



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



# COVID-19 in DFW metroplex

**Clear evidence of increase in spread of infection  
and path forward**

# Key takeaways from our last report in May

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**When we made our last report on the impact of the COVID-19 on May 27, we were able to make these observations:**

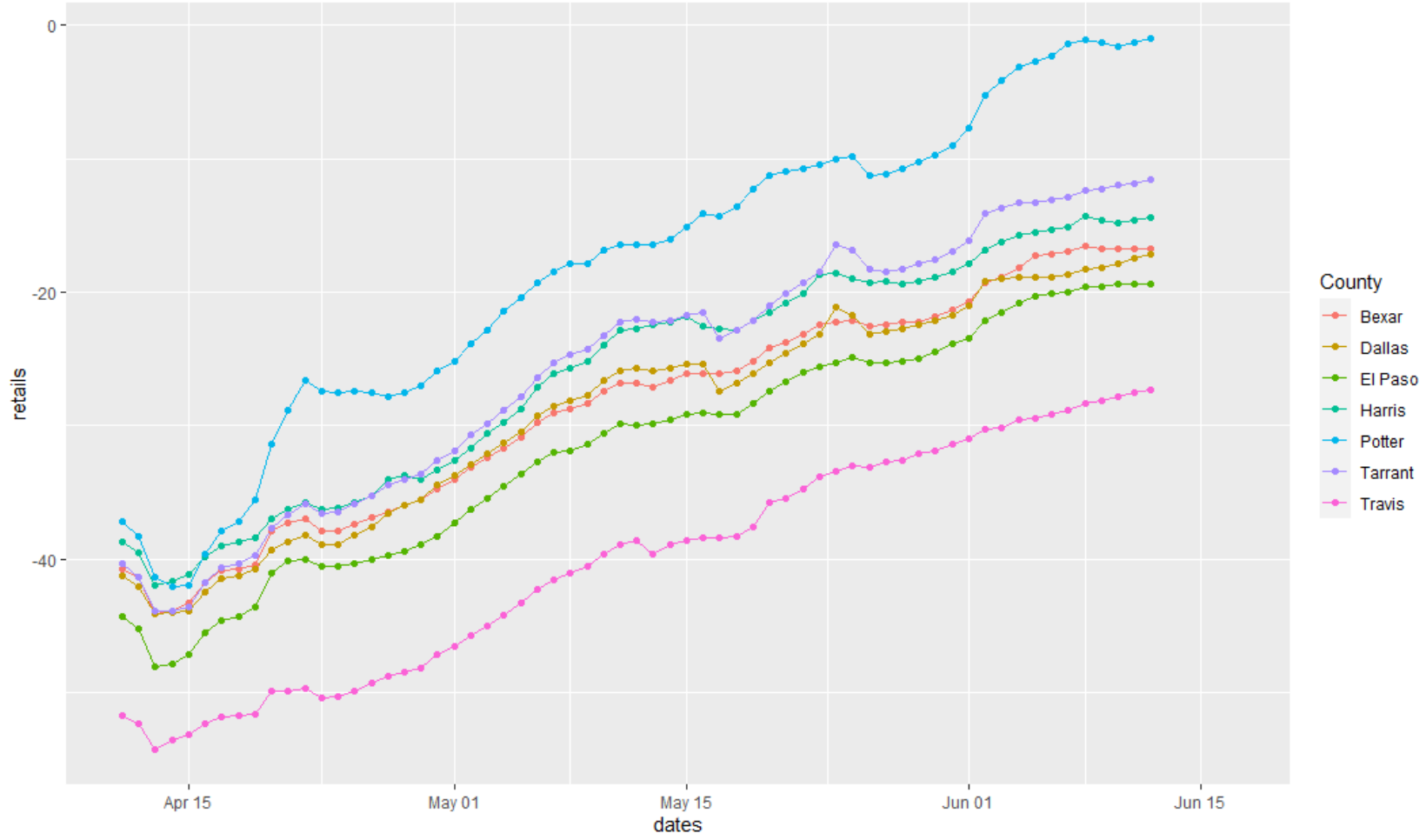
- The community trends in the U.S. show remarkable consistency across states and counties and the actual date of implementation of lockdown orders (or lifting of it) appeared to have little effect on the trend.**
- The retail mobility trend has been slowly but steadily increasing since mid-April.**
- By comparing data from Europe, it was suggested that retail mobility has to stay 15% below baseline to prevent a growth in rate of infection.**
- North Texas counties were at a delicate situation with a risk of potential upswing in the transmission of disease.**

# Key questions looming currently

**In this, our third report, we seek to answers these questions after most restrictions have been lifted and a preponderance of gatherings at a time of social unrest:**

- **Has the slow but steady increase in mobility continued?**
- **Is the increase in mobility and public gatherings having an impact on the transmission of the disease?**
- **Are we experiencing a second surge in COVID-19 transmissions?**
- **What can we learn from the available data in the county, state and elsewhere to mitigate a surge?**
- **We will examine each of these questions and make appropriate conclusions based on our findings.**

