SitRep 17: COVID-19 transmission across Washington State

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Results as of September 22nd 2020.

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 of current situation

Using data from the Washington Disease Reporting System (WDRS) through September 10, we estimate the effective reproductive number (R_e) in western Washington on September 5 was likely between 0.57 and 1.71, with a best estimate of 1.14. Meanwhile, we estimate that in eastern WA, R_e was likely between 0.45 and 1.38 on September 5, with a best estimate of 0.92. Overall case counts in both eastern and western WA continue to decrease, however this decrease is not uniform across regions, with decreases slowing or reversing in some regions.

The long trend since July of holding R_e near one across the state indicates that **small improvements to current practices, widely distributed, can crush the curve heading into the fall.**
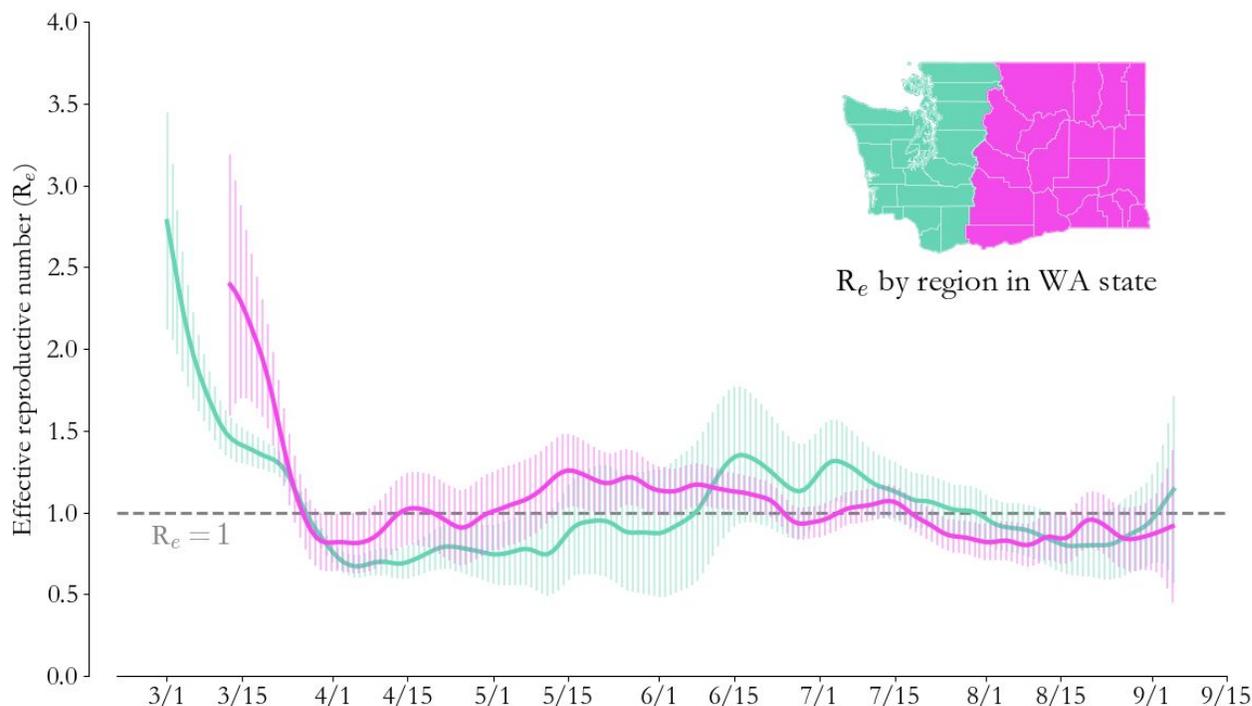

Figure 1*: R_e estimates for eastern (pink) and western (green) WA, with 2 standard deviation error bars. Our most recent estimates suggest that R_e is potentially above 1 in both eastern and western WA as of September 5. More generally, our R_e estimates have hovered near 1 since mid-July, implying that transmission has persisted near replacement level through the second half of summer. For details on how these estimates are generated, see our technical report.*

