Situation Report 8: COVID-19 transmission across Washington State

Ruth Etzioni[1], Juan M. Lavista Ferres[2], Grace H Huynh[2], Ian Painter[3], Roman Gulati[1], Niket Thakkar[4], and Mike Famulare[4]
[1]Fred Hutch Cancer Center; [2]Microsoft; [3]Washington State Department of Health; [4]Institute for Disease Modeling

Results as of July 9 2020 12 p.m.

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.

Summary and highlights

This report highlights the growth in COVID burden across the state. While transmission is likely slowing in Yakima County, it is likely increasing everywhere else. The seven-day average of new cases now exceeds the peak set in early March. Cases are increasing fastest among individuals under 40 years of age across the state. Hospitalization rates are still stable in Western WA but increasing in Eastern WA.

R_e estimates for June 21 for eastern and western Washington are similar to those presented in our previous report, but more confidently above 1. For Western Washington R_e is likely between 1.32 and 1.87, with best estimate **1.59**. For Eastern Washington R_e is likely between 1.06 and 1.34, with best estimate **1.20**. In Yakima the 7-day moving average of new cases has declined from 116 to 85 and the estimated R_e is likely between 0.67 and 1.19 with best estimate **0.93.**

Estimates of R_e persistently above one translate into accelerating increases in new case counts. Within the Puget sound area, the 7-day average of new COVID-19 cases has grown from 95 to 212 since our last report with a slight uptick in the test positive rate. Every Puget Sound county now has R_e estimated to be above 1.4. The biggest increase is in the under-40 age group; the seven-day average of new cases now exceeds its previous peak observed in early April. In King, Snohomish and Pierce counties, the most overrepresented age group is age 20-29. This is particularly noticeable in Pierce and King counties. In eastern Washington, transmission is declining only in Yakima. In Spokane, new case counts are increasing particularly among 20-29 year olds, the test-positive rate is rising despite increases in testing, and R_e is between 1.12 and 1.77, with best estimate **1.45**.

Trends in hospitalizations are variable across the state. In King County, hospitalizations are stable despite the increases in newly diagnosed cases, likely due to the fact that the bulk of the increases in cases in Western Washington are among individuals under 40. In Eastern Washington, hospitalizations continue to trend upwards (Yakima excepted), with a notable uptick in Spokane County.

Implications for public health practice

Transmission continues to increase or accelerate across most of Washington state. While hospitalization rates across the state appear to be stable on average, the upward trend in Spokane County highlights that increasing hospitalizations will surely follow new and growing outbreaks. The turn around in Yakima is yet another encouraging signal that targeted interventions and widespread mask wearing can be effective. However, COVID-19 prevalence in Yakima is likely between 0.4% and 1.4%, roughly late April levels. Thus it is crucial that current mitigation efforts be strictly maintained. The high frequency of infections in younger age groups in Puget Sound and Spokane suggests interventions in these areas should target reducing transmission in these age groups and ensuring that infections do not spread to older vulnerable populations.

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 July 5, and to hedge against delays in reporting, we analyze data up to June 26 in both Western Washington and Eastern Washington.**
- This week we provide prevalence estimates for the Puget Sound region (King, Snohomish, and Pierce counties), Spokane County, and Yakima County. These estimates use data up to June 29 in the Puget Sound area, up to June 27 in Spokane County, and up to June 26 in Yakima County.
- New to this report are data describing the ages of recently confirmed cases. Results reported use data up to June 26 from the WDRS compiled on July 5.
- 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. **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 WADoH 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 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.

With recent effective reproductive numbers definitively above 1, we have complete confidence that the COVID-19 epidemic was growing in both Eastern and Western Washington from mid to late June. Burden on all our communities will likely continue to grow in the coming weeks.