# Retail mobility for Texas counties (smoothed)



# Observations from retail mobility data

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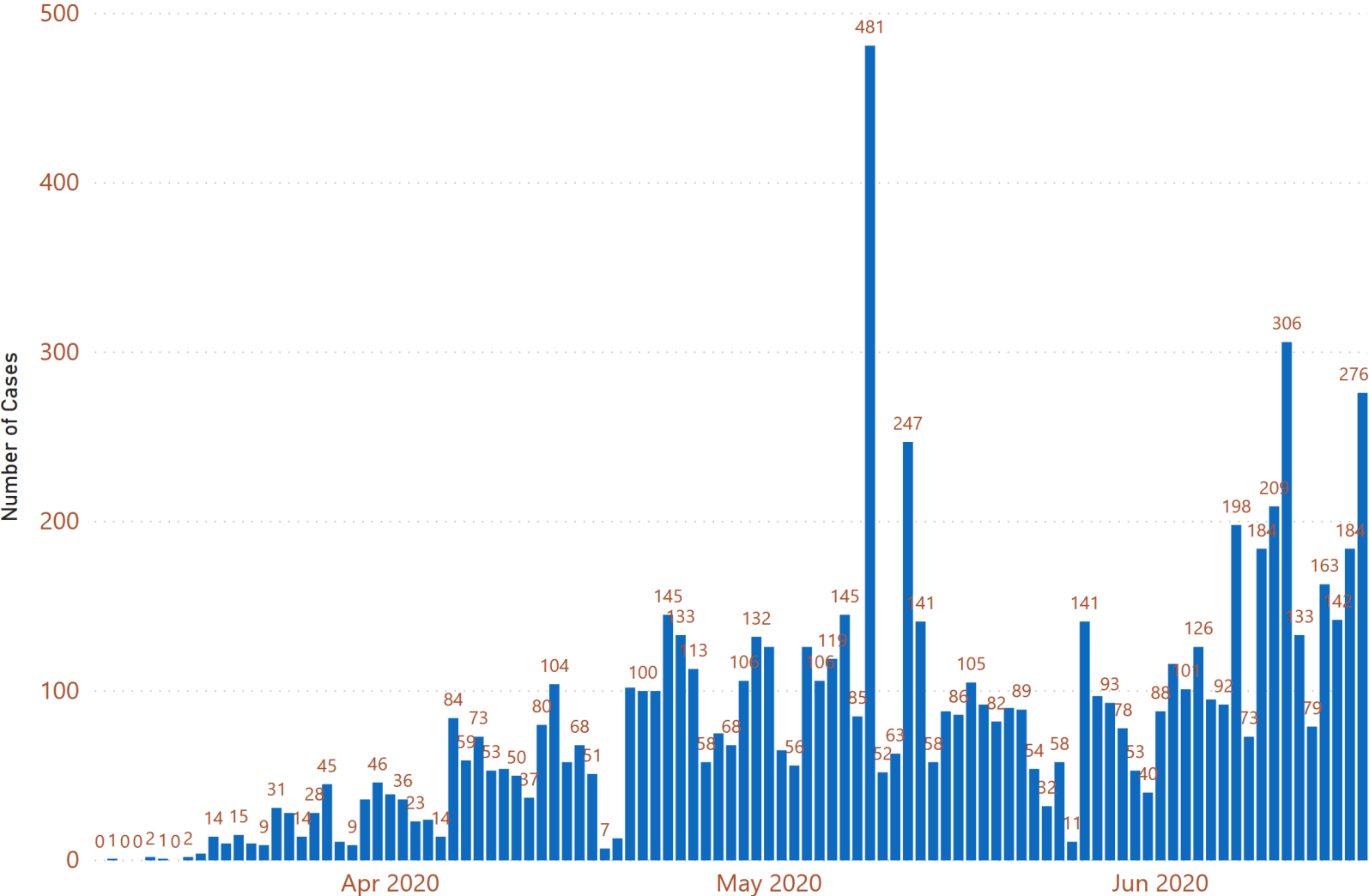
- **We specifically considered seven counties in Texas which recorded at least 2500 COVID-19 cases.**
- **In each of the counties, the steady increase in retail mobility continued.**
- **Several counties are close or have already crossed the 15% below baseline threshold indicated in our previous report.**
- **Tarrant county is close to 10% below baseline indicating a high risk of a surge in transmission.**

# Are we experiencing a surge in North Texas? HSC

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- **The raw data of new cases in Tarrant county indicates an obvious spike in the number of new recorded cases.**
- **However, there has also been a big increase in testing in Tarrant and neighboring counties making it difficult to assess the true extent of the surge, if any.**
- **Instead, we studied hospitalization and ER visit data in North Texas counties for COVID suspect patients.**
- **This data is expected to be less susceptible to the level of testing and reporting lag, under the reasonable assumption that hospitalization and ER visit numbers are proportional to the number of new infections.**

