# Situation Report 6: COVID-19 transmission across Washington State

## Counties in focus: King, Snohomish, Pierce, and Yakima

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From week to week, we will be highlighting 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.

### *What do we already know?*

In our previous report we highlighted rising COVID-19 prevalence estimates in Yakima, Spokane, Benton, and Franklin counties. We also found that testing data was consistent with rising transmission in both eastern and western WA but with significantly higher uncertainty in the west.

### *What does this report add?*

With data from the Washington Disease Reporting System (WDRS) compiled on June 25, our estimates of the effective reproductive number, $R_e$, remain consistent with accelerating COVID-19 transmission across the state. In particular, we estimate that $R_e$ was between 0.95 and 1.25, with best estimate 1.10, on June 12 in eastern WA. Meanwhile, in western WA, we estimate that $R_e$ was between 0.78 and 1.85, with best estimate 1.32, on June 13. While uncertainty is high, our estimates suggest COVID-19 burden will continue to grow across the state. Note that the most recent estimates for $R_e$ in eastern and western WA now appear on the WA State COVID-19 Risk Assessment dashboard.

This week we include model-based COVID-19 prevalence estimates for King, Snohomish, Pierce, and Yakima counties. In Yakima county, we see a decline in COVID-19 cases consistent with declining prevalence from an estimated peak in late May, suggesting that recent public health focus and mitigation efforts are having some success.

Meanwhile, in King, Snohomish, and Pierce counties, we see a recent upwards trend in daily COVID-19 positives. Interpretation of this trend is difficult given the recent increases in testing volume in King County; however, the upward trends in Snohomish and Pierce counties are not accompanied by a large testing volume change, suggesting that the upwards trends are connected to increasing transmission across the Puget Sound area. Consistent with this interpretation, our model-based estimates of COVID-19 prevalence are increasing in all three counties, highlighting the need for continued monitoring and for increased vigilance as communities reopen and mobility increases.

### *What are the implications for public health practice?*

Recent measures taken by public health officials in Washington, including stricter policies on masks and increases in COVID-19 testing volume, are well justified given the current epidemiological situation, with transmission likely rising in multiple places across the state. Our findings in the Puget Sound area highlight the state's precarious position overall, despite the difficult-to-quantify uncertainties associated with the effects of new masking and testing measures.

## 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 and the associated COVID-19 prevalence. 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 and death data compiled on June 25, and to hedge against delays in reporting, we analyze data up to June 18 for Western Washington and up to June 17 for Eastern Washington.**
- This week we provide prevalence estimates in Yakima County, King County, Snohomish County and Pierce County. These estimates use data up to June 15 from the WDRS compiled on June 21.
- New to this report, we include an analysis of syndromic surveillance data, i.e. visits to emergency departments due to COVID-like illness (defined as either a COVID-19 diagnosis or fever and shortness of breath with influenza ruled out). This data set was compiled by the WADoH RHINO team on June 24, and it contains records up to June 20.
- 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.** This further adds difficult-to-quantify uncertainty to our prevalence estimates, since large increases in cases due to specific clusters may not be representative of the region as a whole.
- 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. **In particular, situations with large, rapid testing volume increases introduce additional uncertainties that can only be fully resolved with longer time series. We emphasize however that increased testing volume is an overwhelmingly positive thing. Despite the short term uncertainty test volume changes introduce into metrics of COVID-19 transmission, increased testing is essential to identifying high-risk settings, preventing onward transmission, and linking people to care.**
- 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 is not addressed herein.

## Collaboration notes

The Institute for Disease Modeling (IDM), Microsoft 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 reproductive 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 WADoH 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.

