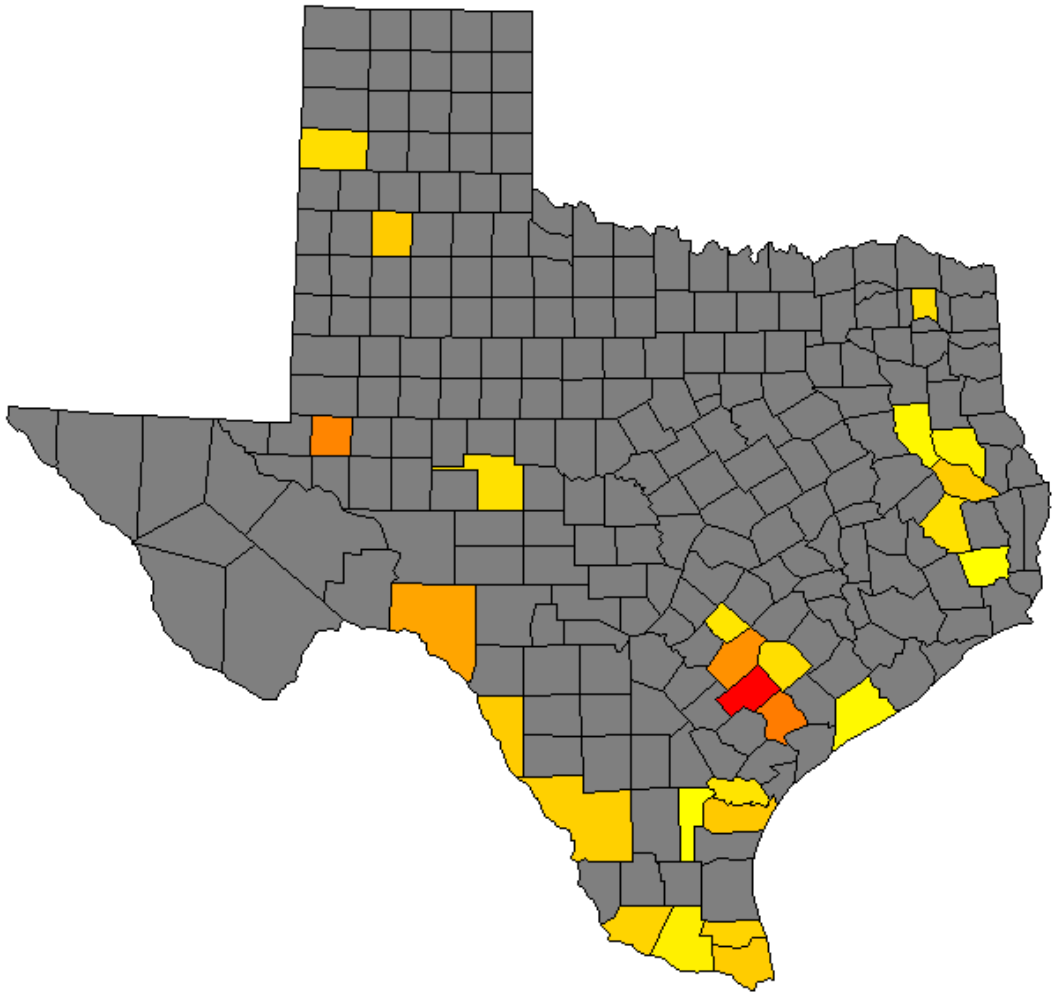
Daily new cases declining in these counties