# New cases in Tarrant County by report date (source TCPH)



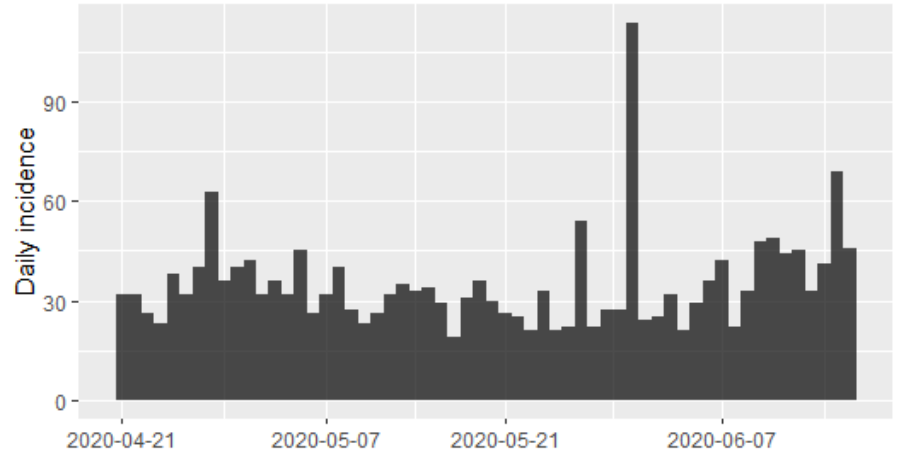


# Current transmission rate of the disease

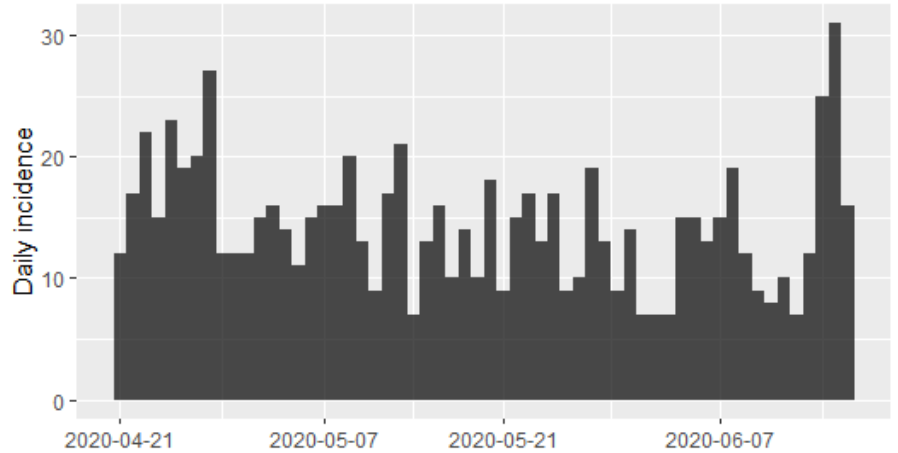
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- In epidemiology, the basic reproduction number  $R_0$ , of an infection can be thought of as the expected number of cases directly generated by one case in a population where all individuals are susceptible to infection.
- $R_0$  is time-varying and, if it goes significantly above 1, there will be a surge in number of cases.
- We will estimate the trend in  $R_0$  for Tarrant county and neighboring counties using hospitalization and ER visit data in North Texas counties for COVID suspect patients.

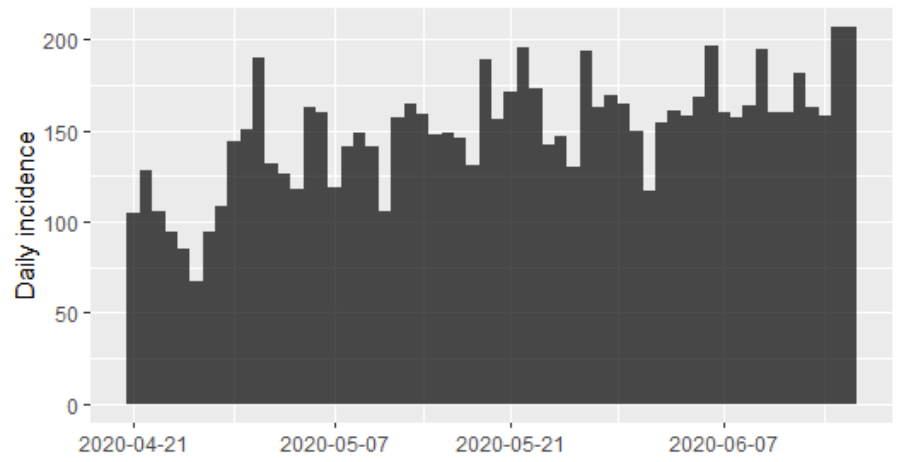
# Daily new hospital admits (NCTTRAC)