In both eastern and western WA, increases in COVID-19 positives are consistent with rising transmission rates, albeit with particularly high uncertainty in the western part of the state, where case counts are lower overall.
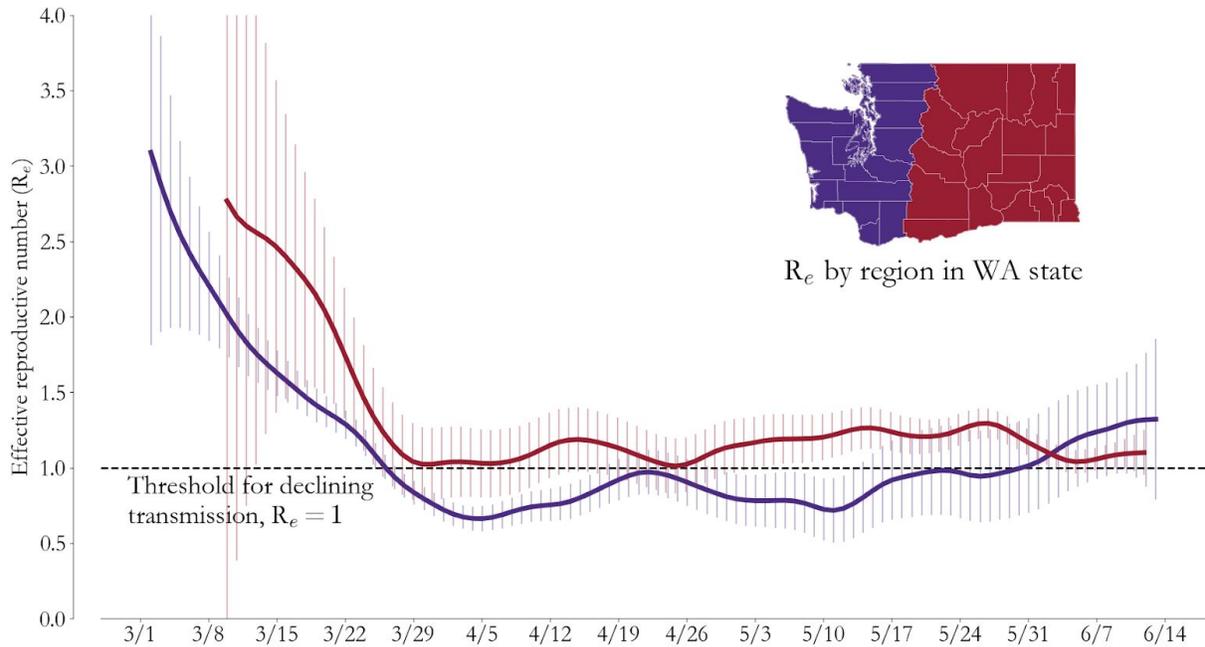


**Figure 1**: $R_e$ estimates for eastern (red) and western (purple) WA, with 2 standard deviation error bars. Our most recent estimates suggest that $R_e$ has recently been increasing