# Average daily cases per 100,000 people in the past week




Only counties with total more than 500 cases are considered

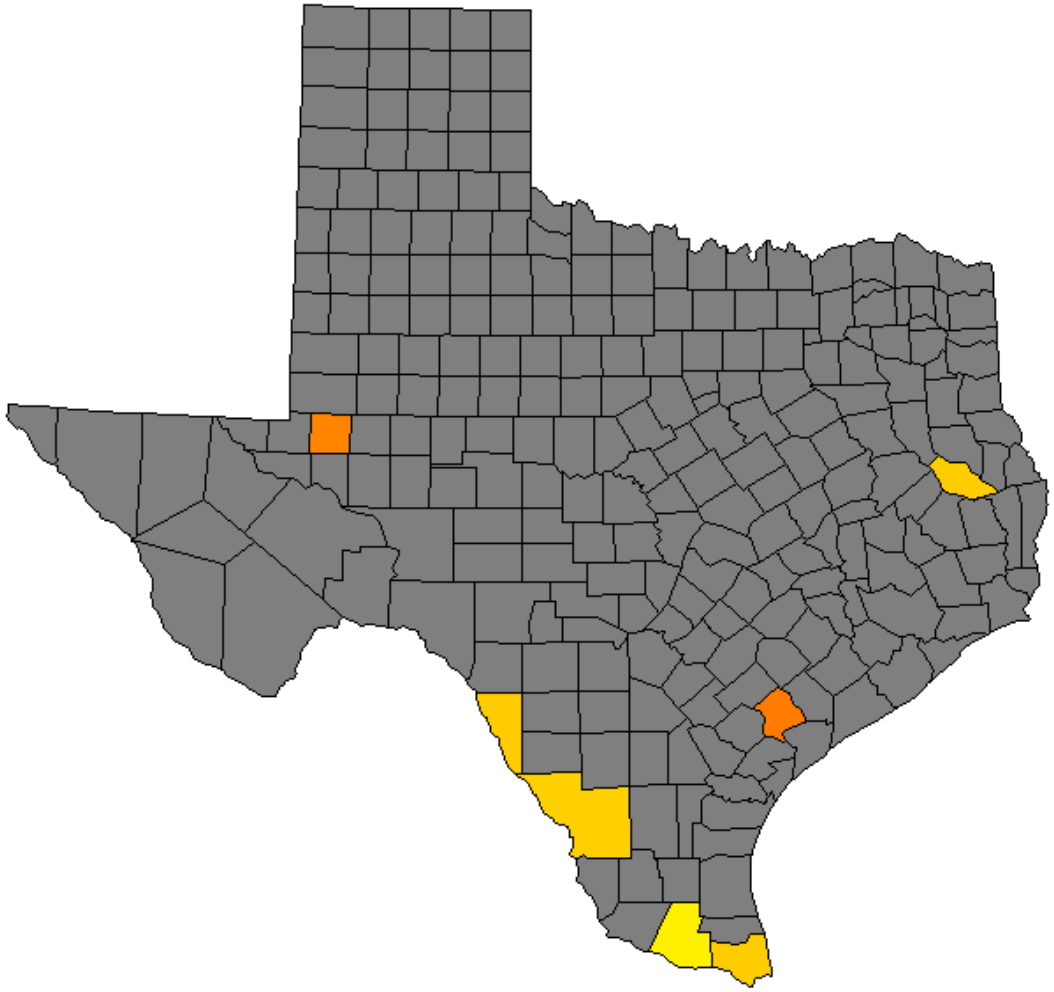
# Hot Spots




Only counties with total more than 500 cases are considered

Average daily cases per 100,000 people in the past week > 40

# Super Hot Spots




Only counties with total more than 1000 cases are considered

Average daily cases per 100,000 people in the past week > 40

Cases are growing, $R_0 > 1.05$

# Observations from the plots

- We considered all counties in Texas with a total number of reported cases being at least 500
- The criterion is satisfied by 76 counties, which are the most affected counties
- To study the potential impact of the mask mandate at the county level, we compared the $R_0$ values before the mandate was effective with the current values
- In all but one of the 76 counties, the $R_0$ value declined which indicates that the mandate (along with other possible factors such as closure of bars and reduced retail mobility) likely has been effective in reversing the rate of growth in COVID transmission (Slide 9)
- In San Patricio county (total reported cases 666), $R_0$ value stayed the same.

# Observations from the plots

- Currently in 34 counties, the current $R_0$ value is still over 1 indicating an increase in the average number of daily new reported cases (slide 10)
- In the remaining 42 counties, the current $R_0$ value is below 1 indicating a decline in the average number of daily new reported cases (slide 11)
- Even though the total number of statewide daily new cases have stabilized (or may be showing signs of decline), there are counties where we still observe growth in the average number of daily new reported cases
- This prompted us to identify specific counties where the condition is particularly alarming

# Hot spots

- Currently, the national average number of new cases per 100,000 population is approximately 20
- We are defining counties with more than twice the national average as hot spots for COVID transmission
- In slide 13, 24 potential hot spot counties have been identified
- Not all these counties are at similar risk, since in some counties the cases may be declining, or the total number of positive cases is relatively low
- Next, we will identify the counties currently at highest risk