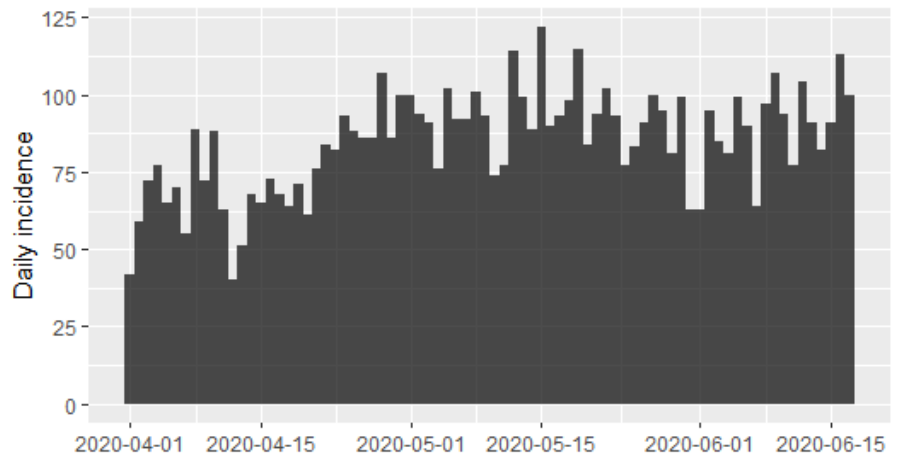
Collin



Denton

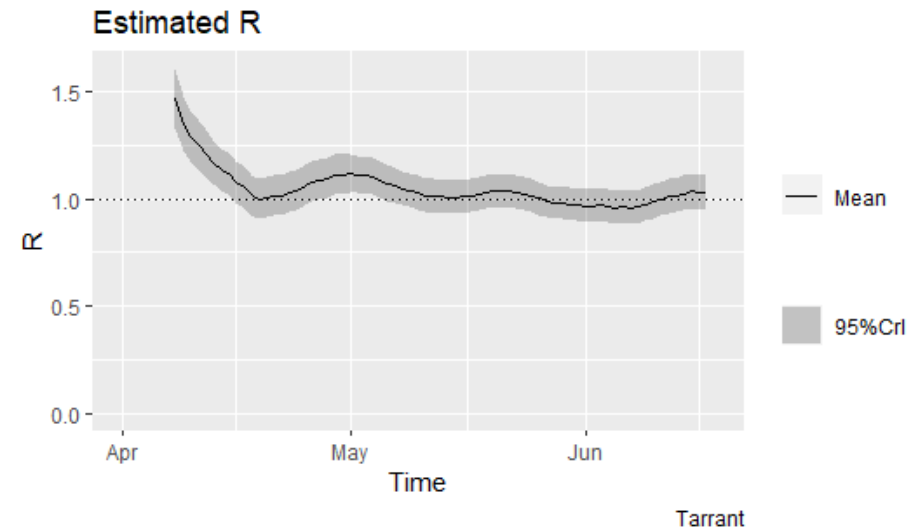
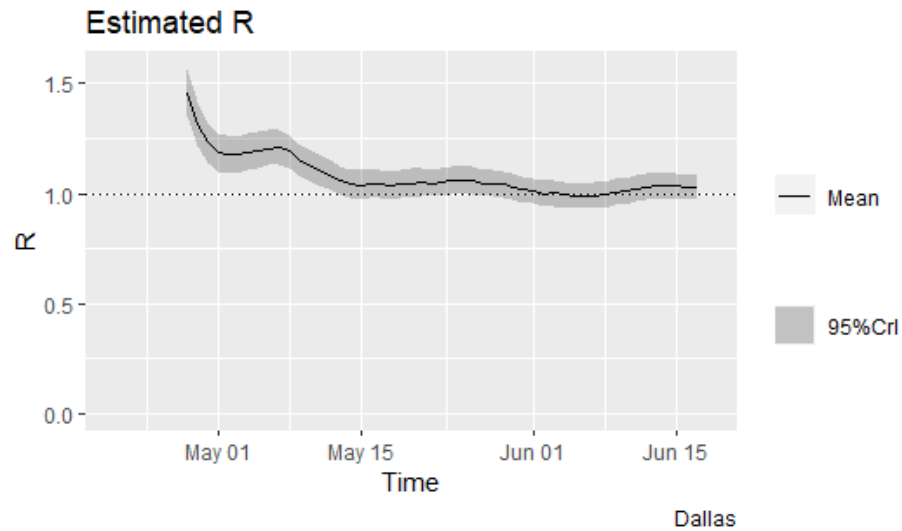
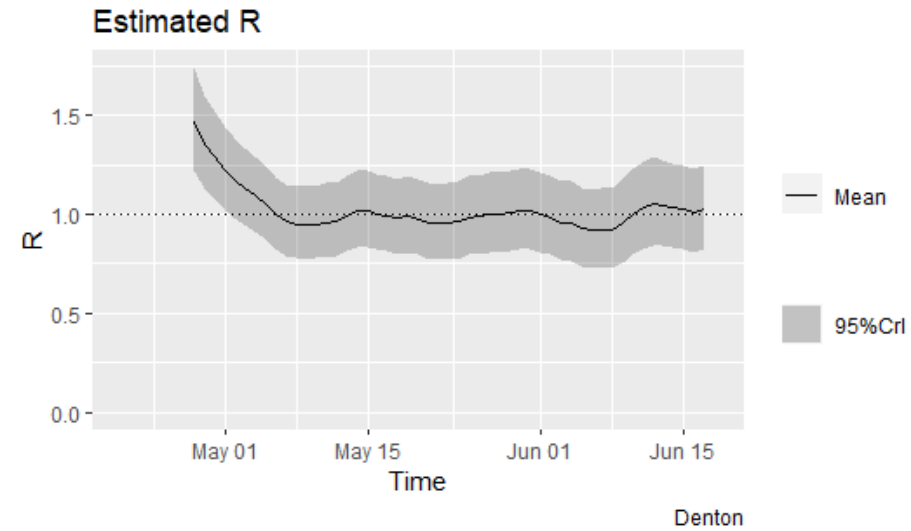
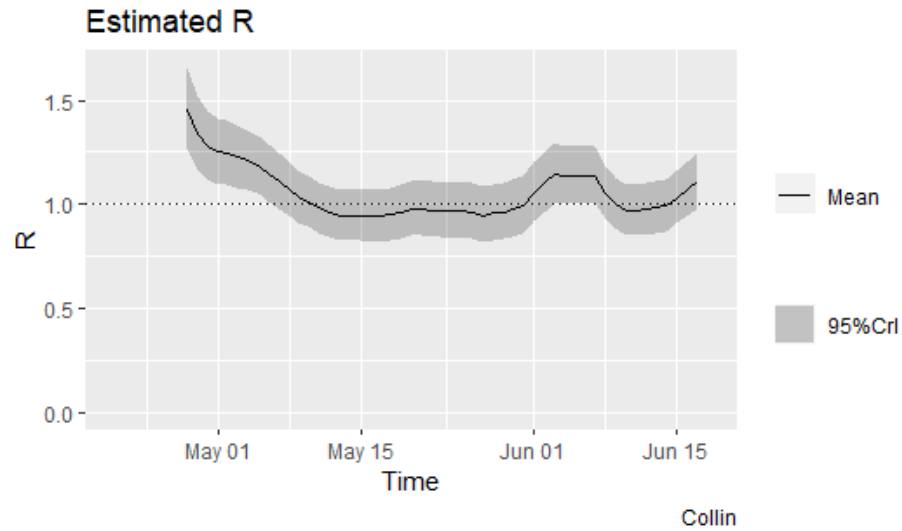