Testing data shows that cases are declining in a number of counties, including King, Snohomish, and Yakima. That said, in parts of the state, declines have stagnated, suggesting we may need to redouble efforts to encourage risk reducing behaviors. These plateaus have become prominent in Pierce, Spokane, Clark, Benton, and Franklin, and they raise cause for concern as risk may increase going into the Fall. Spokane in particular is of concern, as cases have increased subsequent to September 10 despite incomplete reporting.
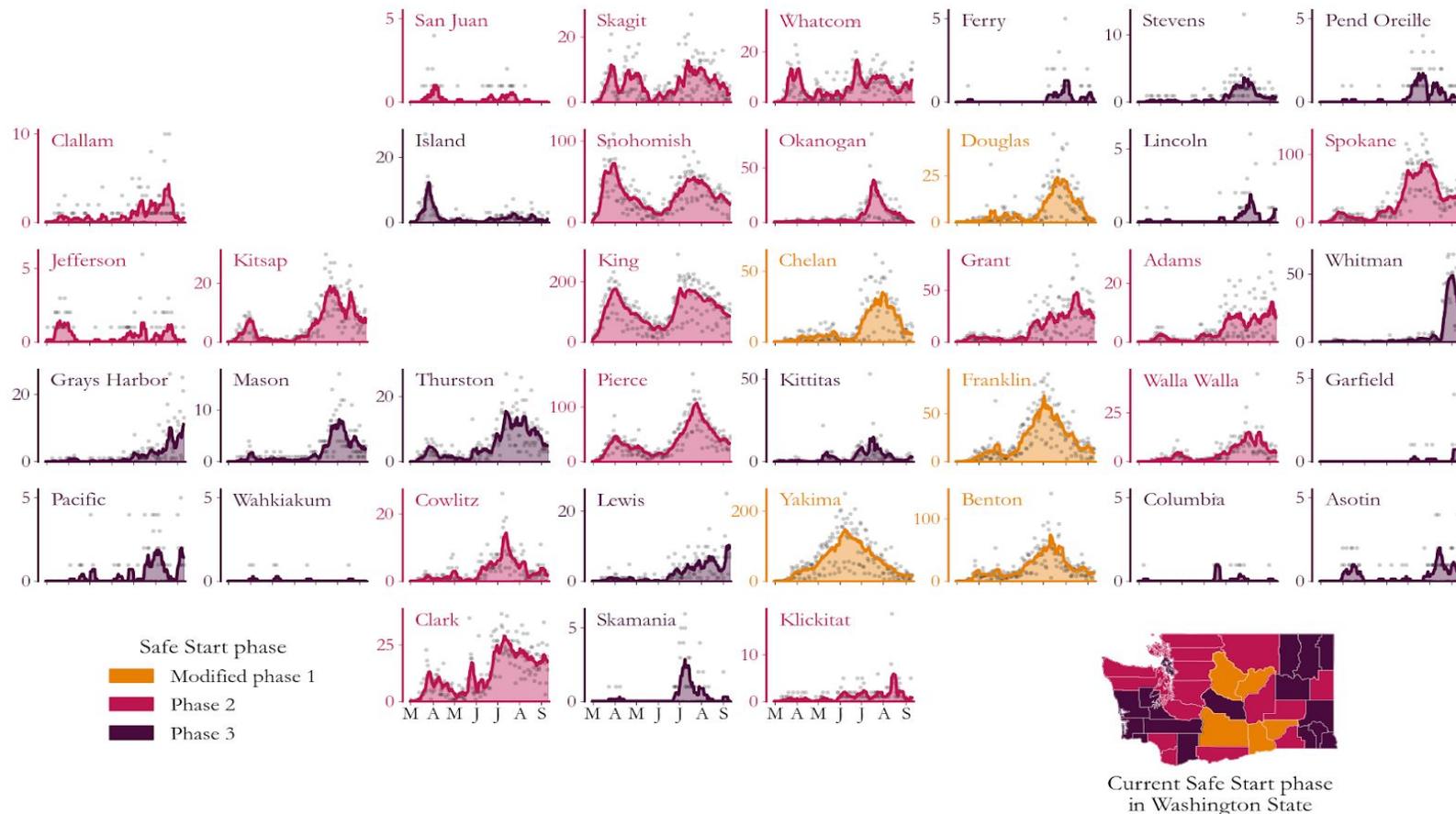

Figure 2: *Daily COVID-19 positives (dots) and 7-day moving averages (curves) arranged geographically and colored by* Safe Start phase *as of September 5. Case trends across counties highlight geographic correlations, and help us better understand region-level estimates of the transmission rate (see Figure 1).*
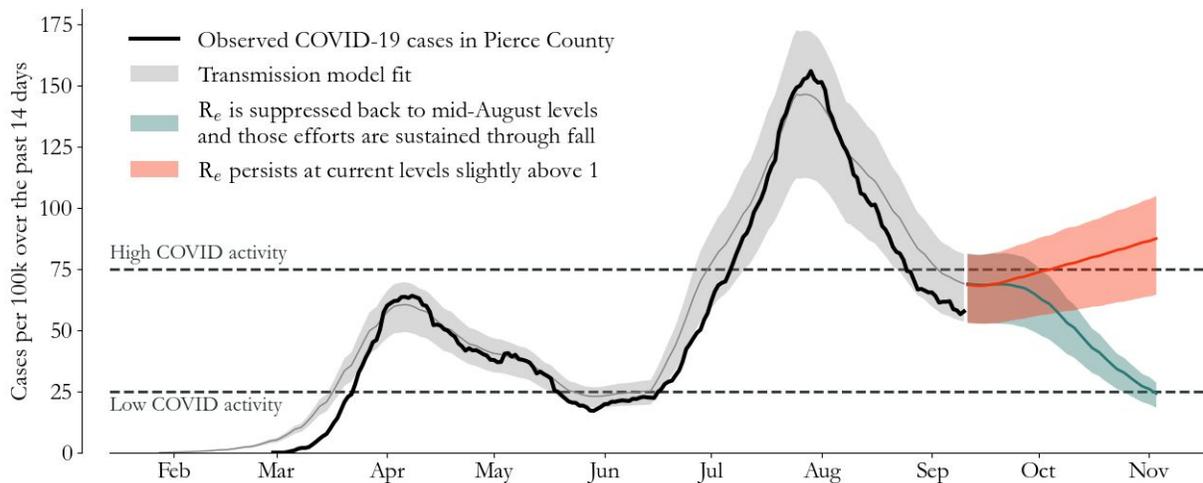
Figure 3. *Model based projections of COVID-19 burden (as measured by positive tests per 100k over the previous 14 days, shown in black) for Pierce County illustrate potential risk going into the Fall. Our model is fit (50% interval in grey) to Pierce county's COVID-19 testing, hospitalization, and mortality data. With the fitted model, we can explore outcomes under future scenarios. Here, we show that Pierce county is on the cusp of sustained burden increase (red) if transmission continues at current levels. However, if rates are suppressed to levels observed in mid-August, continued declines are also possible (green). The level of COVID activity (dashed lines), as defined by the [state's school safety guidelines](), depends strongly on the collective success of mitigation efforts in the coming months.*