# Super Hot spots

- **Among the hot spot counties, we define the super hot spots as counties satisfying the following additional criteria**
  - **Total number of reported cases being at least 1000**
  - **Current $R_0$ value is greater than 1.05 indicating sustained increase in the average number of daily new reported cases**
- **7 counties are classified as super hot spots based on the above criteria - Angelina, Cameron, Ector, Hidalgo, Maverick, Victoria and Webb**
- **San Patricio County has not been marked as super hot spot for hitting the 1000 cases mark, but the current $R_0$ value is alarmingly high at over 1.5**
- **Hidalgo county is particularly vulnerable due to the large number of reported cases**

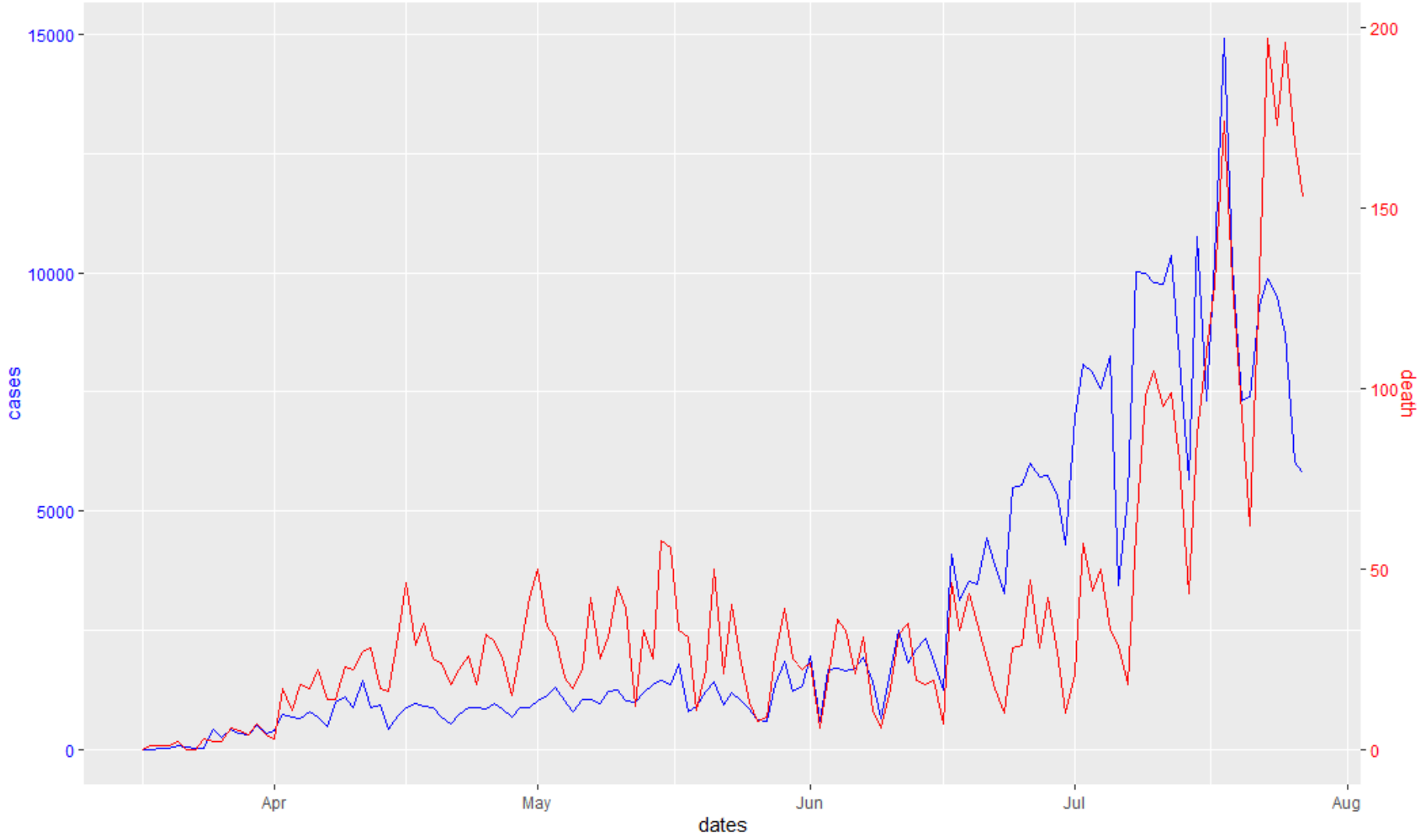
# Conclusions from the statewide study

- The mask mandate (along with other measures such as closure of bars and reduced retail mobility) likely has been effective in reversing the rate of growth in COVID transmission
- Among the 76 worst hit counties in Texas, the $R_0$ value is still over 1 in 34 counties, which is a cause of concern
- Also, extra attention is needed for the seven counties classified as Super Hot Spots
- Furthermore, even though the statewide numbers have stabilized, we are still operating at a very high level of number of new cases and hospitalizations
- In the hardest hit counties, hospitals are operating at near full capacity running the risk of overwhelming the health care facilities, which runs the risk of increased mortality
- There is also the risk of a shortage of health care pofessionals as there is evidence of fatigue among health care professionals from their relentless work since the start of the pandemic