and may be above 1 in western WA, and may be decreasing in eastern WA, though it is still above 1. Overall, this suggests that COVID-19 prevalence will increase across the state in the near future. For details on how these estimates are generated, see our technical report.

Progress to Zero reveals a similar picture, with a number of counties near their historic peaks in cases on both sides of the state.
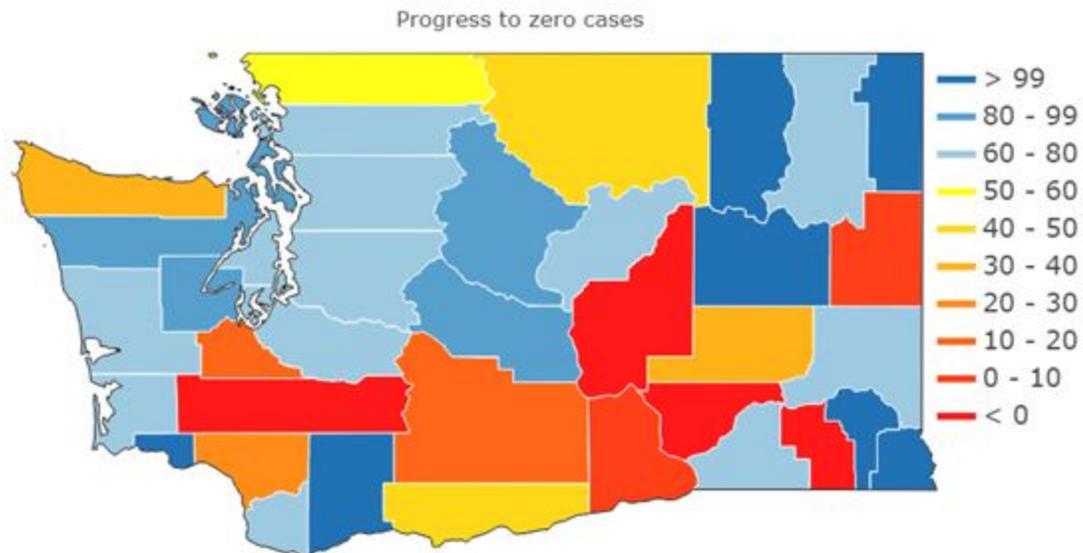


