SitRep 13: COVID-19 transmission across Washington State

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Results as of August 13 2020 10 a.m. Incidence data through July 31 2020.

From week to week, we highlight situations around the state that we think warrant special attention. For a comprehensive and up-to-date picture of what's happening around the state, see the WA State COVID-19 Risk Assessment and WADoH COVID-19 data dashboards.

Summary and highlights

Data from the Washington Disease Reporting System (WDRS) through August 4 show that new cases are plateauing overall across the state, and we find in both eastern and western Washington that R_e is hovering around 1. We estimate that in western WA, R_e was likely between 0.79 and 1.15 on July 26, with a best estimate of 0.97 (down from the estimate of 1.12 in our last report). In eastern WA, our best estimate is that R_e on July 25 was likely between 0.82 and 1.13, with a best estimate of 0.98 (up from the estimate of 0.78 in our last report).

The flattening of new case counts is observed in practically all counties. Pierce county, which previously had alarmingly high growth in cases is showing early signs of a turnaround, with R_e on July 26 below 1. However, Spokane, which previously appeared to be plateauing, is now on the rise again due to a sharp uptick in the older age groups (age 40+). Case counts in Yakima continue to decline.

Additional positive news is that a plateauing of cases is generally occurring across age groups in both western and eastern Washington (Spokane excepted). This reflects an improvement over our previous report which noted continued increases among older age groups, generating concern about potentially increasing hospitalizations.

Implications for public health practice

The deceleration in the growth of new cases is an improvement over the rate of increase observed in June and the early part of July. It is almost certain that this would not have taken place spontaneously; transmission modeling included in this situation report suggests that the attenuation in R_e is attributable to statewide policy changes like the June 23 and July 7 mask mandates and restrictions pausing Safe Start. Note also that it remains too soon to assess the effects of policies that were implemented at the end of July which included bar closures and other restrictions. The sustained decline in Yakima suggests that there are lessons to be learned here for the rest of the state.

While a number of trends are moving in the right direction, Washington is not out of the woods. It is imperative that we remain compliant with masking and distancing policies that have likely helped get us out of the uncontrolled outbreak situation that we were in just three weeks ago when R_e estimates for both western and eastern Washington were above 1 and new case counts were increasing across the state. Even if current trends are sustained and R_e declines further, any plans for future reopening will need to account for lessons learned during the Safe Start program to date. In the absence of a safe and effective vaccine, coexistence with the virus requires ongoing mitigation measures and recognition that return to normal will not be possible in all spheres of activity.

Key inputs, assumptions, and limitations of our modeling approach

We use a COVID-specific transmission model fit to testing and mortality data to estimate the effective reproductive number over time. The key modeling assumption is that individuals can be grouped into one of four disease states: susceptible, exposed (latent) but non-infectious, infectious, and recovered.

- For an in-depth description of our approach and its assumptions and limitations, see this earlier report.
- In this situation report, we use data provided by Washington State Department of Health through the Washington Disease Reporting System (WDRS). **We use the WDRS test, hospitalization, and death data compiled on August 4th , and to hedge against delays in reporting, we analyze data up to July 31 in western Washington and July 30 eastern Washington.** This relatively conservative hedge against lags is in response to reports of increasing test delays.
- Estimates of R_e describe average transmission rates across large regions, and **our current work does not separate case clusters associated with known super-spreading events from diffuse community transmission.**
- Results in this report come from data on testing, confirmed COVID-19 cases, and deaths (see previous WA State report for more details). Also as described previously, estimates of R_e are based on an adjusted epi curve that accounts for changing test availability, test-positivity rates, and weekend effects, but all biases may not be accounted for.
- This report describes patterns of COVID transmission across Washington state, but it does not examine factors that may cause differences to occur. The relationships between specific causal factors and policies are topics of ongoing research and are not addressed herein.

Collaboration notes

The Institute for Disease Modeling (IDM), Microsoft AI For Health, the University of Washington, and the Fred Hutchinson Cancer Research Center are working with WA DoH to provide regional modeling of case, testing, and mortality data across Washington State to infer effective reproduction numbers, prevalence, and incidence from data in the Washington Disease Reporting System. This report is based on models developed by IDM that are being advanced to better represent the state by Microsoft, and both together volunteer to support WA DoH in its public health mission. This collaboration has evolved alongside the science, data systems, and analysis behind the models, and it reflects the ongoing commitment of all parties involved to improve our understanding of COVID-19 transmission. This collaboration and its outputs will continue to evolve as scientific frontiers and policy needs change over time.