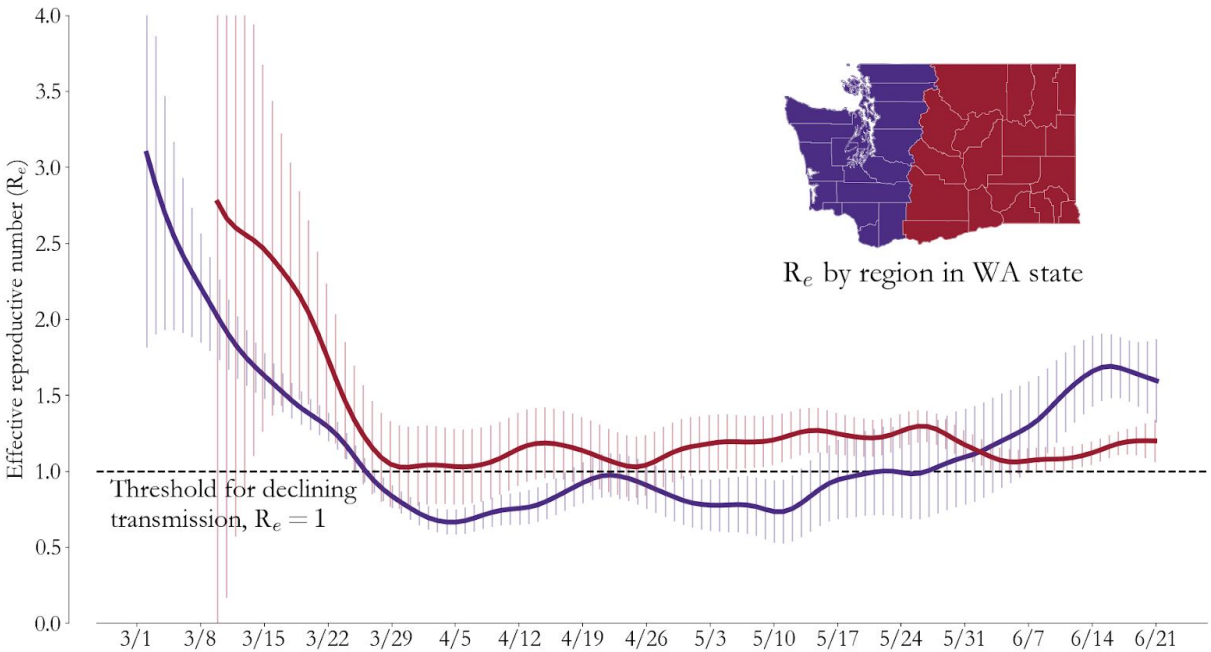


Figure 1: *R_e estimates for Eastern (red) and Western (purple) WA, with 2 standard deviation error bars. Our most recent estimates suggest that R_e is above 1 in both Eastern and Western WA, with increased confidence relative to past situation reports. For details on how these estimates are generated, see our technical report.*

While the resurgence in cases was originally limited to a few hot spots, upwards trends are now prominent in most counties. One encouraging exception is Yakima County, where we have growing confidence that mitigation efforts are working.