*Figure 2*: *Progress to zero, the percentage decline in cases from a previously recorded peak level, is heterogeneous across the state. A number of eastern and western counties, such as Grant, Columbia, and Lewis, have all hit new peaks in positive cases. Meanwhile in Yakima County, progress from the peak, though minor at this point, is encouraging. Finally, compared to our previous situation report, King, Snohomish, Pierce counties all have lower progress, highlighting cause for concern.*

New COVID-19 cases are beginning to rise in King County, though large increases in testing make interpretation difficult at this time. That said, trends are similar in neighboring Snohomish and Pierce counties without similar testing increases, raising cause for concern. Meanwhile, in Yakima County, the rising trend in new cases may be starting to reverse.
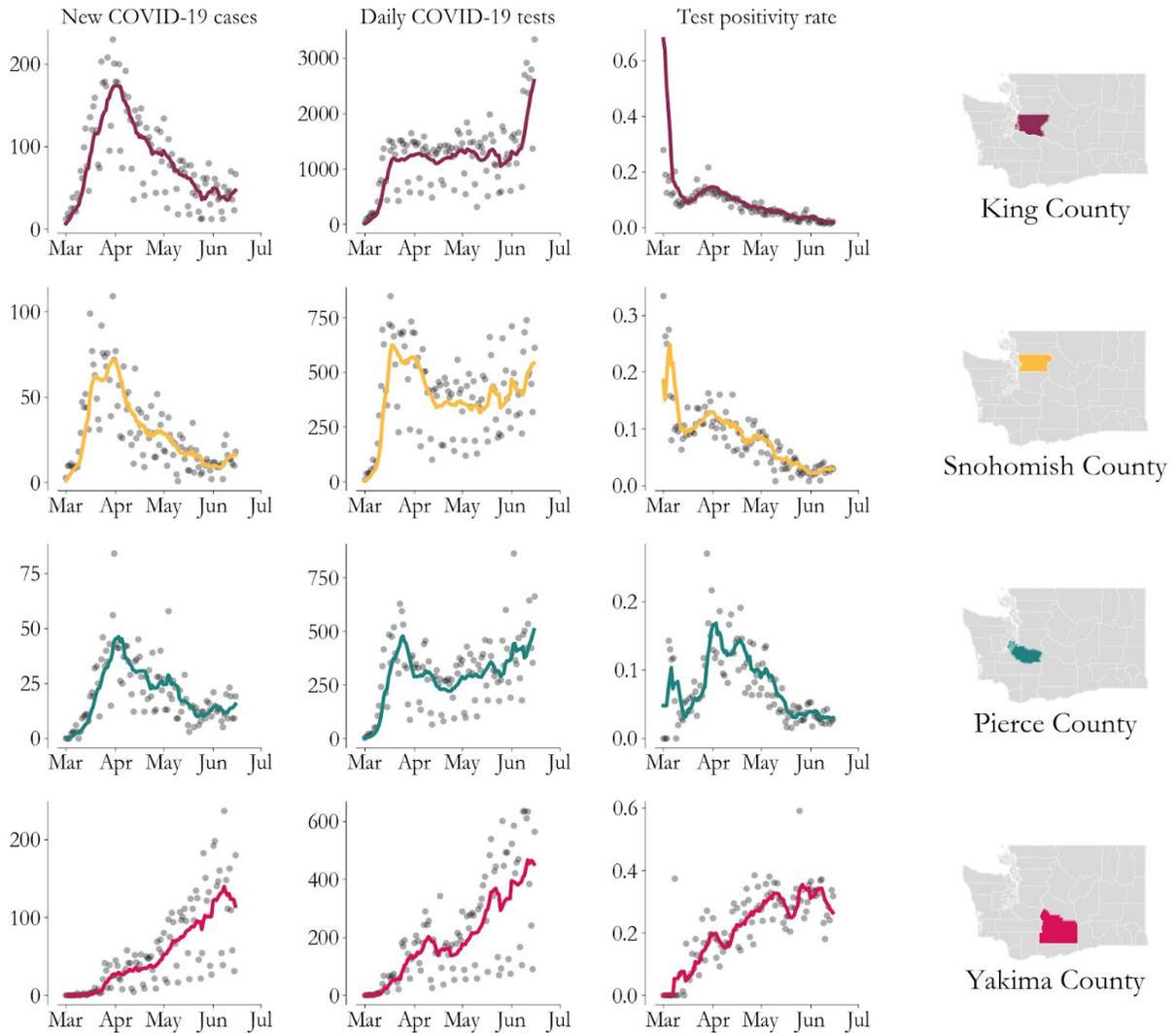


