



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

HSC COVID-19 Report #4 – July 3, 2020



COVID-19 in DFW metroplex

**Growth in new positive cases, hospitalizations
and projections**

Summary from our last report in June 18

- **All four counties in the metroplex had R_0 greater than 1 and it was concluded that there was a mini-surge in the spread of infection and things could quickly go out of control due to the multiplicative nature of the spread**
- **Tarrant County was specifically deemed to be at high risk for surge due to high retail mobility**
- **Increase in retail mobility (close to pre-pandemic level), preponderance of large gatherings and violation of social distancing guidelines (failure to wear masks at public indoor locations) were deemed to be possible causes behind the surge**
- **Mandating masks in public places was recommended as there is clear evidence in favor of effectiveness of mask mandates from data in 147 most affected counties**

Where do we stand now?

- **The entire state of Texas including DFW metroplex area has become a hotspot for COVID-19 transmission**
- **Records for new daily positive cases are made with alarming frequency**
- **The surge can no longer be considered a mini-surge**
- **There has been an explosion in new positive COVID-19 cases and increased hospitalizations**
- **There is a real risk of overwhelming hospital capacities due to daily growth in the number of cases**
- **Mask use in public places has been mandated at county level after our previous report**

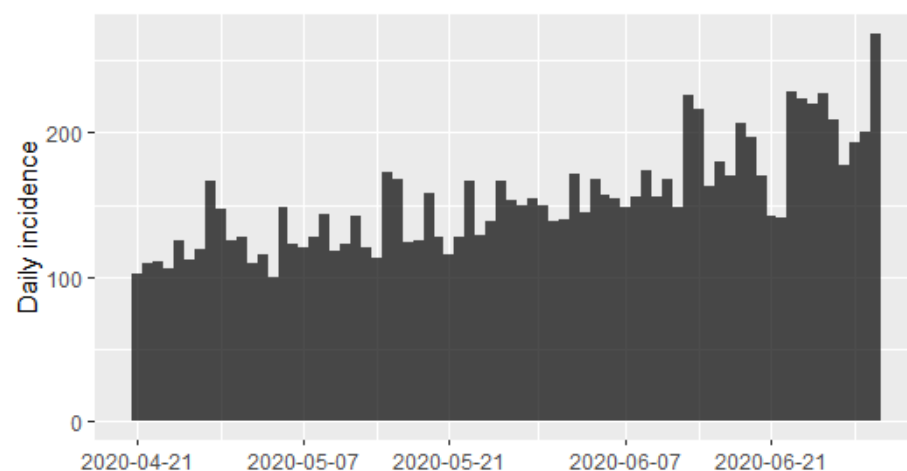
Key questions looming currently

- **What can we expect to see in the near future if there is no reversal of the trend?**
- **If nothing changes, how soon will the hospital capacities be overwhelmed?**
- **Can we expect to see a reversal in trend?**
- **Is another “shelter in place” order necessary to control the spread?**

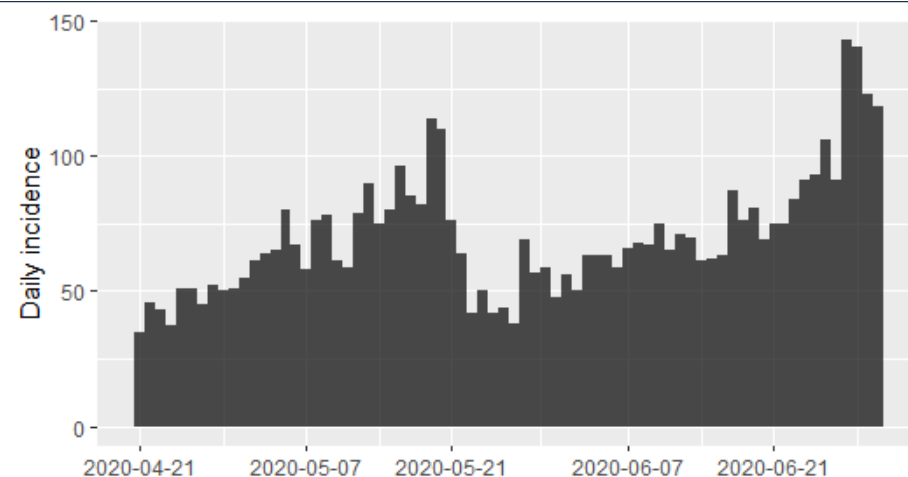
Current transmission rate of the disease

- 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 ER visit data in North Texas counties for COVID suspect patients.

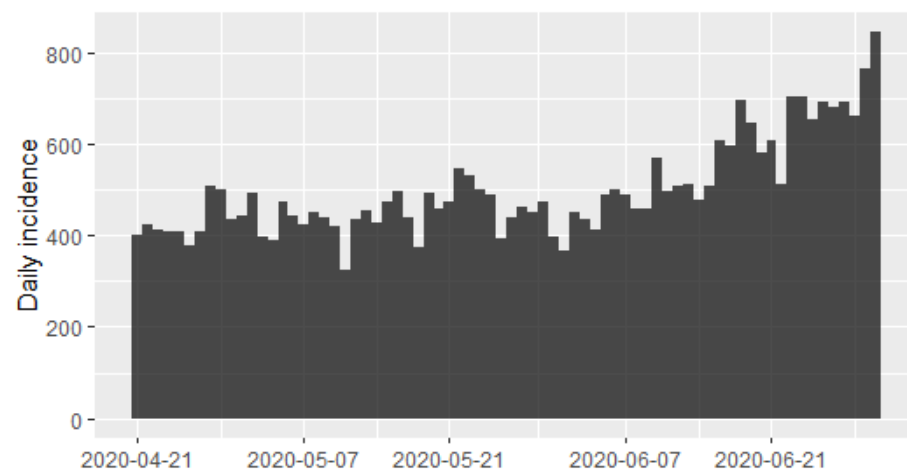
ER visits for suspected COVID patients in the metroplex