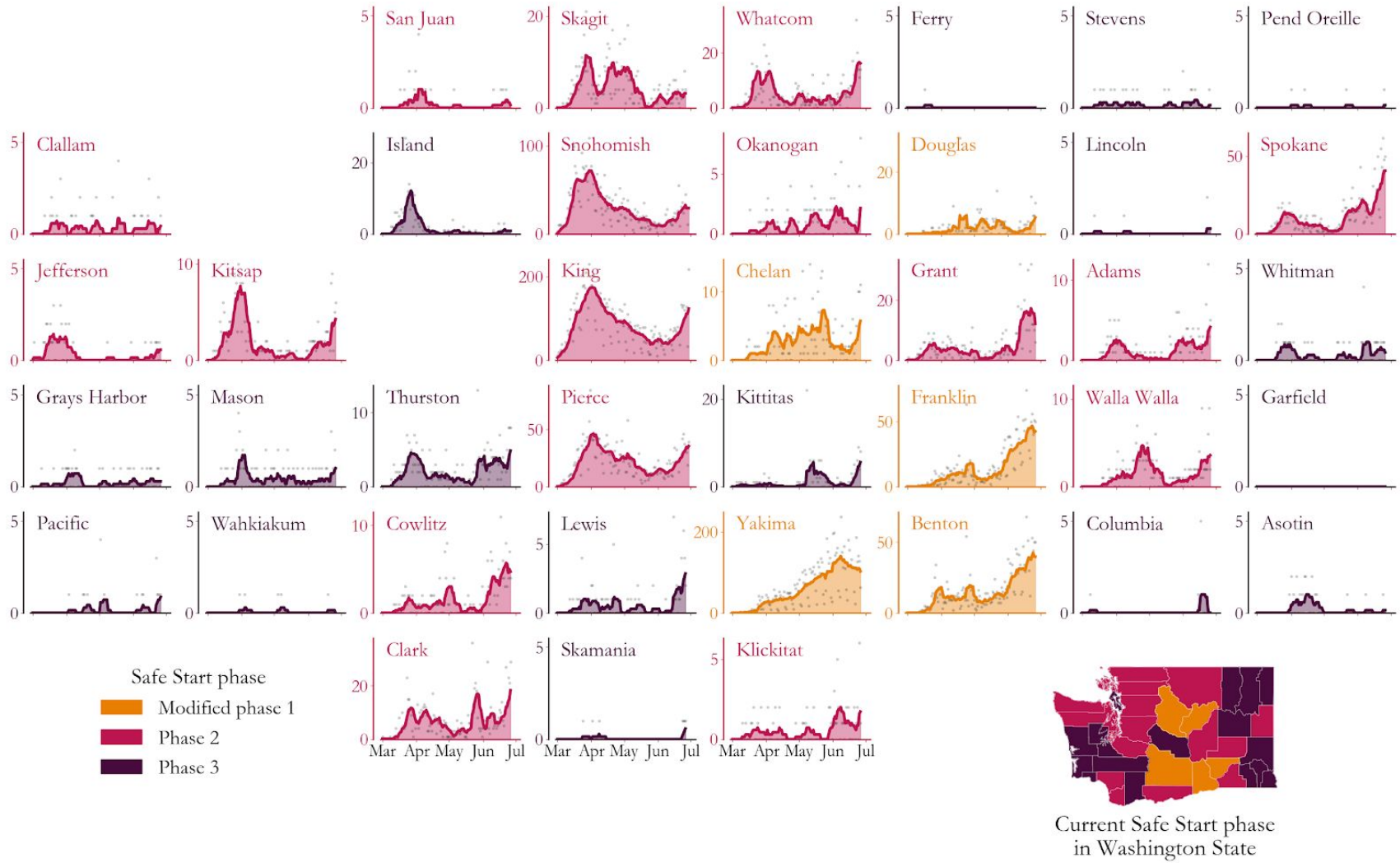


***Figure 2**: Daily COVID-19 positives (dots) and 7-day moving averages (curves) arranged geographically (inspired by this) and colored by Safe Start phase as of July 9. The figure shows clearly that infections are accelerating in all counties in Modified Phase I except for Yakima, and in the most populous counties in Phase 2 including Puget Sound and Spokane, as well as other counties - Clark, Kitsap, Benton, Franklin, and Cowlitz. Many phase 3 counties, with generally lower population, have not yet seen substantial growth, but risk is currently very high given the situation in surrounding areas.*

In the Puget Sound area and in Spokane County, the increase in testing has been outpaced by the increase in cases, as evidenced by rising test positivity from mid June onward. Meanwhile, in Yakima County, falling test positivity is encouraging given the relatively stable testing volume.