*Figure 3*: *Cases (left), tests (middle), and test-positivity (right) are smoothed with a 7-day rolling average (curves) to highlight trends. In King, Snohomish, and Pierce, we see upwards trends in COVID-19 positives. In King County, testing was recently increased by nearly 100%, making interpretation somewhat difficult. However, volume is more consistent in Snohomish and Pierce, suggesting that increases in positives reflect increased transmission. Finally, in Yakima, cases may be starting to fall, consistent with reports of [increased local mitigation efforts](). For the most recent data see the [WA DOH Data Dashboard]().*

Daily visits to emergency departments due to COVID-like illness offer a complementary perspective on transmission that is independent of changes in the number of tests. In the Puget Sound area recent trends are flat, giving us additional cause for concern.
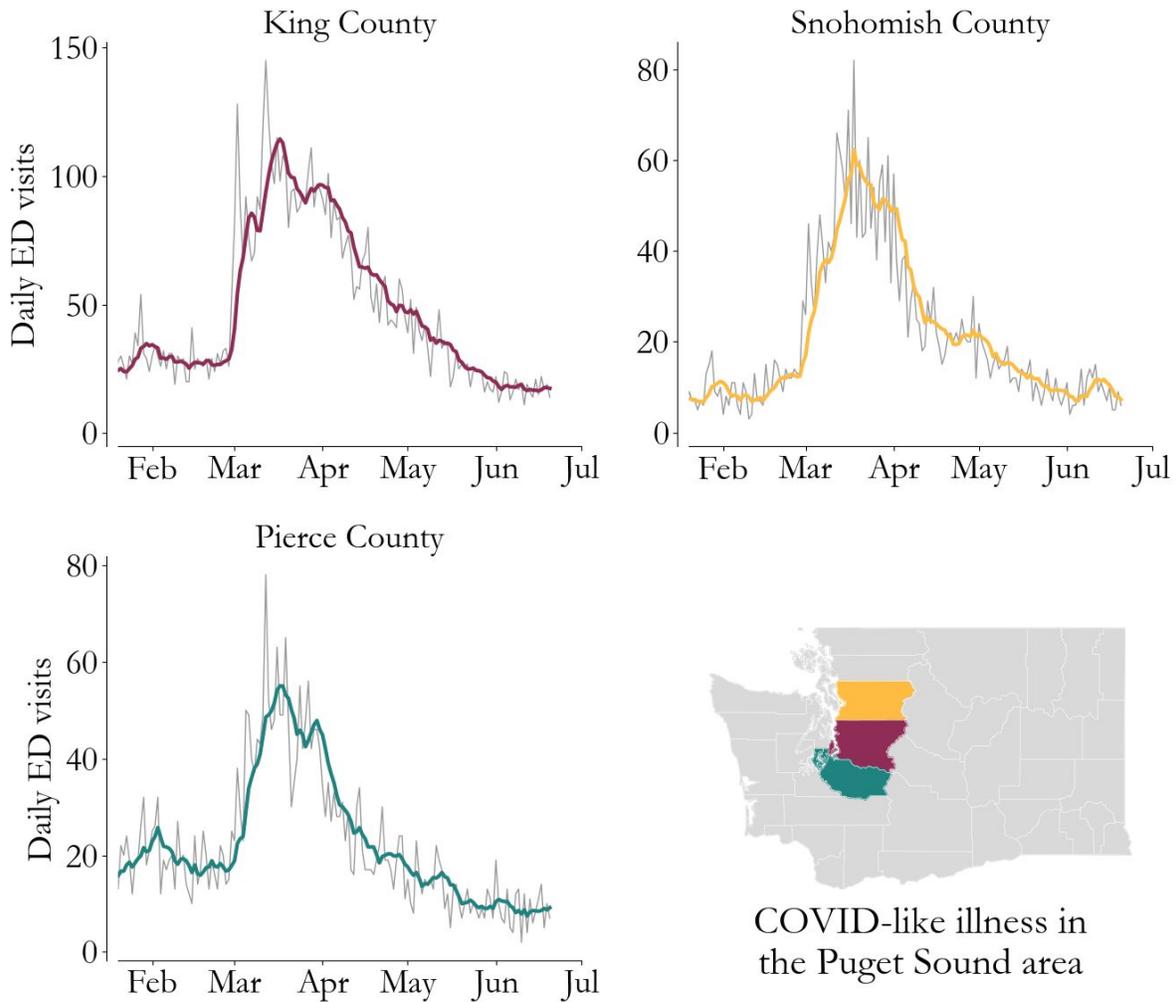


*Figure 4*: *Syndromic surveillance data (grey curves), compiled by the [WADoH RHINO team](#), records the number of visits to emergency departments due to COVID-like illness (CLI). This measure of severe COVID-19 infections is independent of testing availability, and in King, Snohomish, and Pierce counties recent trends (7 day rolling average in color) are similar and stagnant. For more information about our interpretation of this type of data, see our [blog post on the topic](#).*