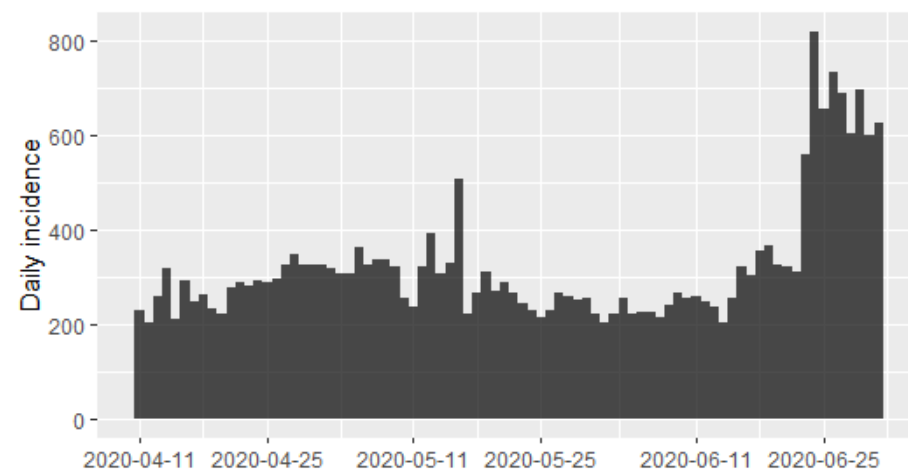
Collin



Denton

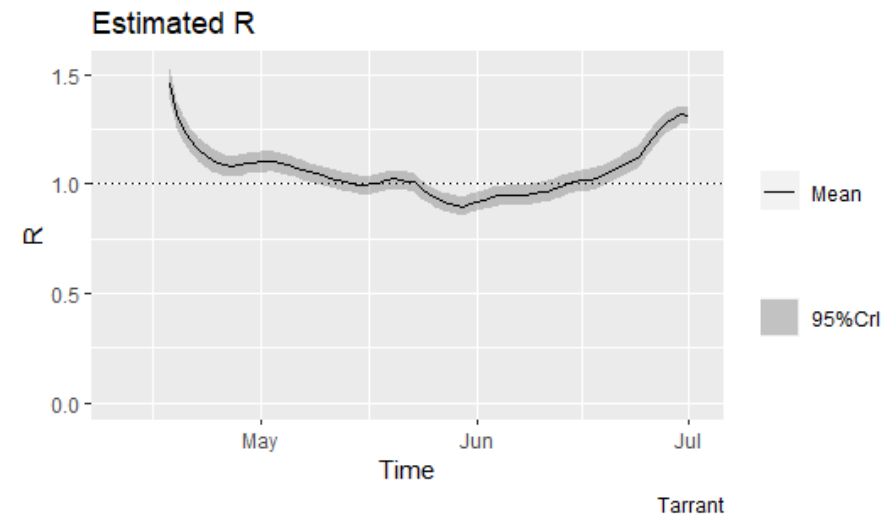
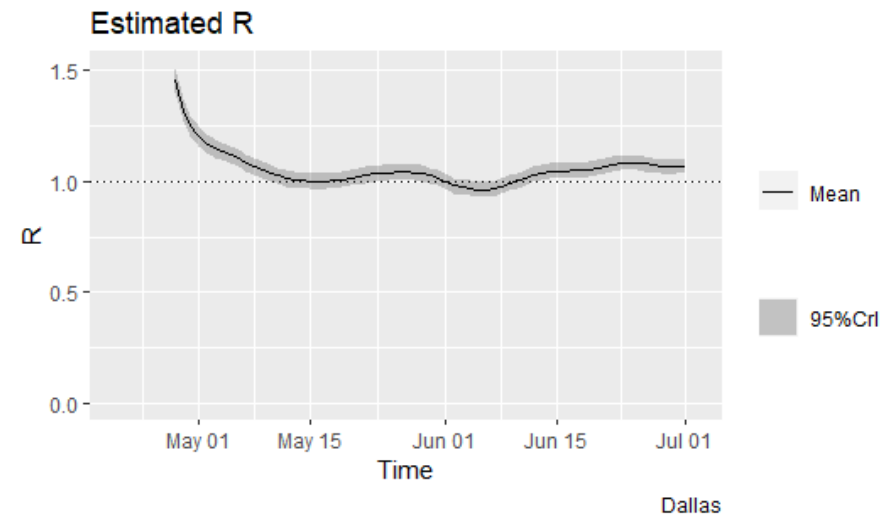
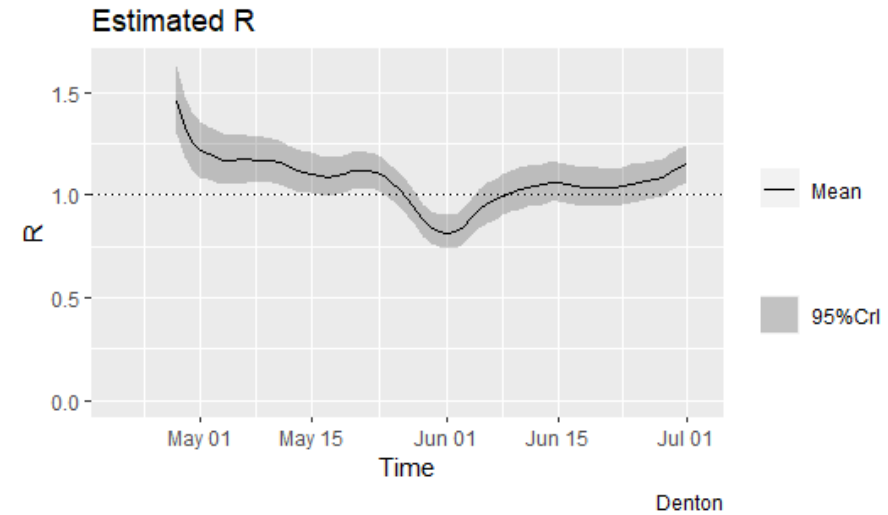
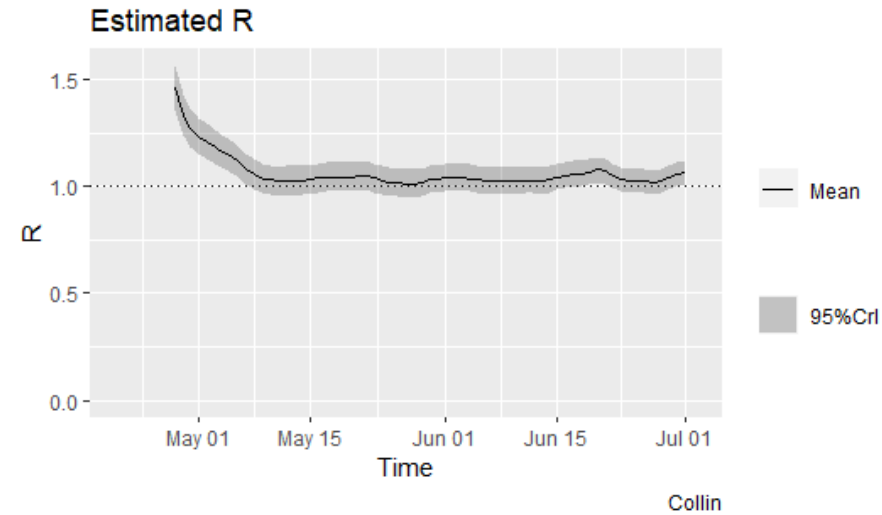