Dallas

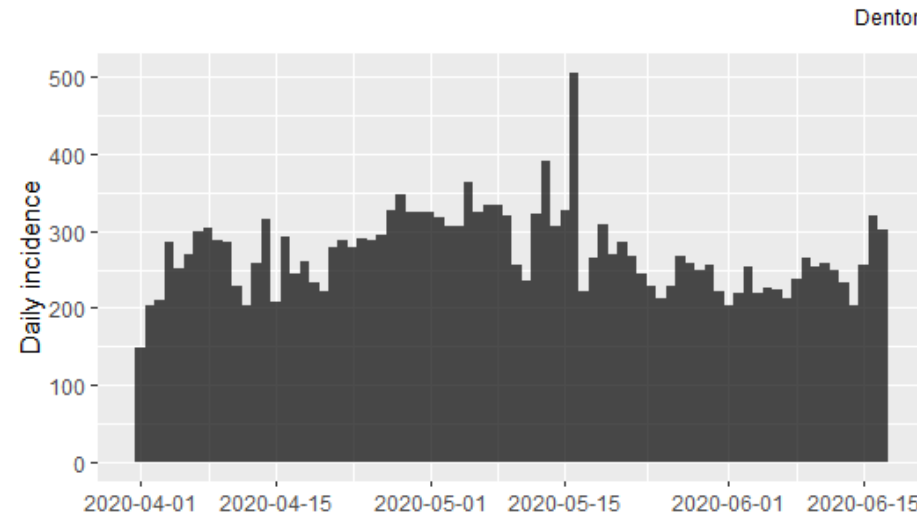
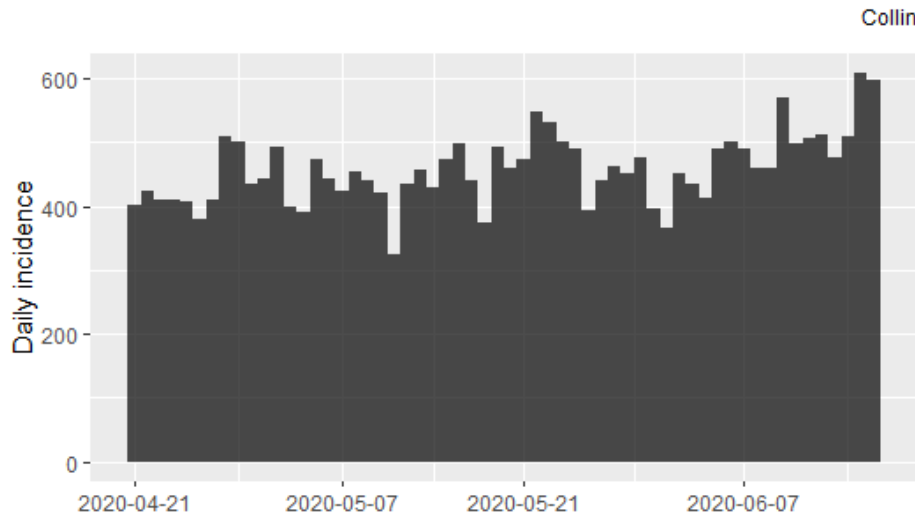
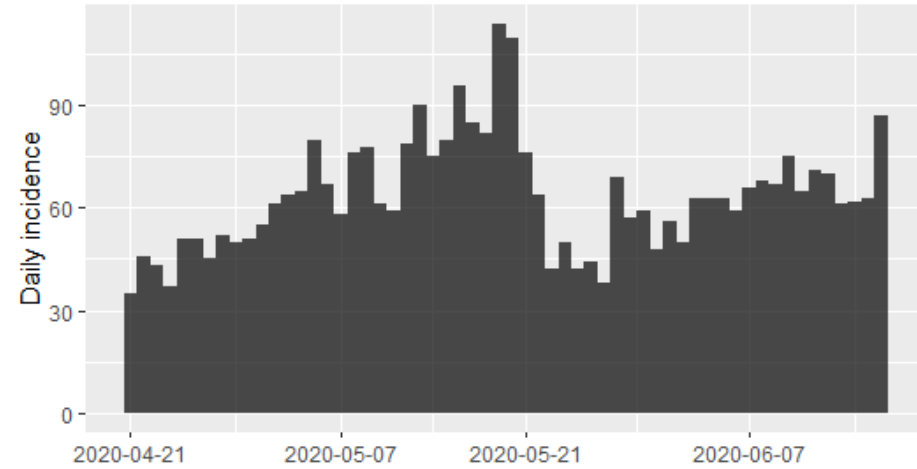
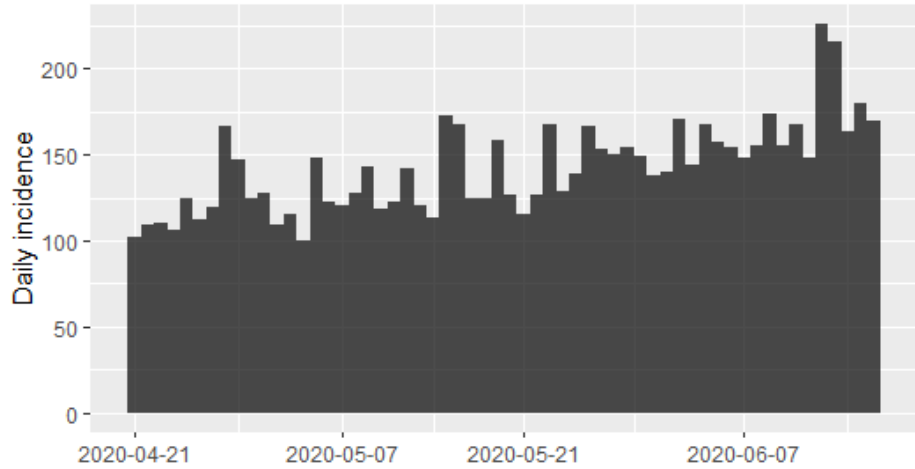