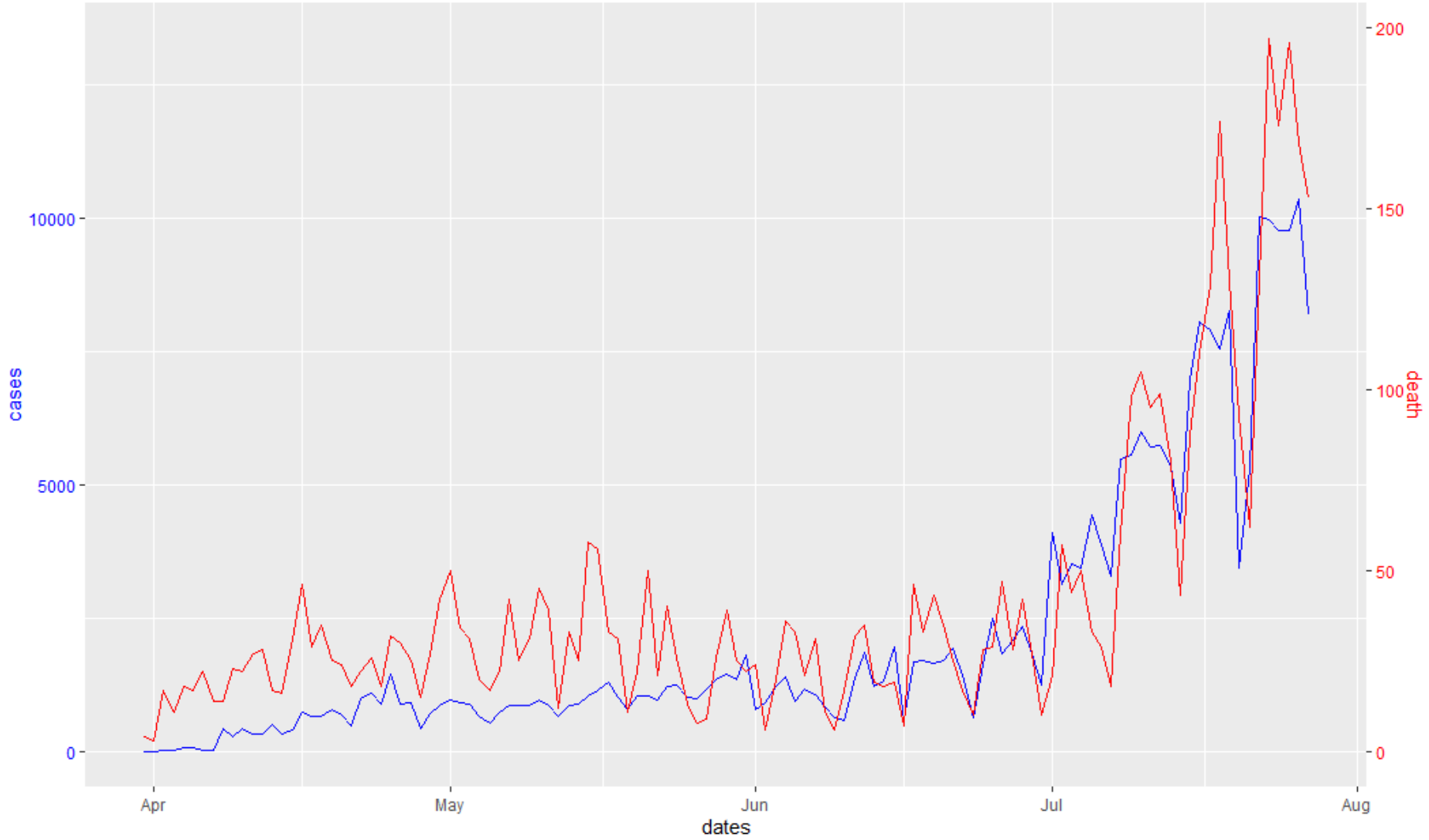
# COVID-19 related mortality in Texas

- Even though the mask mandate appears to be effective in controlling the growth in the number of daily new reported cases, the number of reported COVID-19 related deaths is still showing an increase, which is quite alarming
- However, there is a significant lag in mortality trend from the daily reported cases trend
- We will now explore what to expect in future in terms of mortality.