Dallas



Tarrant

Current estimated R_0 in the metroplex



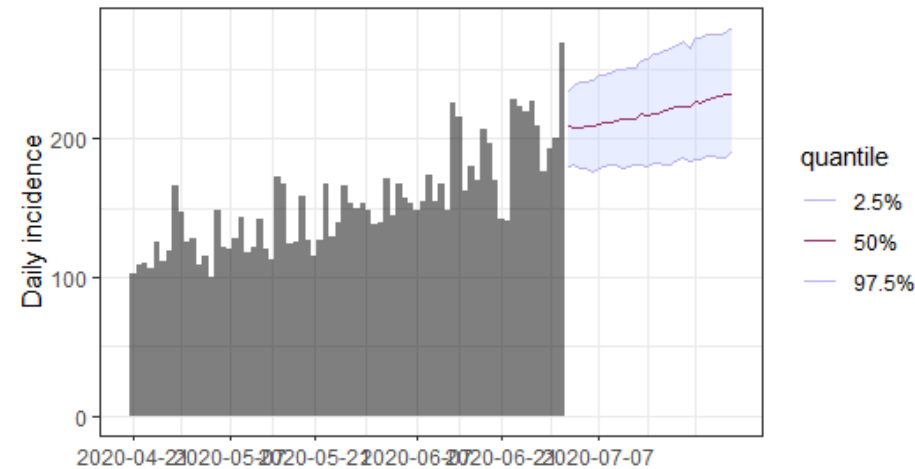
Takeaways from time-varying R_0 trend

- **Currently, all four counties in the metroplex have consistently seen R_0 values greater than 1 for the last couple of weeks, which clearly indicates a surge in the number of daily new cases.**
- **Among the four counties, the surge in Tarrant county is most alarming.**
- **Unless there is a reversal of trend, we run the risk of reaching maximum capacity in hospitals very quickly.**
- **Finally, it should be noted that the rate of growth in number of new cases is higher than the rate of growth in number of new hospitalizations which offers a little more time to the hospitals for surge preparation.**
- **This can be attributed to the disproportionately large number of cases in the younger population.**

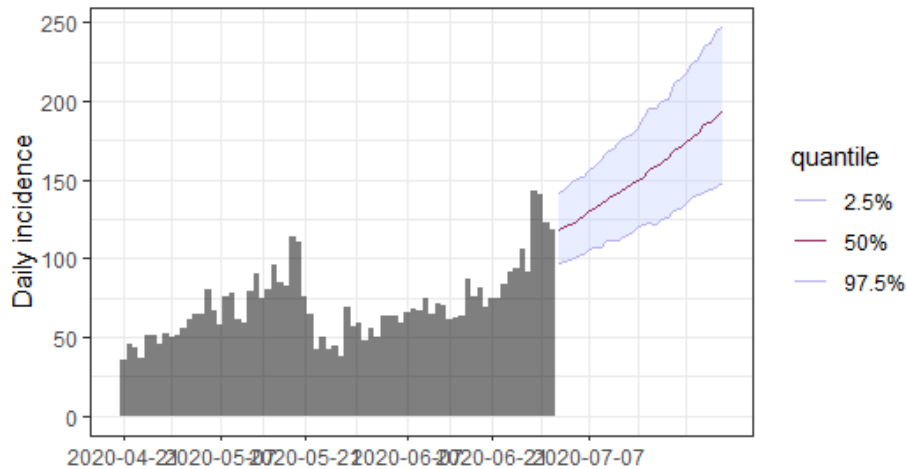
What to expect in the near future?

- **We will project the number of new COVID-19 related ER visits and hospitalization numbers for the next four weeks for two different scenarios**
- **First, we will make our projections assuming that there is no change in the current trend – Scenario 1**
- **Next, we will make our projections assuming that mask mandate has been effective causing a modest reduction of 0.1 in the R_0 value as observed in other counties across the nation with the implementation of mandate – Scenario 2**