Tarrant

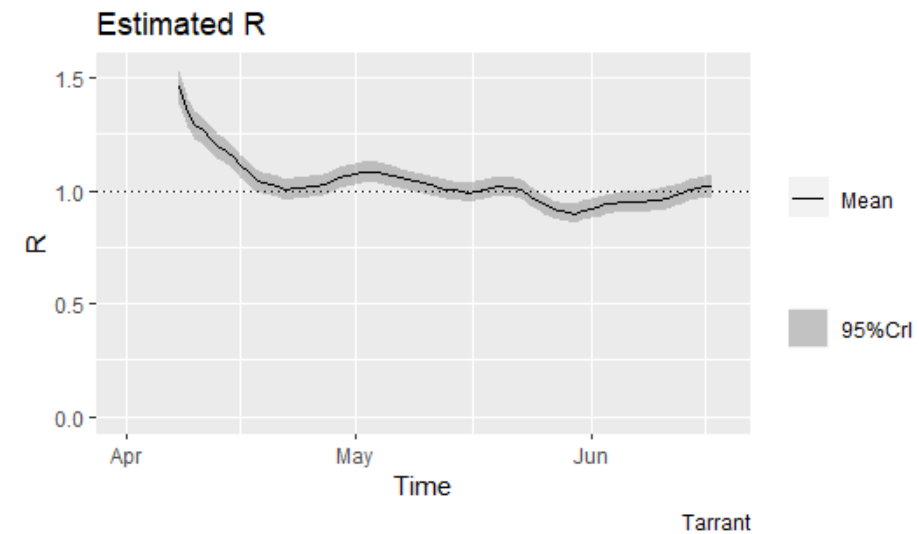
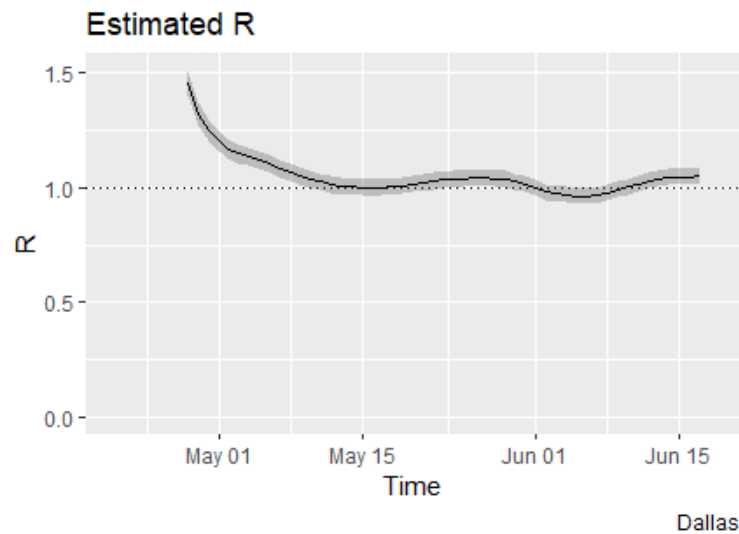
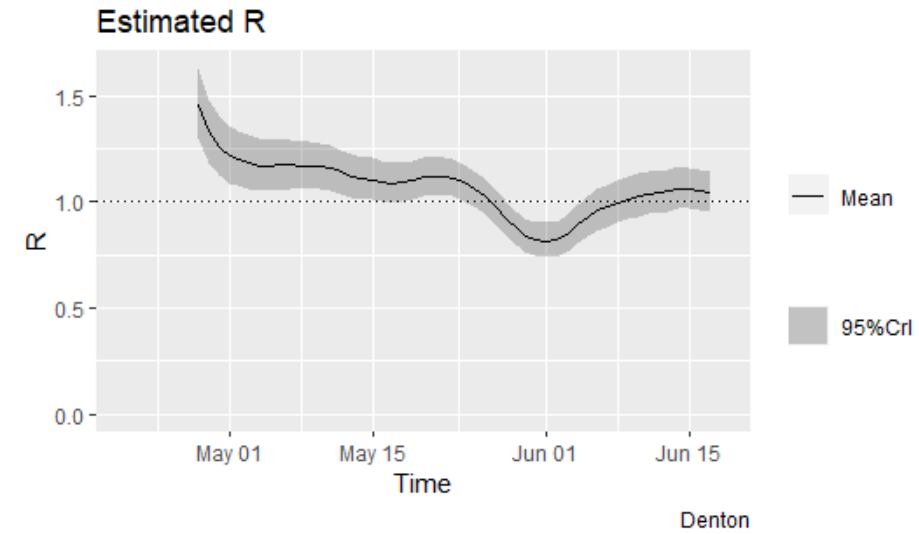
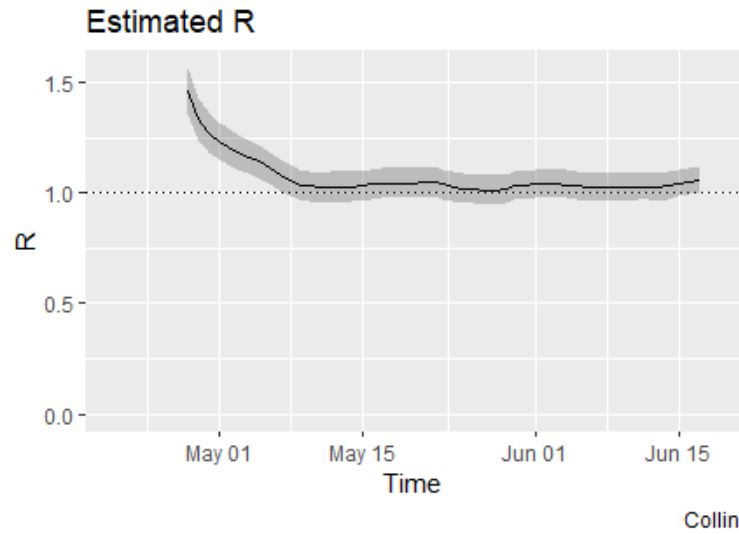
# $R_0$ using hospital admits (NCTTRAC)



# Daily new ER visits (NCTTRAC)



# $R_0$ using hospital admits (NCTTRAC)



# Takeaways from time-varying $R_0$ trend

- **Currently, all four counties in the metroplex have  $R_0$  greater than 1, which clearly indicates a real growth in the number of daily new cases.**
- **The estimated time-varying  $R_0$  trend is consistent whether we use the number of hospitalizations or ER visit which offers validation of our estimates.**
- **Although, there has been an unmistakable growth in the number of daily new cases in all four counties, the rate is probably lower than what would appear from the reported case counts.**
- **It can be reasonably concluded that we are currently experiencing a mini-surge in the spread of infection.**

# What can we conclude from the data

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- **We are obviously experiencing a mini-surge in all four counties, although the growth rate is possibly smaller than indicated by reported new case counts.**
- **However, since  $R_0$  is above 1 and the disease progression is multiplicative in nature, things can quickly go out of control.**
- **Preventative measures have to be implemented quickly to keep the spread under control.**

# What is causing the mini-surge?

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- **There is no single or simple explanation due to the novel and complex nature of the virus, but the following has likely contributed to the reversal of trend in disease progression.**
- **Retail mobility has steadily increased and almost back to pre-pandemic level.**
- **There have been a preponderance of large gatherings at a time of social unrest across the nation.**
- **It is likely that people are less observant of the social distancing guidelines including wearing of masks in public places (where social distancing is difficult to maintain).**



# How can the spread be controlled?

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- **Another statewide mandated stay-at-home order is currently not realistic and is probably not necessary.**
- **It is possible that as the perceived threat increases retail mobility will decrease and people will be more observant of the social distancing guidelines.**
- **However, hoping for the best cannot be the modus operandi at a time of global public health crisis.**
- **One possible course of action is to enforce social distancing guidelines in public places.**
- **Specifically, the use of masks can be mandated.**