We estimate that the effective reproductive numbers in eastern and western Washington are hovering around one.* In both regions, transmission has slowed relative to mid-June levels, with timing consistent with state-wide masking mandates, and limits on gathering sizes.

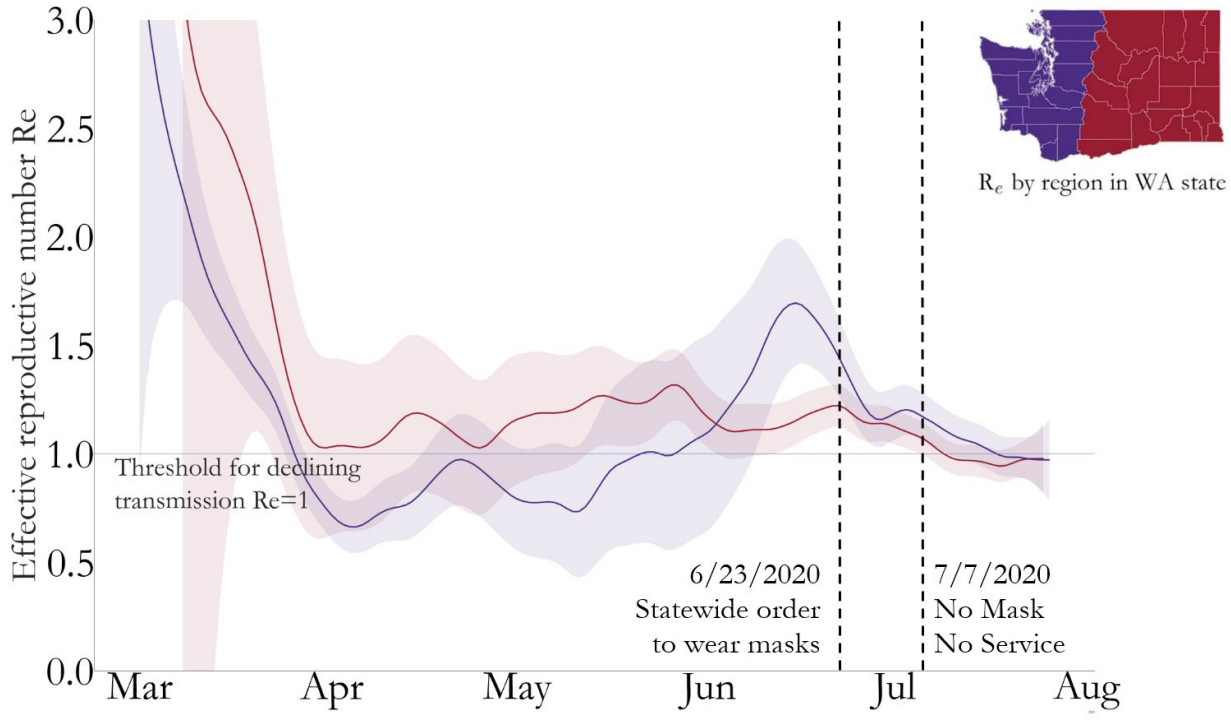

***Figure 1**: The effective reproductive number is estimated for eastern (red) and western (purple) WA, with the 95% confidence interval shaded. Our estimates suggest that R_e is essentially 1 in both eastern and western WA. Overlaid on the plot are the timings of recent masking policy changes. While we cannot from this region-level data definitively attribute decelerating transmission to these policies, the timing of changes, particularly in eastern WA, suggests that masking and related physical distancing behaviors are having a positive effect across the state. For details on how these estimates are generated, see our technical report.*

** For eastern WA, the inference that R_e is "essentially 1" differs from the "confidently under 1" result reported in our previous SitRep. Our uncertainty intervals are defined such that approximately 5% of the time the true result lies outside it, and after producing more than 20 such R_e estimates since March, we think this discrepancy is an unfortunate but expected outlier. We will continue to monitor for more systematic accuracy issues with the model.*

Case data disaggregated by county further contextualizes our effective reproductive number estimates and show how Washington state has reached a plateau that is visible in most counties. Plateauing is not enough to keep the epidemic under control; we must transition to a state of sustained decline in new cases as has taken place in Yakima.