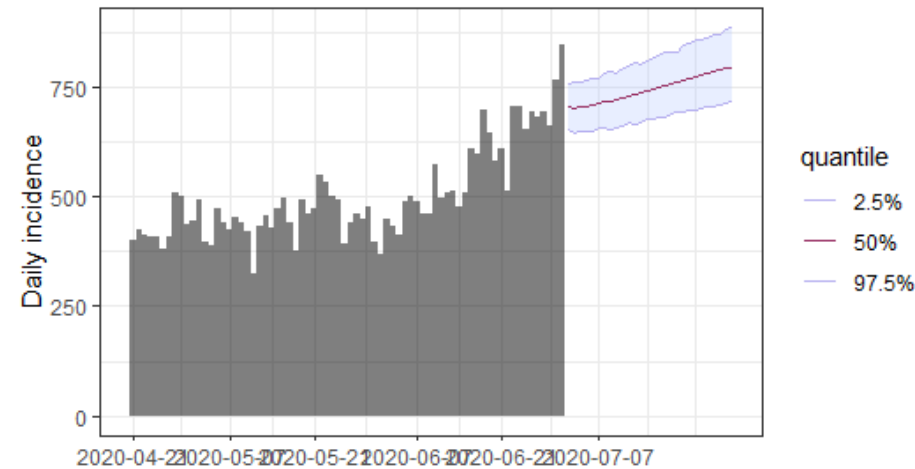
ER visits Scenario 1



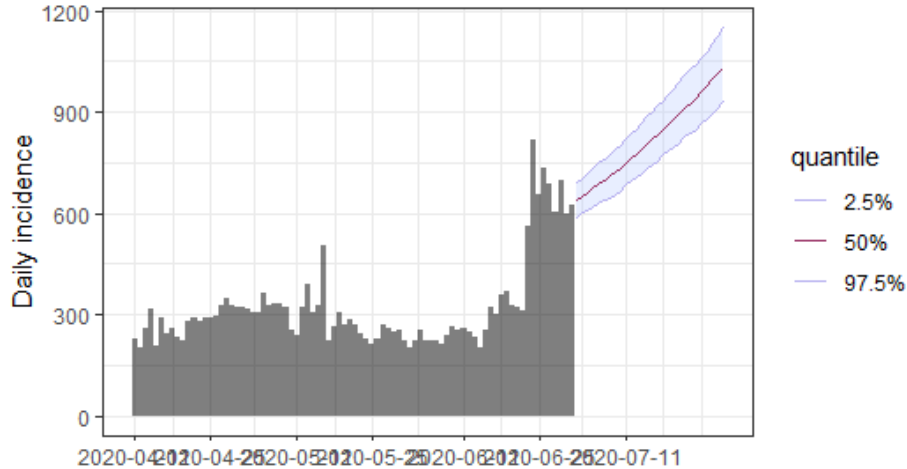
Collin



Denton

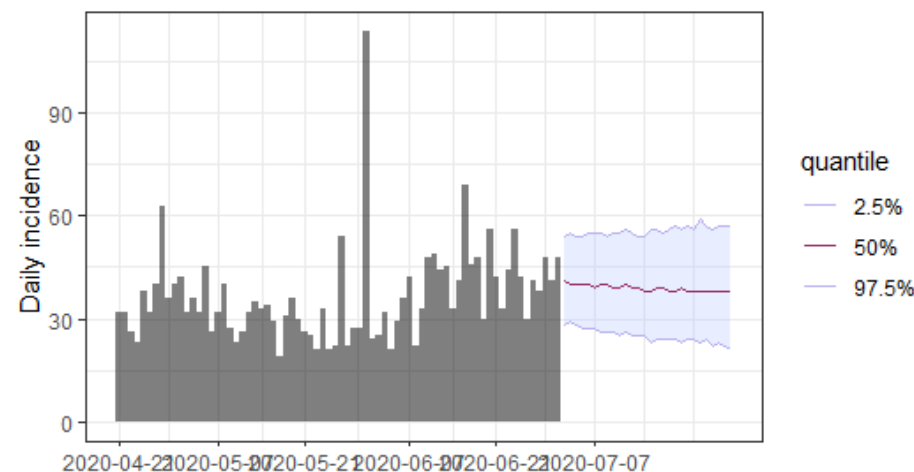


Dallas

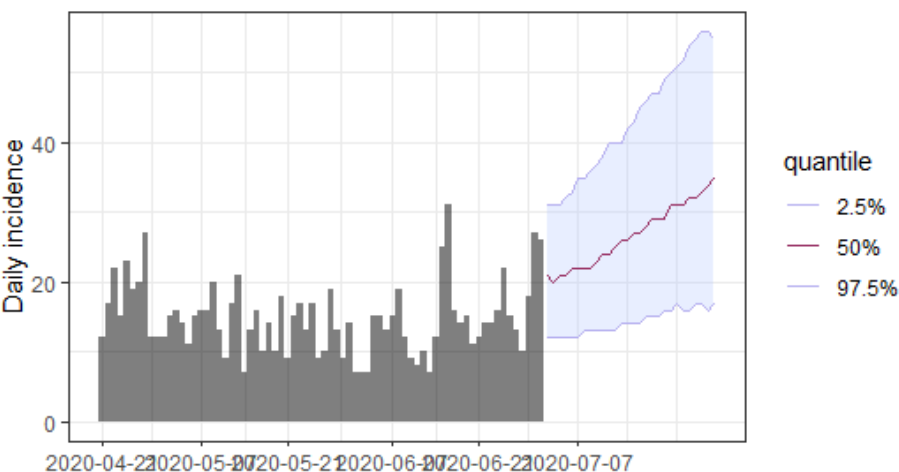


Tarrant

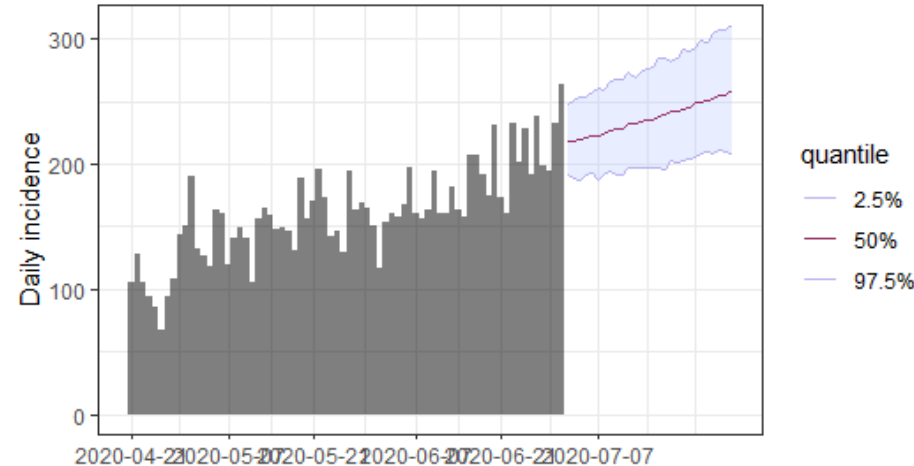
Hospitalization Scenario 1



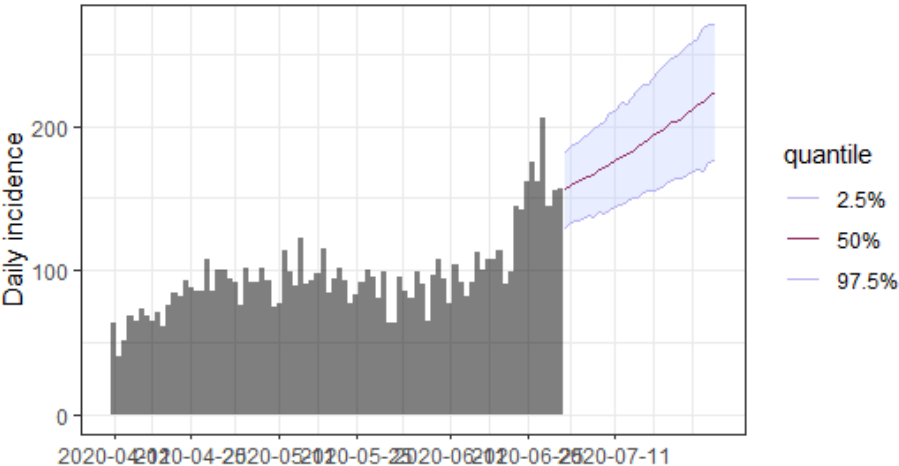
Collin



Denton

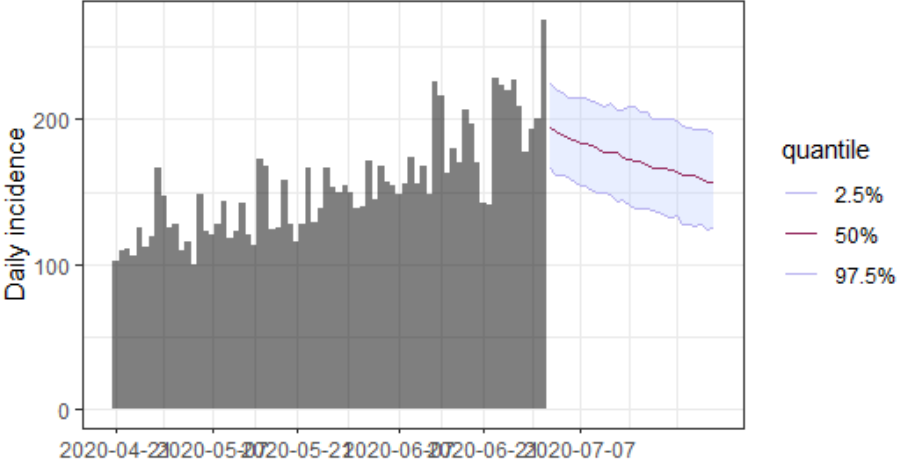


Dallas

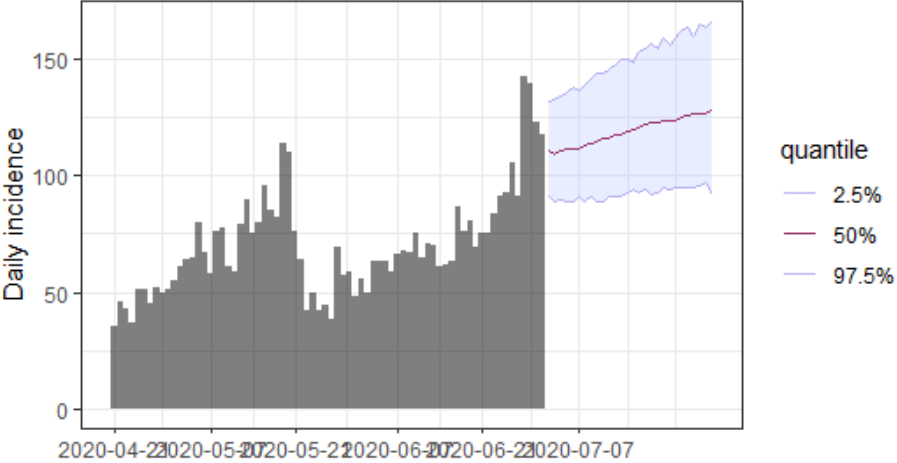


Tarrant

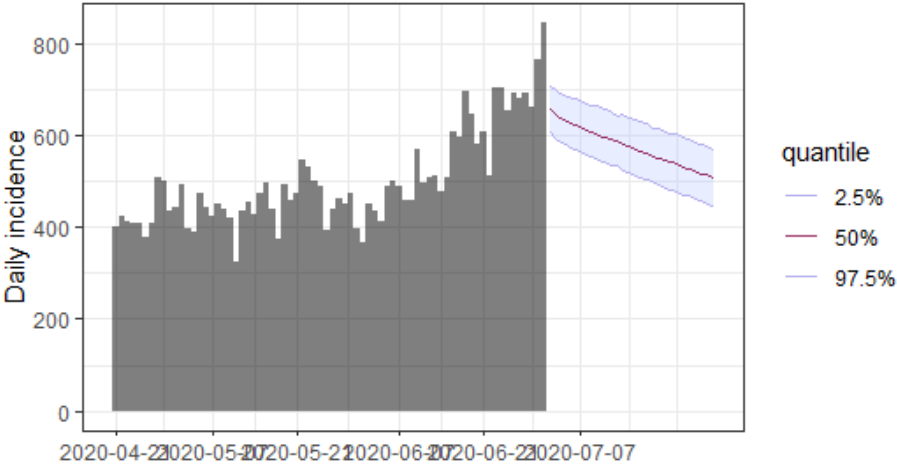
ER visits Scenario 2