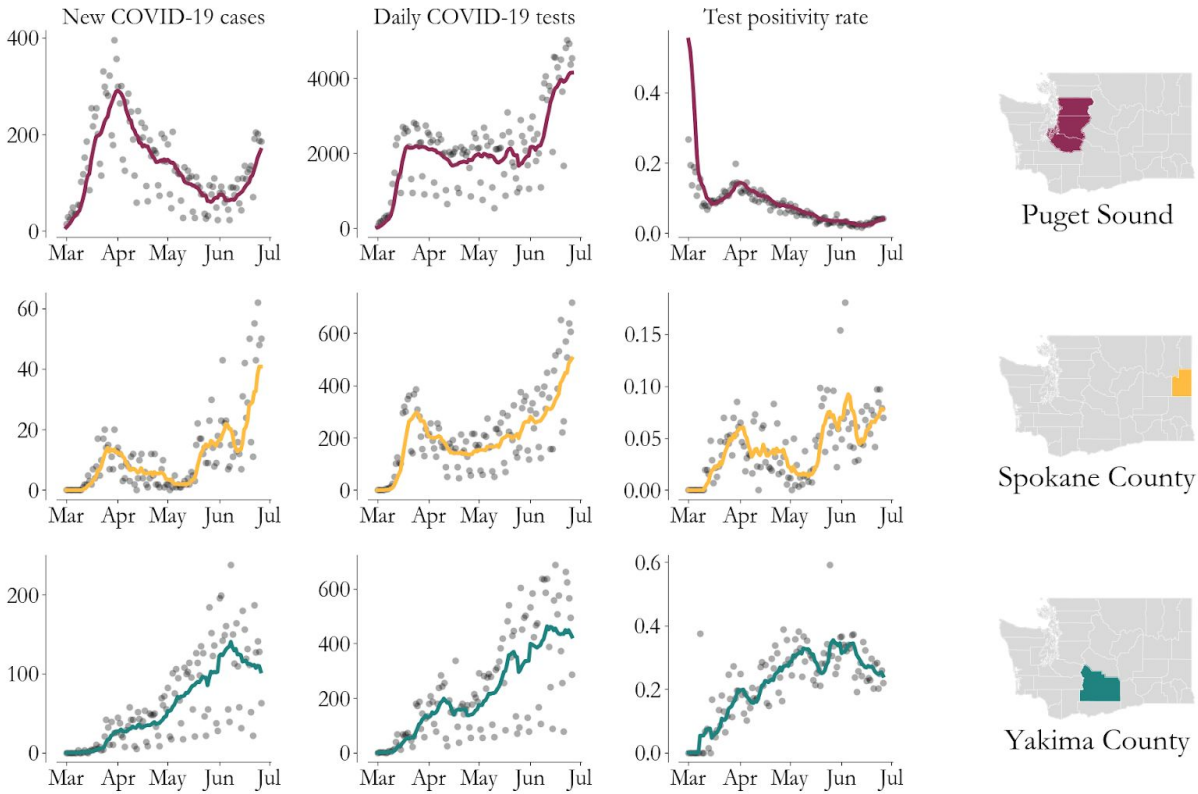


***Figure 3**: Cases (left), tests (middle), and test-positivity (right) are smoothed with a 7-day rolling average (curves) to highlight trends. From top to bottom, rises in the Puget Sound area (burgundy) are concurrent with rises in Spokane (yellow). The situation in Yakima appears to be improving, indicating that rigorously observed community interventions have the potential to change the course of the epidemic.*

Model-based estimates of COVID-19 prevalence are rising in the Puget Sound area and are comparable to peak levels from late March. Meanwhile, in Spokane County, we estimate that prevalence is likely higher than it's ever been. Finally, the declining trend in Yakima suggests that mitigation efforts have had success but need to continue since prevalence is still comparable to late April levels.