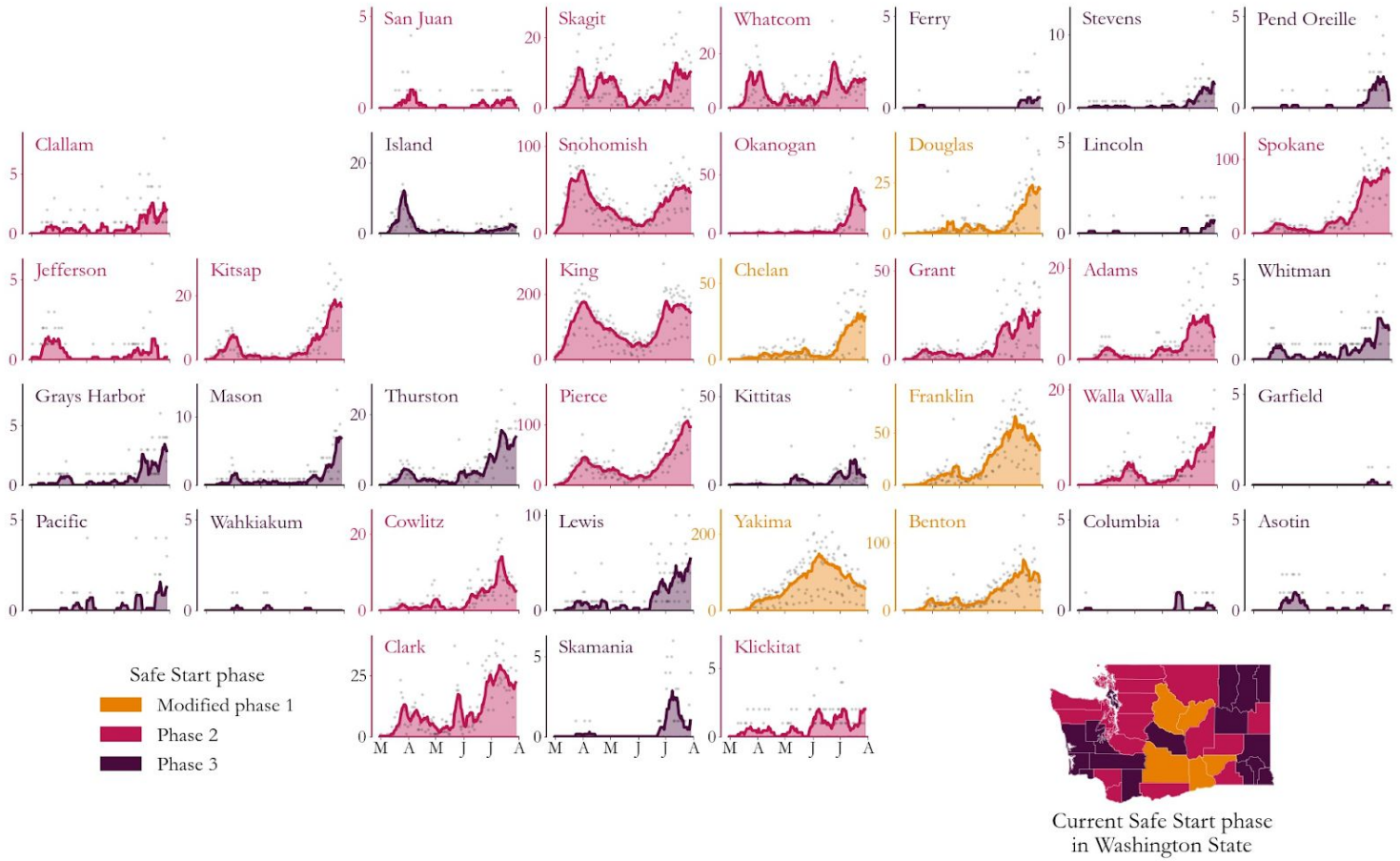

***Figure 2**: Daily COVID-19 positives (dots) and 7-day moving averages (curves) arranged geographically and colored by [Safe Start phase] as of July 23. Case trends across counties highlight geographic correlations, and help us better understand region-level estimates of the transmission rate (see Figure 1).*

Case counts are plateauing or declining across ages in King and Yakima counties. Pierce may be beginning a similar decline after alarmingly high growth in 0-69 year olds in June/July. Spokane has started a decline or plateau in 0-39 year olds, but increases continue in the older age groups.