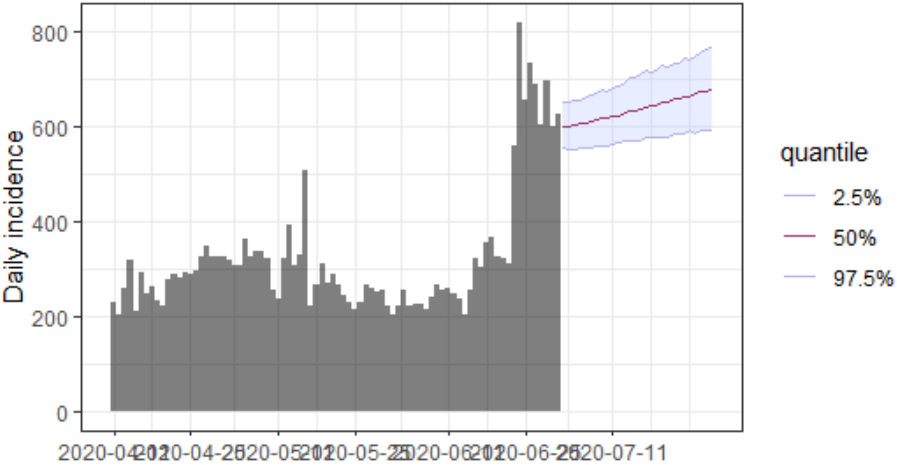
Collin



Denton

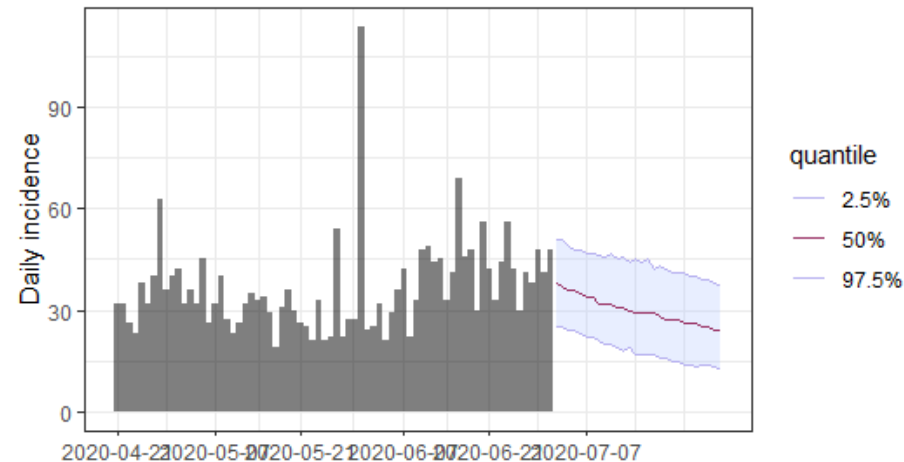


Dallas

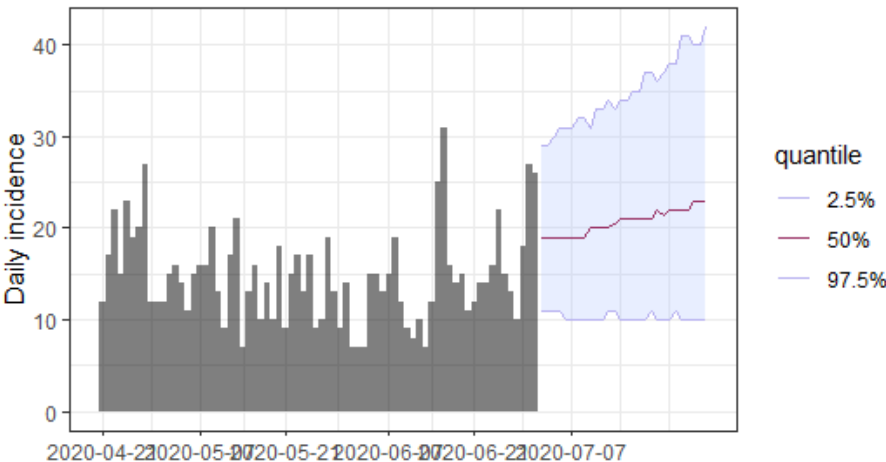


Tarrant

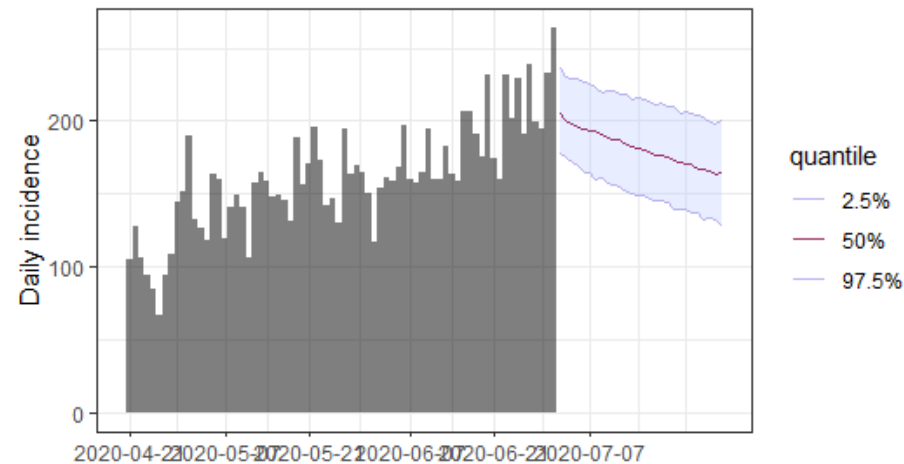
Hospitalization Scenario 2



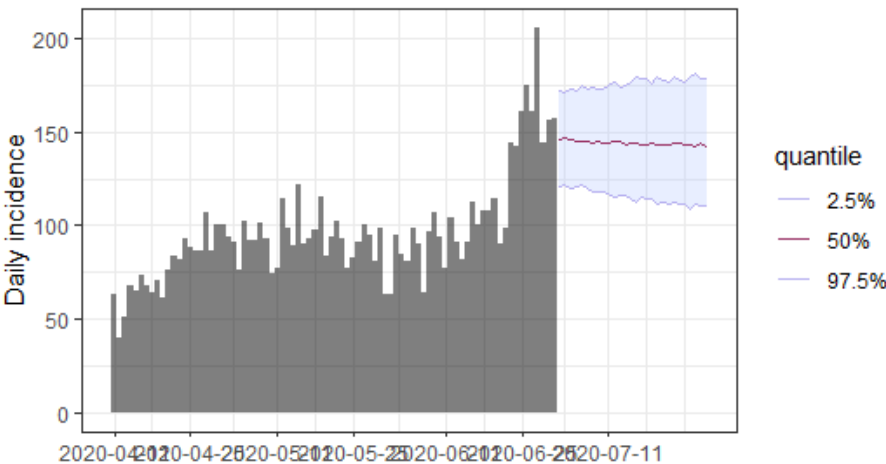
Collin



Denton



Dallas



Tarrant

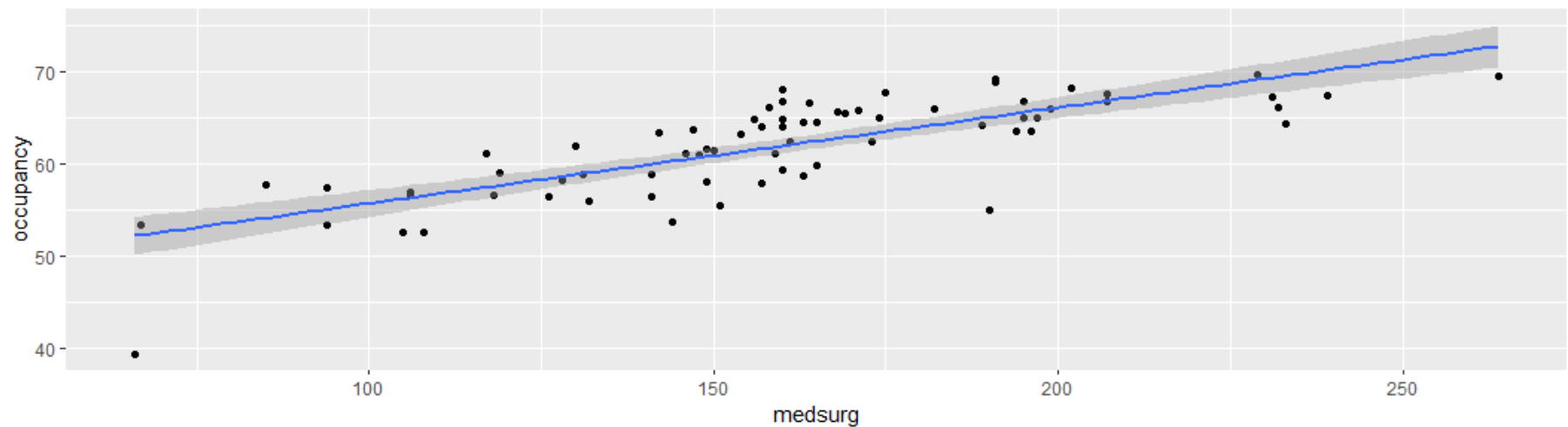
Will the hospital capacities reach 100%?

- **This is currently the burning question as the number of daily cases and hospital admits are rising**