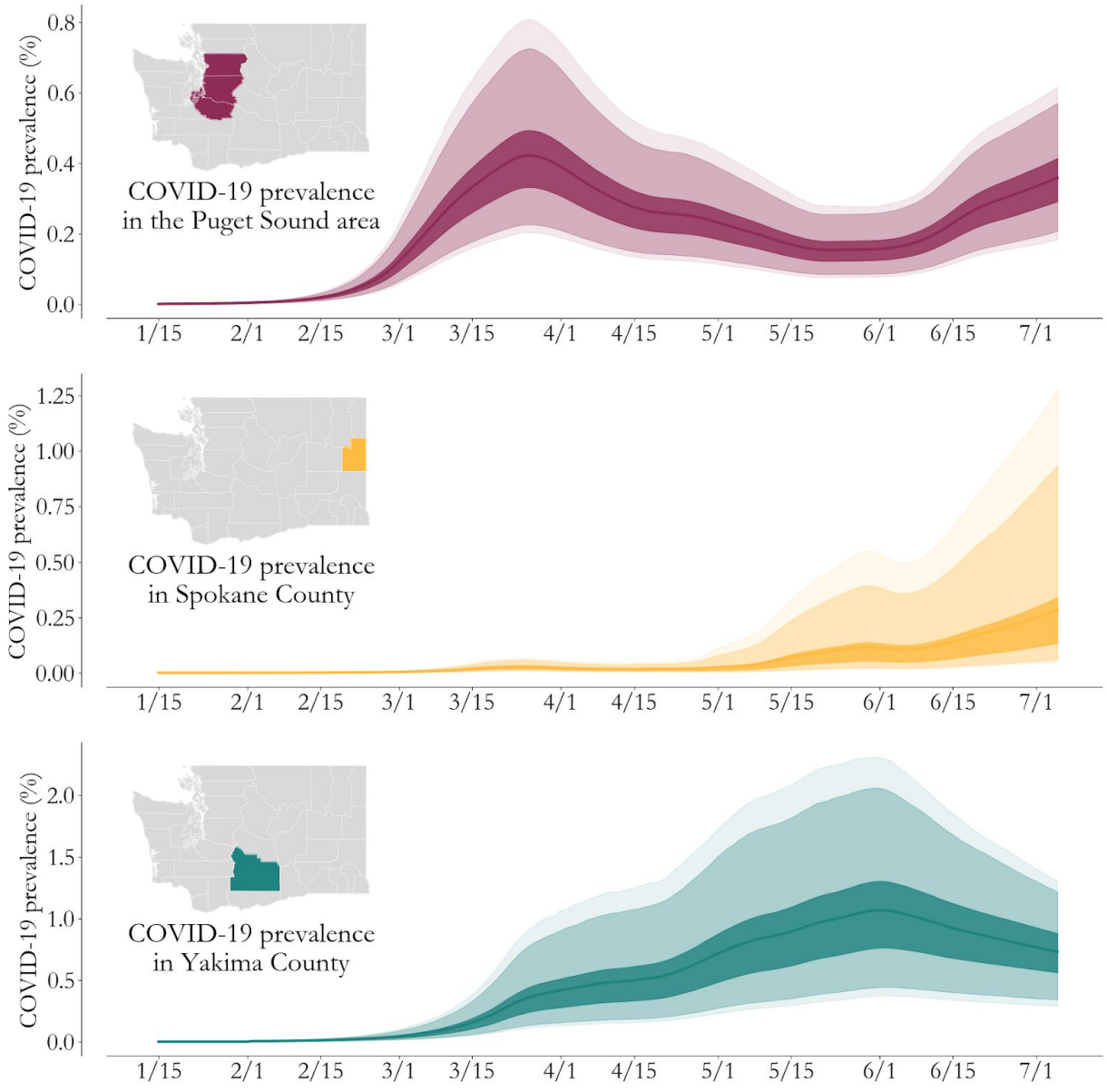
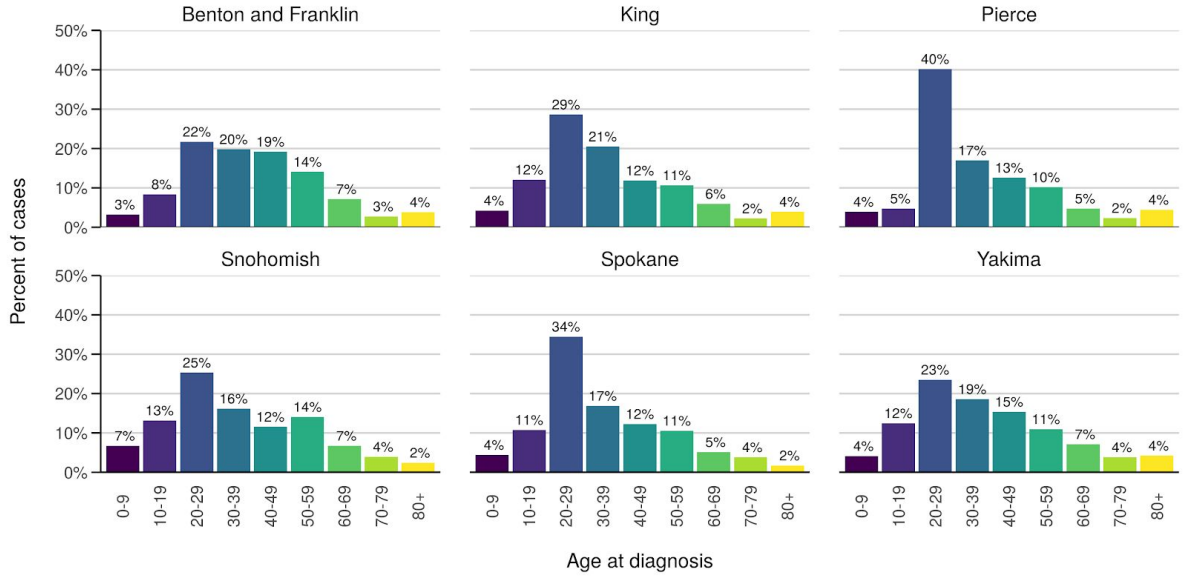