Consistent with trends in testing, model-based estimates of COVID-19 prevalence are rising in the Puget Sound area. Although changes in testing volume add additional, difficult to quantify uncertainty to these estimates, their consistency across all three counties suggests that mandatory masking policies were timely.
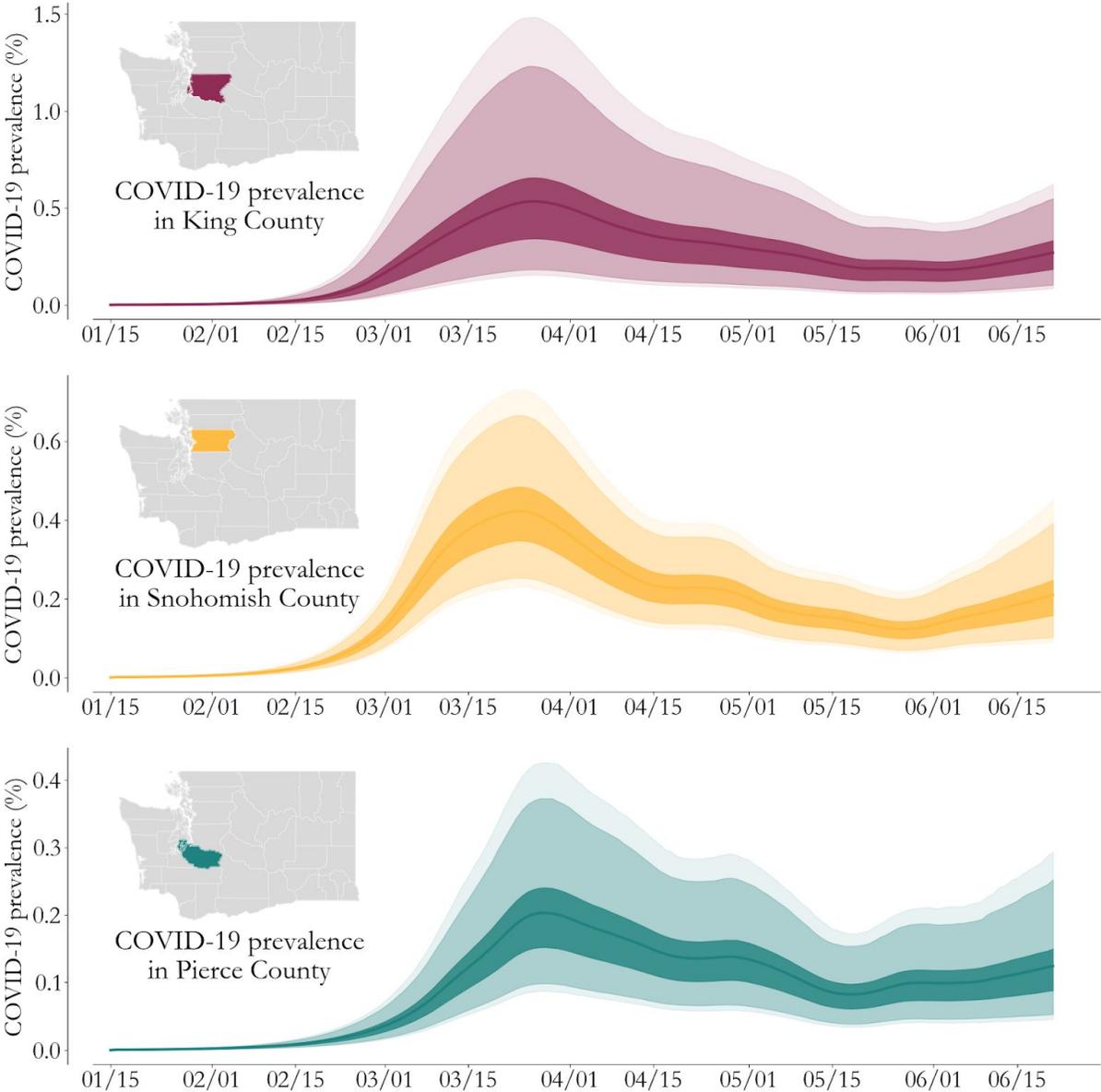


*Figure 5*: Estimated percentage of the population actively infected with COVID-19 (50% CI dark, 95% CI light, 99% CI lightest) in the Puget Sound area. Consistent with trends in COVID-19 tests, we see recent prevalence increases in response to increasing transmission. Although we estimate that mid-June prevalence is likely lower than the late-March peak for these counties, susceptibility to COVID-19 is high across Washington state, and new peaks are a possibility in the future if transmission continues at this rate. For detailed information on how these estimates are generated, see our technical report.