# Daily statewide reported cases and death



# Daily cases shifted by 14 days to account for the lag



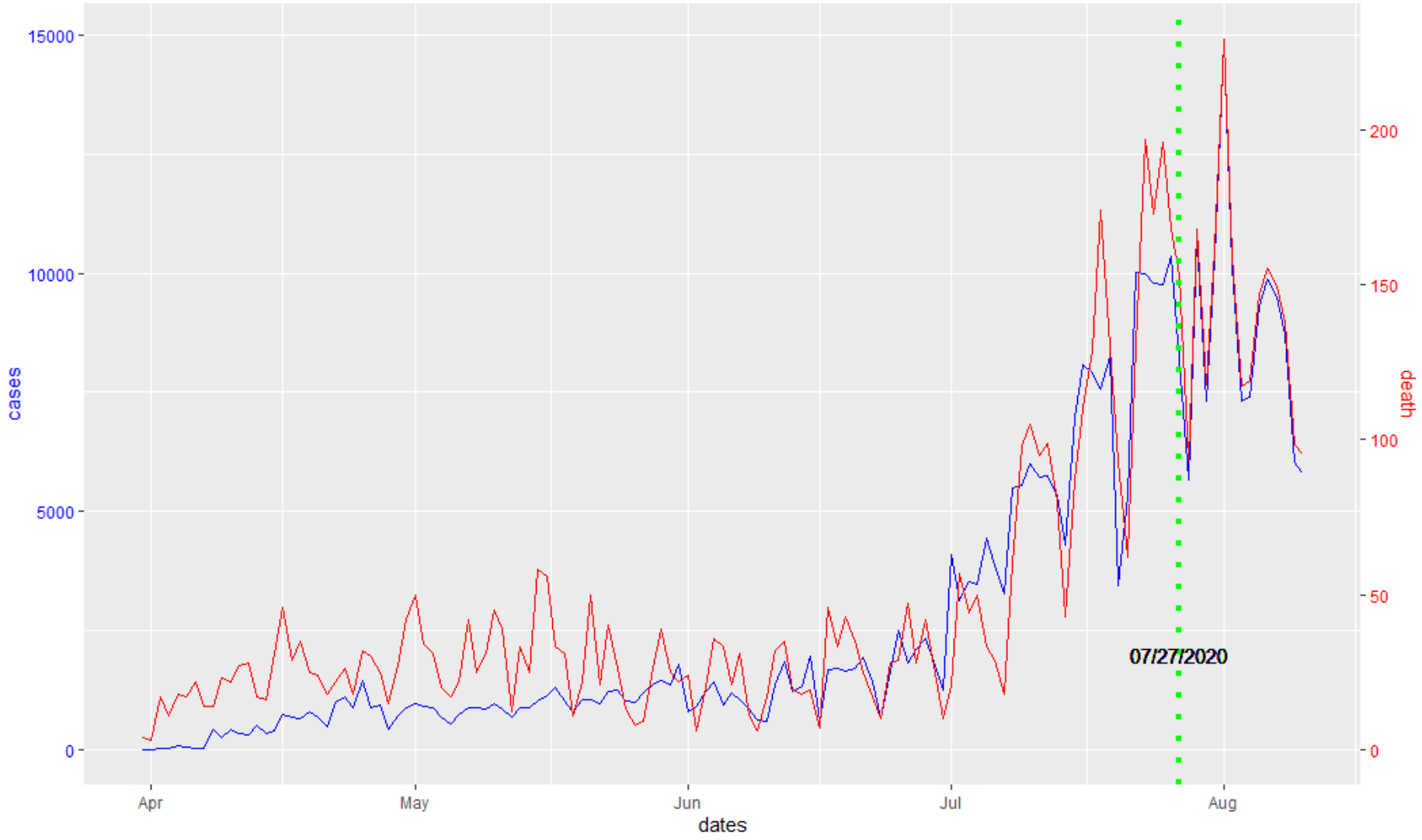
# COVID-19 related mortality forecast

- Slide 21 overlays the mortality data on the daily reported cases data to visually observe the lag in trend
- Our analysis finds a lag of 14 days between the trend for daily new reported cases and