- **This is a difficult question to answer as the situation is continuously evolving and the facilities are making arrangements to increase capacity**
- **Even with increased capacity, adequate staffing with health care professionals can also pose some challenge**
- **Nonetheless, we will make some estimates for Dallas and Tarrant counties under the simplified assumption that the current trend in hospitalization continues and hospital capacity remains at current level**

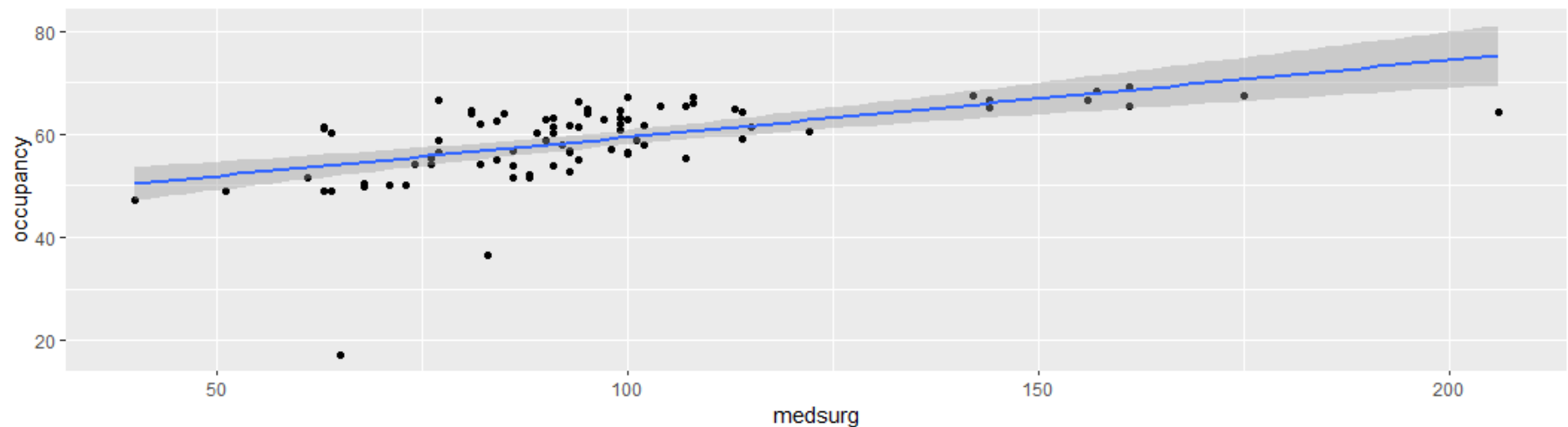
A simple model for prediction

- **There is a fairly strong association between new daily COVID-19 related admissions and occupancy percentage as can be seen in the figure in the next slide**
- **We will use linear regression for each of Tarrant and Dallas counties to estimate the expected level of new daily COVID-19 related admissions for hospitals to reach occupancy at maximum capacity**
- **We will then use our projected number of new daily COVID-19 related admissions to estimate the number of days to reach maximum capacity**

