WA Situation Report 3: COVID-19 transmission across Washington State

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Results as of June 5, 2020 5 p.m.

Some of these estimates, particularly R_e in Eastern and Western WA, now appear on the WA State COVID-19 Risk Assessment dashboard. As a result, moving forward, we expect situation reports to shift in focus towards self-contained analyses that highlight relevant and timely features in the data.

What do we already know?

The previous IDM report indicated diverging trends in transmission between Western and Eastern WA; transmission is likely declining in Western WA but continues to increase in Eastern WA. We noted geographic heterogeneity across WA, with the majority of cases stemming from Yakima and King counties.

What does this report add?

With updated data from the Washington State Disease Reporting System through June 3, we find that the trends in R_e suggest that transmission is mostly flat in Western WA but continues to increase in Eastern WA. We estimate that in Western WA, R_e has been flattening near 1 since May 18, and on May 24 we infer R_e was likely between 0.28 and 1.56, with best estimate 0.92. In Eastern WA, our best estimate is that R_e has been at or above 1 since April 27,and we infer on May 23 that R_e was likely between 1.10 and 1.41 with best estimate 1.26.

We continue to observe the majority of cases were reported in King and Yakima counties. New case counts are continuing to trend downwards in King County, with some indication that this trend is flattening out in the most recent week, but steadily increasing in Yakima County. For more in-depth comparison between these two counties, see our recent technical report. Excluding these two counties, the trend in case counts in Eastern and Western WA is relatively flat. We also observe that there is geographic heterogeneity within counties. For example, within Clark County in the time period between May 19 to May 24, 94% of the cases were in Vancouver, which represents only 37% of the county's population.

In addition to the geographic heterogeneity in reported cases, there is also heterogeneity in testing by county. The majority of tests are completed in King County. Tests per capita are high in Yakima County, but the test positive rate in this county remains high.

What are the implications for public health practice?

Our estimates indicate that transmission is declining slightly in Western WA but continues to increase in Eastern WA. Geographic heterogeneity in reported cases supports the ongoing need for identifying specific activities that lead to transmission across the state. In counties where the test positive rate remains high, additional resources may be needed to help limit transmission.

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 and incidence. 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 3, and to hedge against delays in reporting, we analyze data up to May 29 for Western Washington and up to May 28 for Eastern Washington.**
- 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 derive 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. Ongoing research is focused on incorporating other data streams, including covid-like-illness reports and hospitalization data.
- 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.