***Figure 4**: Estimated percentage of the population actively infected with COVID-19 (50% CI dark, 95% CI light, 99% CI lightest) in Puget Sound, Spokane, and Yakima. Consistent with trends in new diagnoses, we see recent prevalence increases in response to increasing transmission in Puget Sound and Spokane. Hospitalizations and deaths lag prevalence, thus the implications of these prevalence trends for those endpoints will become clear in the coming weeks. For detailed information on how these estimates are generated, see our technical report.*

Case data from the last two weeks of June shows that young adults, particularly those in their twenties, are experiencing a disproportionately high burden of infection. Although younger cases are less prone to hospitalization and death, infections among the young inevitably spread to older and more vulnerable populations. Thus, it is critical to act now with interventions that specifically address the reasons for the increased transmission among young adults.

CASE AGE FREQUENCIES



POPULATION AGE FREQUENCIES

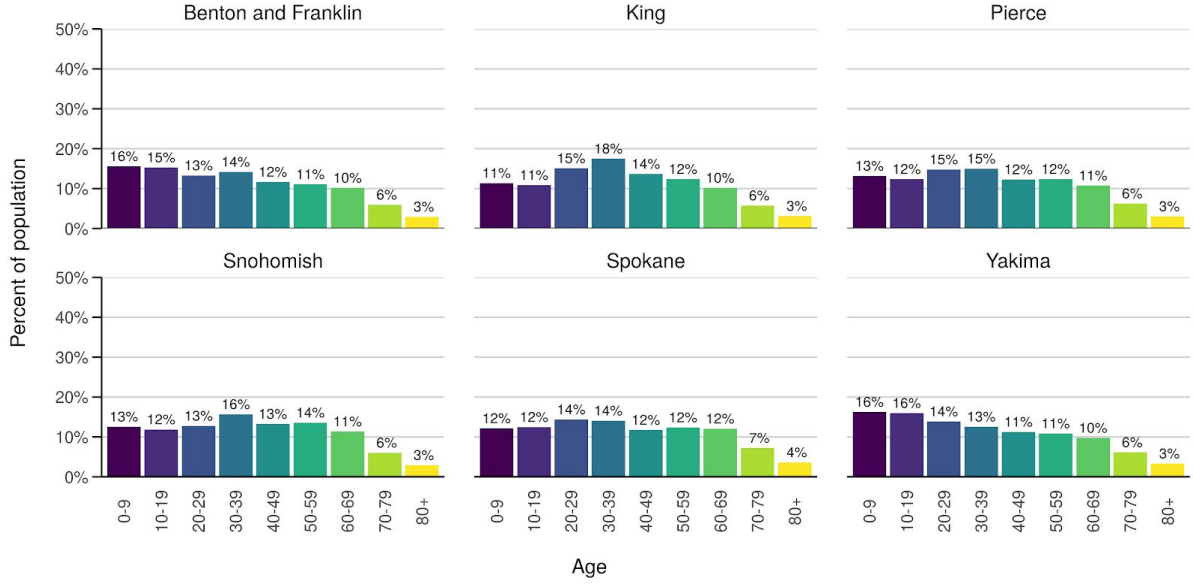


***Figure 5**: Age distribution of cases diagnosed June 15-30 in five counties plus Benton and Franklin (upper panel) and comparison with census age distributions for 2019 (lower panel). Across the state the most frequently diagnosed age group in late June was ages 20-29. This age group was particularly overrepresented relative to population age distributions in Spokane, Pierce, and King counties.*