Relationship between new COVID related admits and Occupancy



Dallas



Tarrant

Crude estimates for hospitals to reach max capacity

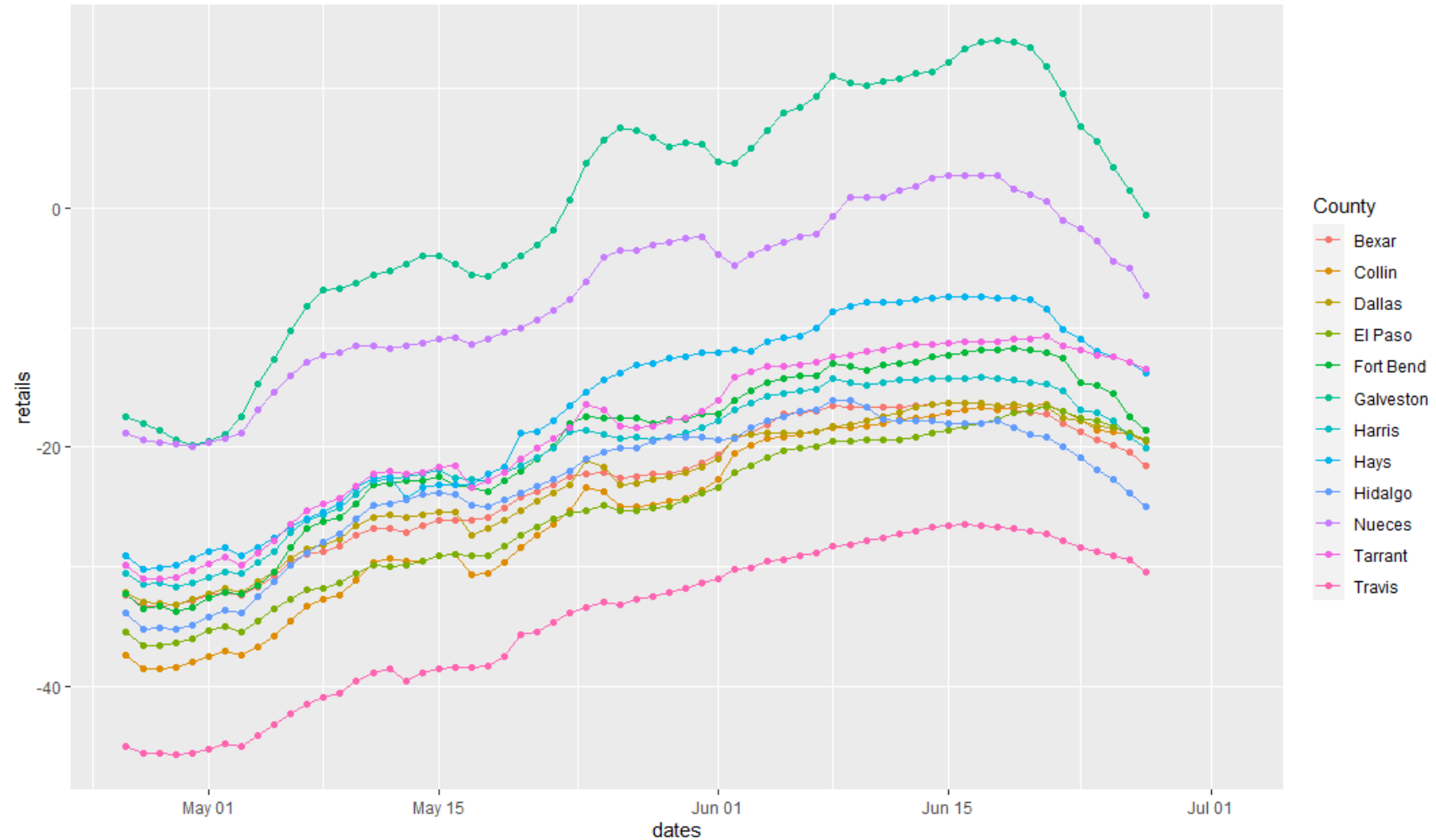


- **Exploiting the linear relationship between new daily COVID-19 related admissions and occupancy percentage, we estimate that 100% occupancy will be reached when expected number of new daily COVID-19 related admissions reaches 371 in Tarrant County, and 525 in Dallas County**
- **If the current growth rate in the number of new daily COVID-19 related admissions remain unchanged, it will take approximately another 16 days in Tarrant County to reach current maximum capacity of the hospitals and 44 days in Dallas county**
- **However, it needs to be reiterated that these estimates are crude, since conditions are evolving and capacities are being increased**

Can we expect to see a reversal in trend??

- **The raw data on the numbers of new cases, ER visits and hospitalizations currently does not indicate any reversal of trend yet**
- **However, to observe the impact of any new policy or change in behavior, there is typically a lag of approximately 10-12 days**
- **As indicated in our previous report, data from most affected counties in the nation indicate an efficacy in a mask mandate**
- **Since the mandate was implemented earlier last week, the impact (if any) will be visible in the following 7 days' data**
- **Finally, there has been a steady drop in retail mobility in all four counties once the threat of surge became apparent (data as of June 23)**

Retail mobility for North Texas counties



Observations from retail mobility data

- **We specifically considered twelve counties in Texas which recorded at least 3000 COVID-19 cases**
- **In each of the counties, there has been a steady increase in retail mobility that continued till around June 18**
- **In each of the counties, there has been a reversal of retail mobility trend since then**
- **In an earlier report, we noted that apparently people's collective action in terms of mobility is dictated by perceived threat from the pandemic**
- **We are currently observing a similar behavior in terms of steady decline in retail mobility**
- **Any impact of the decline in retail mobility should be apparent in the next few days**

Is a new “shelter in place” order necessary?_{hsc}

- If there is no reversal of trend in disease transmission in the near future, it must be considered as an option again
- Although the current data is alarming, there are two possible reasons to not call for a new “shelter in place” right now
- First, usage of masks in public places has been mandated last week and data from counties across the nation indicates efficacy of such a mandate
- Second, there has been a steady decline in retail mobility since around June 18
- In the following week it will be apparent if these two measures have been effective in reversing the trend
- However, a new “shelter in place” measure cannot be ruled out

Is a new “shelter in place” order necessary? hsc

- In the end, whether a new “shelter in place” order is necessary will mostly depend on us
- Even though mandate on usage of mask is found to be effective, compliance is also equally important
- With 4th of July coming, it is imperative that social distancing guidelines are strictly maintained
- Retail mobility has to be kept at bare necessity level

Data sources used for this analysis

- **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)**