# Should the use of mask be mandated?

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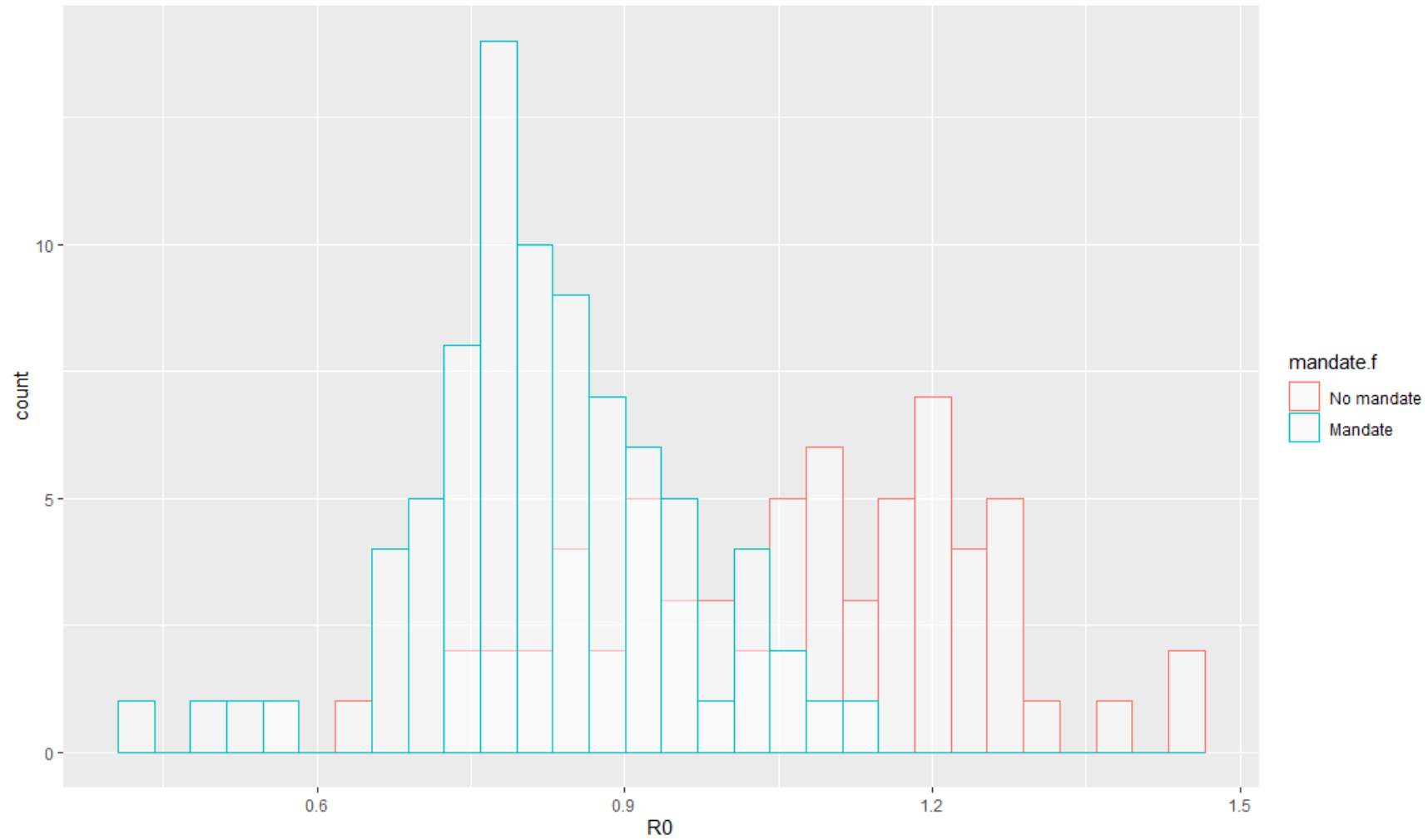
- **There has been a general consensus that wearing masks in public places help controlling the spread of disease.**
- **However, there is some debate on whether actually mandating the use the masks in public places has any beneficial effect.**
- **To answer the question, we considered 147 counties across the nation with a total number of reported cases over 2500.**
- **We compared the current (as of June 17)  $R_0$  values for the counties where a mandate has been issued with the counties where no mandate has been issued.**
- **The result is presented in the following pages.**

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# Histograms for counties with and without mandates on masks



# Is a mandate on using mask effective?

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- **The answer is a resounding yes as evident from the figure in the previous page.**
- **The mean  $R_0$  in counties with no mandate is 1.0595298 as opposed to 0.8223954 for counties with a mandate on usage of masks in public places.**
- **The difference in  $R_0$  is highly significant statistically with a p-value of  $4.778 \times 10^{-14}$ .**
- **Due to the multiplicative nature of transmission, a reduction of 0.24 in  $R_0$  can potentially prevent thousands of new cases with the mandated use of masks in public places.**

# Data sources used for this analysis

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- **Case and mortality counts in US counties - Johns Hopkins Coronavirus Resource Center**
- **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)**
- **New York Times on how States shut down and reopened (or will reopen)**

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