In Yakima County we estimate that population prevalence has been declining while a large fraction of the population remains fully susceptible to COVID. This suggests that declines are due to recent interventions and changes in behavior.
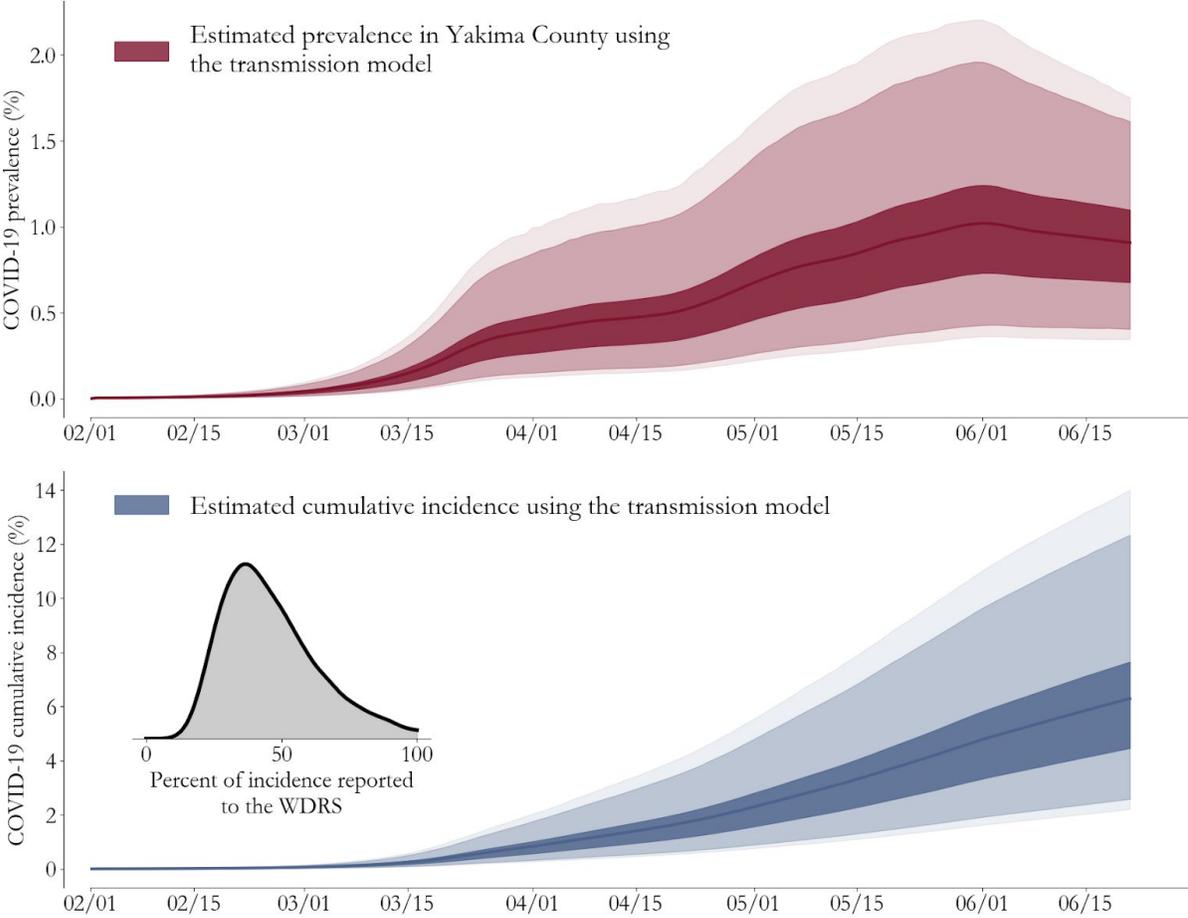


**Figure 6**: *In Yakima County, our best estimate of population prevalence (top panel, red line) shows modest declines through early June, with an estimate between 0.4% and 1.7%, with best estimate 0.9%, as of June 16. At the same time, consistent with the prevalence time-course in our model, we estimate that between 2.4% and 11.7% of Yakima County's population was no longer fully susceptible to COVID-19. As a result, with the majority of the population susceptible, recent declines likely reflect changes in community behavior.*