Implications for public health practice

We are entering a state of transition in Washington. Seasonal changes in the weather will increase the amount of time individuals spend indoors. The start of classes, both online, or cohorted, hybrid and in-person is shifting behavior patterns for K-12 students and parents, as well as college age students. These patterns will further shift as more schools move from online models of teaching to hybrid or fully in person. These transitions have the potential to increase transmission. However because we are entering a situation where there are few prior examples to look to, it is challenging to predict the magnitude of the impact of transitions on COVID-19 transmission.

Current estimates of R_e for eastern and western Washington are around one. At values around one even a slight change in transmission can have large impacts on disease occurrence over subsequent weeks. A slight but persistent increase in R_e due to changes in behavior brought about by Fall transitions could lead to exponential growth. Alternatively, small collective changes to our behavior and indoor environment to reduce risk of transmission could be enough to decrease R_e sufficiently to offset increases from these transitions. Ideally, they would lower R_e sufficiently to allow for further K-12 school reopening. Figure 4 illustrates what can happen if R_e were to be maintained slightly above one throughout the Fall vs. if collected behavior changes shifted R_e to be persistently below one.   **In the example of Pierce county, a return to COVID prevention levels seen only a month ago in mid-August may be sufficient to allow in-person K-12 education in November.** While the figure uses Pierce county's data as a concrete example, Pierce's recent plateau following a period with R_e confidently below 1 is mirrored in data across the state.

Because a large fraction of COVID-19 cases are asymptomatic yet can still transmit to others, it is important to both reduce the risk of becoming infected and reduce the risk of unwittingly infecting others in order to lower transmission in the population. There are multiple behaviors which reduce risk of transmission.

For individuals, behaviors that can reduce the risk of becoming infected and reduce the risk of infecting others include:

- Avoid gatherings or reduce gathering sizes.
- Keep outdoors and in well-ventilated spaces.
- Wear a mask when gatherings cannot be avoided.
- Wear a mask so it covers your nose and your mouth.

Behaviors that lower the risk of spreading COVID-19 once infected with, or exposed to COVID-19 include:

- Avoid contact with others if infected with COVID-19.
- Get tested and avoid contact with others when you have symptoms of COVID-19.
- Get tested and avoid contact with others if you have been exposed to someone with COVID-19.

For employers:

- Support universal mask usage among employees and customers.
- When possible, arrange shifts to maintain smaller cohorts of employees that stay together.
- Maintain good ventilation in indoor workspaces.
- Encourage employees to stay home when sick.

If you are infected with COVID-19, warning others with whom you have been in contact allows them to take precautions against unknowingly spreading COVID-19. Your local public health agency (or in some cases the Washington State Department of Health) will try and contact you to determine if there are individuals who need to be notified that they may have been exposed. Working with public health by providing contact information about people with whom you have been in contact is critical to breaking chains of transmission. Note that public health agencies will attempt to contact individuals who may have been exposed to someone who is infected. They will not identify the infected individual.

The data indicate that small improvements to current practices, widely distributed, can crush the curve heading into the fall. Working together, each of us doing what we can consistently, will get us through this challenging period, with many lives saved and children back in school. While we cannot know the future, after 7 months of learning from data, there is hope if we continue to work together to mitigate transmission.

Key inputs, assumptions, and limitations of the IDM 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 to estimating R_e and its assumptions and limitations, see the most recent technical report on the modeling methods. The estimates this week and going forward use the updated method in that report, which results in some statistically-insignificant retrospective changes to R_e relative to our previous 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 September 20, and to hedge against delays in reporting, we analyze data up to September 10 across the state.** 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 support for 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. Modeling and analysis for the report are led by WA DoH and are based on models developed by IDM and advanced by Microsoft to better represent the state. 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 and to support WA DoH in its public health mission. This collaboration and its outputs will continue to evolve as scientific frontiers and policy needs change over time.