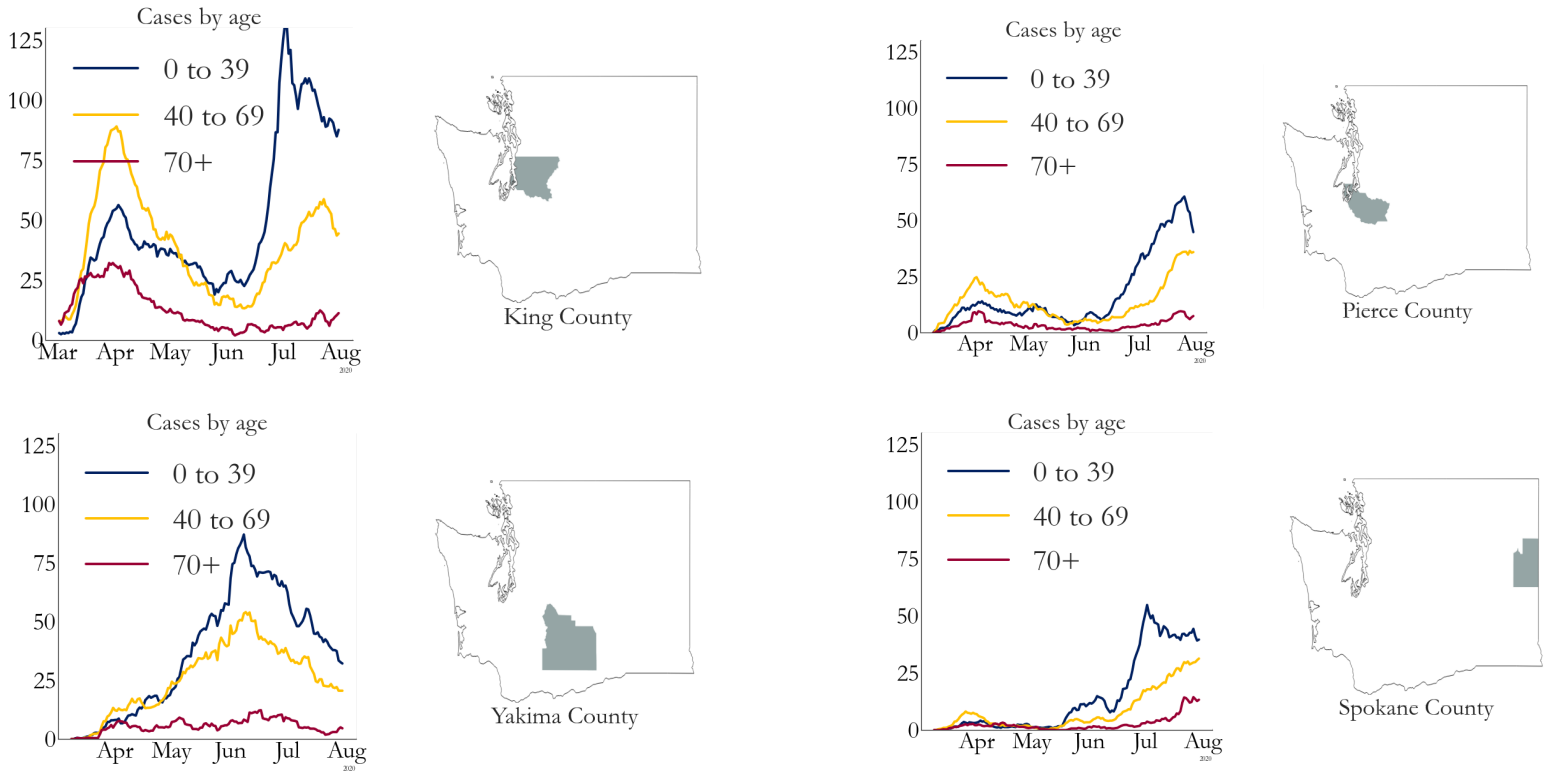

Figure 3: *Stratifying cases by age group helps us better understand the epidemiology. Slowing of growth in COVID-19 cases is visible across age groups in Yakima and King counties and a similar trend may be occurring in Pierce county. Spokane has seen slowing or plateauing growth of cases in 0-39 year olds while there is a clear continued increase in older ages.*

We can use a transmission model to contextualize the recent declines in the effective reproductive number. In King County, had R_e remained at the level estimated before the June 23 masking mandate, we would have expected nearly double the number of cases and hospital admissions we observed on July 31.