the daily new reported death offer the best fit with a very high correlation of 0.91
- The correlation increases to 0.95 if a 7-day moving average is taken
- Slide 22 overlays the mortality data on the daily reported cases data accounting for the 14-day lag in trend offering a near perfect match

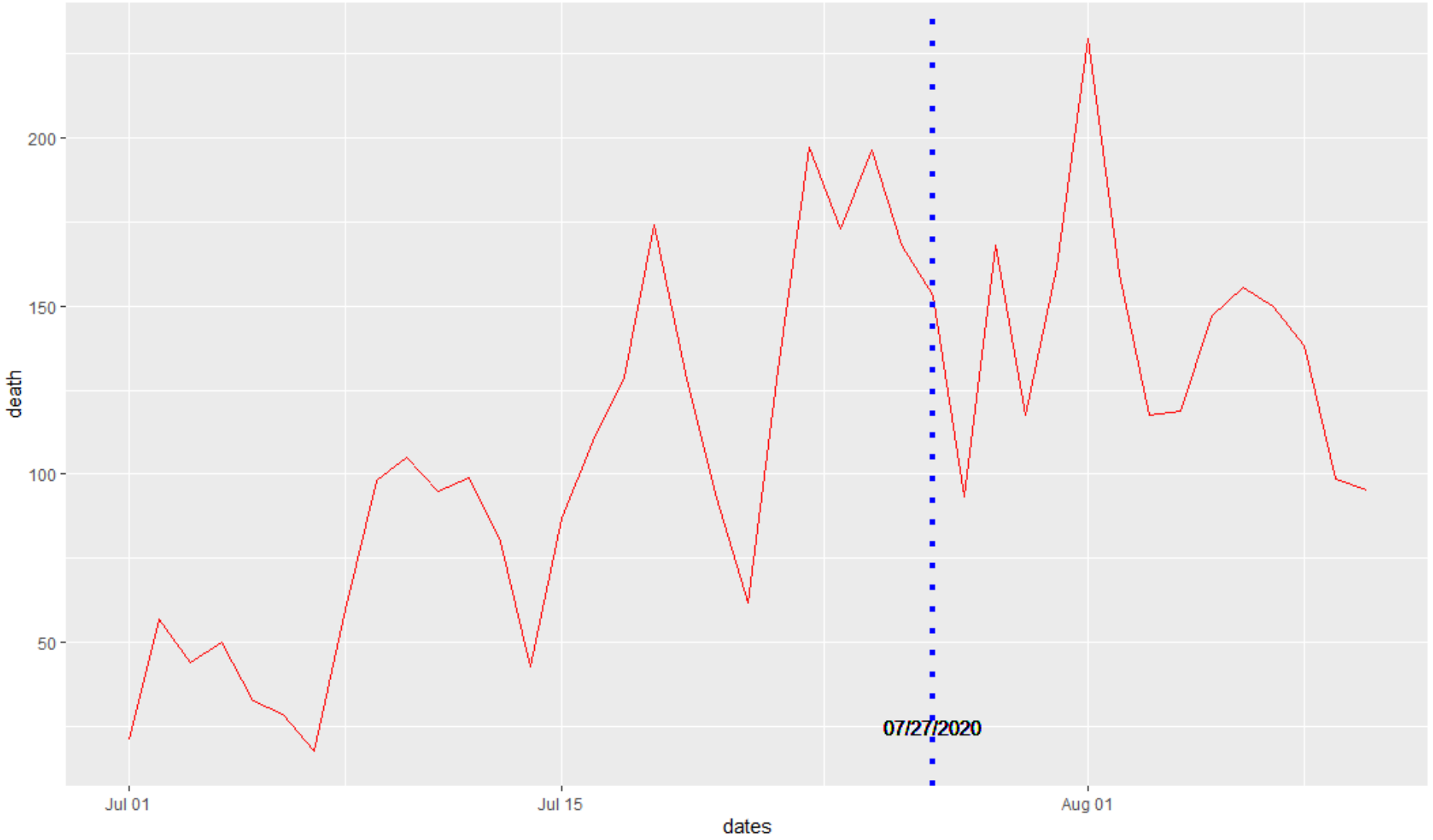
# Mortality forecast for the next two weeks