Survey based estimates of mask usage in Yakima County give us further confidence that efforts to curtail transmission are making a difference. Continued increases in mask usage and other mitigation behaviors are likely to lead to more definitive declines in transmission rates and COVID-19 burden.
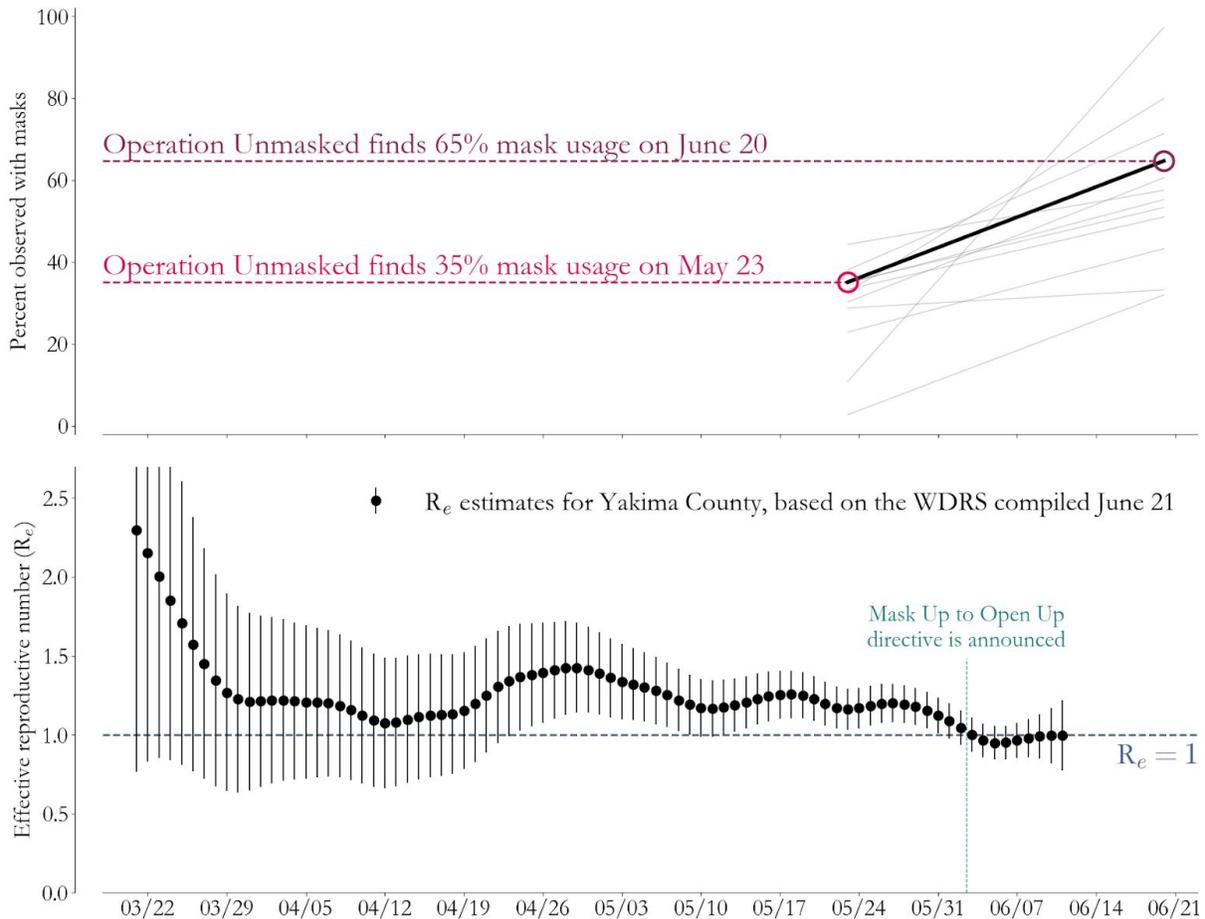


**Figure 7**: (Top panel) Operation Unmasked, a visual survey of Yakima County businesses by Signal Health, found dramatic increases in mask usage (black lines) from May 23 to June 20, with heterogeneity across sub-county areas (grey lines). (Bottom) Model based estimates of $R_e$ (black dots, 2 standard deviation error bars) show a switch in point estimate from above to below 1 in early June, consistent with the timing of increased mask distribution and public awareness efforts. While uncertainty is high, and supports $R_e > 1$, this is an encouraging sign. We expect further increases in mask usage to make transmission declines more definitive. Mask up!