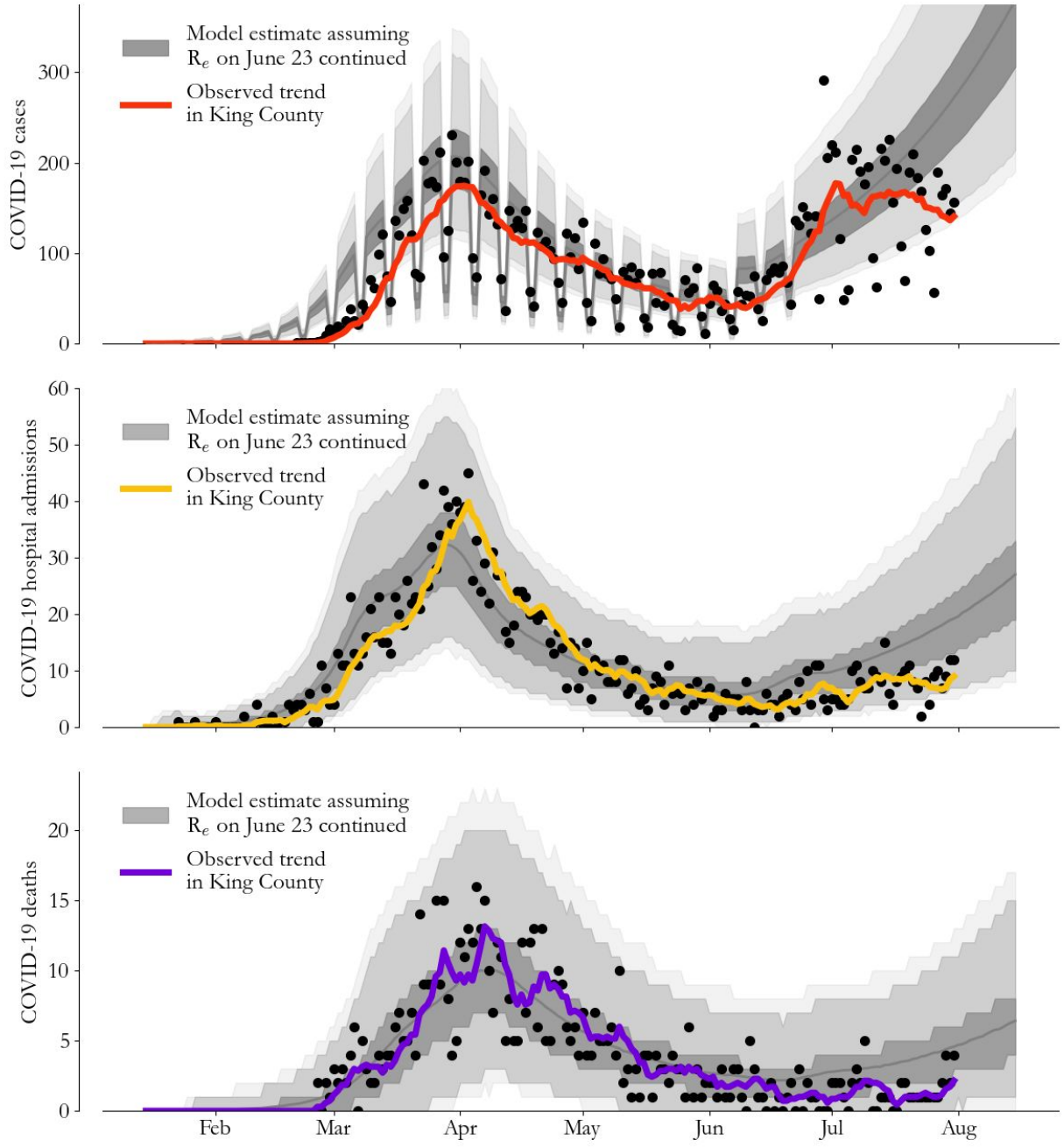

***Figure 4**: Trends (colors) in King County's daily COVID-19 cases (dots, top), hospital admissions (dots, middle), and deaths (dots, bottom) contextualized with a model-based counter factual (grey, 50%, 95%, and 99% CIs dark to light) estimating what would have happened had transmission rates remained at June 23 levels till August 15. We would have expected substantially more cases and hospitalizations by July 31; however, we would not yet have expected to observe effects on mortality due to delays between infection and death. Overall, this comparison suggests that the June 23 and July 7 masking mandates averted significant disease burden in King County. This comparison leverages our updated transmission model. For more information, see our recent technical report.*