- We use regression to forecast the number of deaths in the next 14 days
- Our forecast on the number of deaths is presented in the following two slides
- Our model predicts that the number of death will exhibit a declining trend beginning Aug 1
- We must emphasize that this is a short-term projection based on the current trend on the daily reported cases
- If the number of daily cases starts rising again, so will the number of deaths with a 14-day lag
- Our estimate of the current case-fatality rate in Texas is approximately 1.7% which is much lower than the case-fatality rate in the early days of the pandemic (4%)

# Mortality forecast for the next two weeks using cases data for the last two weeks after accounting for the lag



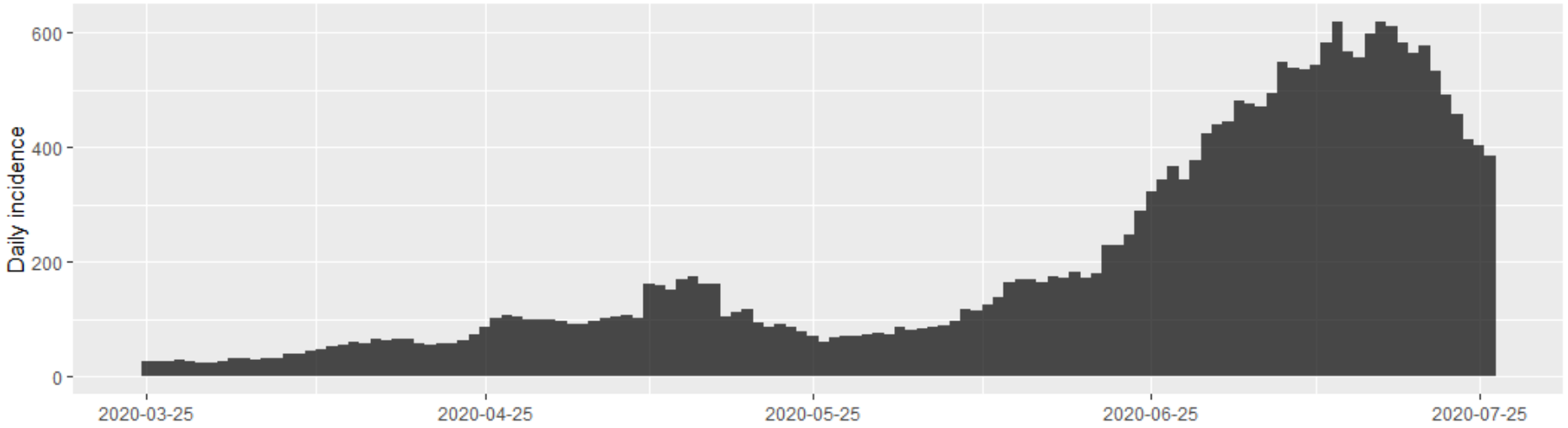
# Mortality forecast for the next two weeks in more detail

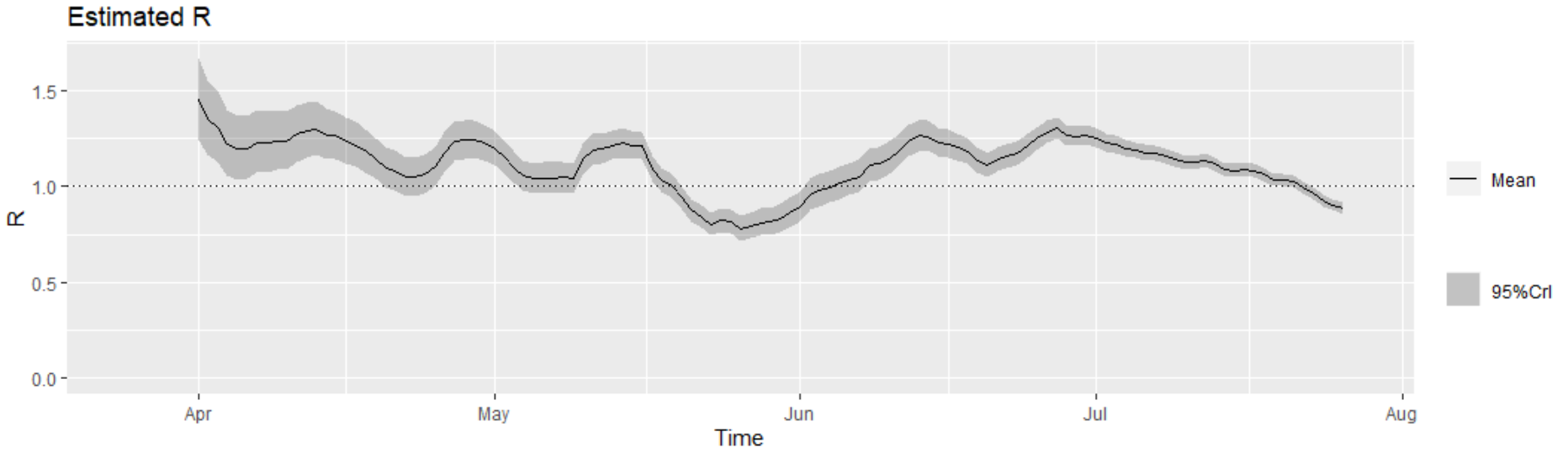


# Tarrant County

- Due to a current overhaul in the NCTTRAC database on COVID-19 related hospitalization and ER visits data, current hospitalization situation in the DFW counties is not studied in this report
- We only present the current state of COVID-19 transmission using data from Tarrant County Public Health (Slide 28)
- In our earlier report, we saw evidence of reversal of trend in Tarrant county since the surge in June and the $R_0$ value was at around 1
- The current condition indicates further improvement with the current $R_0$ value well below 1, which is also evidenced by the declining number of average new reported cases

# Tarrant county incidences and time-varying $R_0$



# Key takeaways

- The trend from the statewide data offers some reasons for optimism
- The statewide mask mandate and other local interventions appears to be effective as evidenced by a stabilization or small decline in the number of daily new cases
- Survey from New York Times indicates moderate to high compliance in mask usage at public places, especially in high density metropolitan areas
- However, since the number of daily new cases is still very high, there is little headroom towards handling another surge and strict vigilance is imperative
- A few days of good data shouldn’t make us complacent because it’s a long game until we have a vaccine or a treatment that’s established to work very well
- We have identified counties at high risk where further intervention may be needed

# Key takeaways (cont.)

- The current upward trend in COVID-19 related mortality is quite alarming
- However our model predicts a reversal of the trend in the short run
- The case fatality rate has dropped to below 2% compared to 4% in the early days of the pandemic
- The temporal association between the issuance of mandate and the stabilization in the number of daily new cases is strong enough to conclude that the mask mandate has played an important role in controlling the surge in Texas
- Other factors such as closure of bars, drop in retail mobility, proper maintain of social distancing are also likely to have contributed to the positive change
- In Tarrant county, we observe a reversal of trend in the number of new cases

# Data sources used for this analysis

- Case and mortality counts in US counties - Johns Hopkins Coronavirus Resource Center and the COVID tracking project
- Global case and mortality counts - European Centre for Disease Prevention and Control
- Global mobility data (including US counties) – Google COVID-19 community mobility report
- Case and mortality counts in Tarrant County – Tarrant County Public Health (TCPH)
- ER visits, hospital admits, ICU admits in North Texas counties - North Central Texas Trauma Regional Advisory Council (NCTTRAC)
- Case and mortality counts in Texas – Texas Department of Health Services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