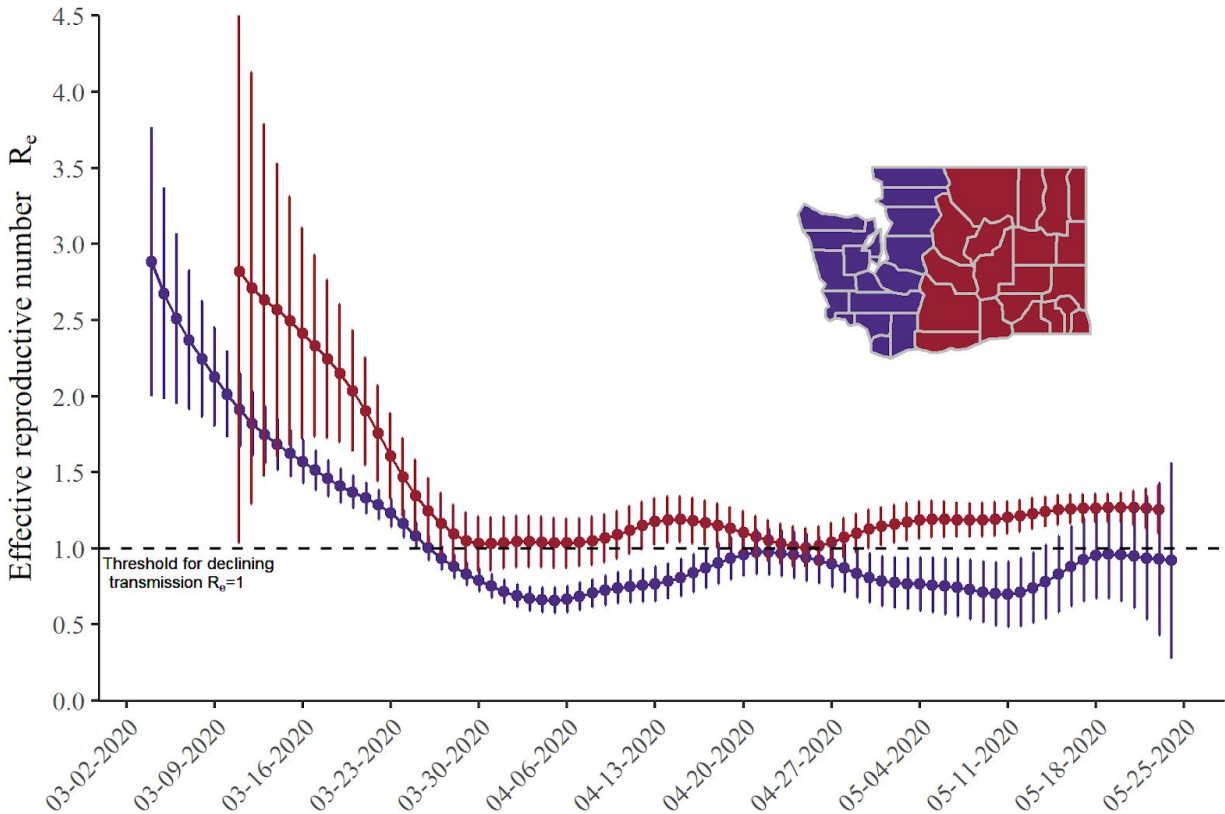## Models of Eastern and Western WA highlight differences in trends for transmission across the state.

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 was slightly below 1 on May 24 in Western WA, but above 1 in Eastern WA through May 23. For details on how these estimates are generated, see our *technical report*.

From May 22-28, population adjusted cases are highest in Central WA
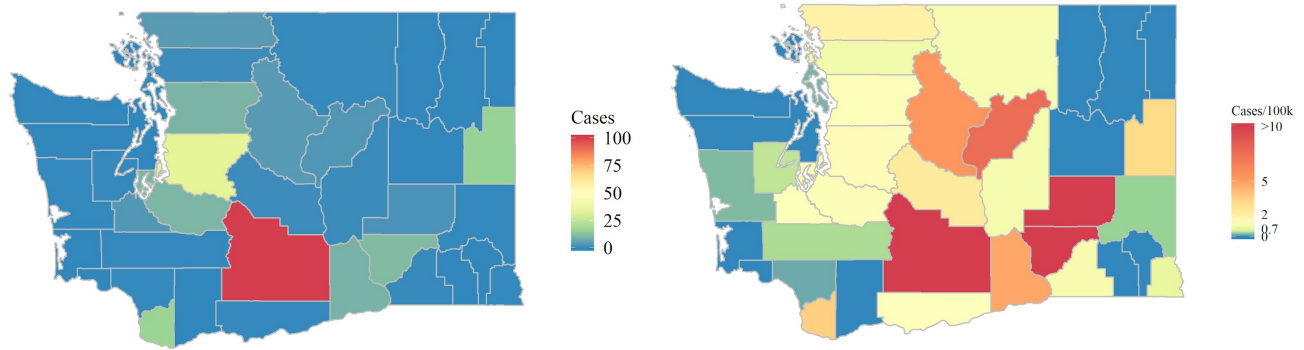

Figure 2: *Average daily cases per county (left) and average daily cases per 100k population per county (right). The majority of cases were reported in King County and Yakima County, and the highest cases per capita are in Yakima County. The most recent data can be found on the [WA DOH Data Dashboard](). For more information on the epidemiological situations in King and Yakima counties, see our [recent technical report]().*

New daily case counts are declining in King County but increasing in Yakima County
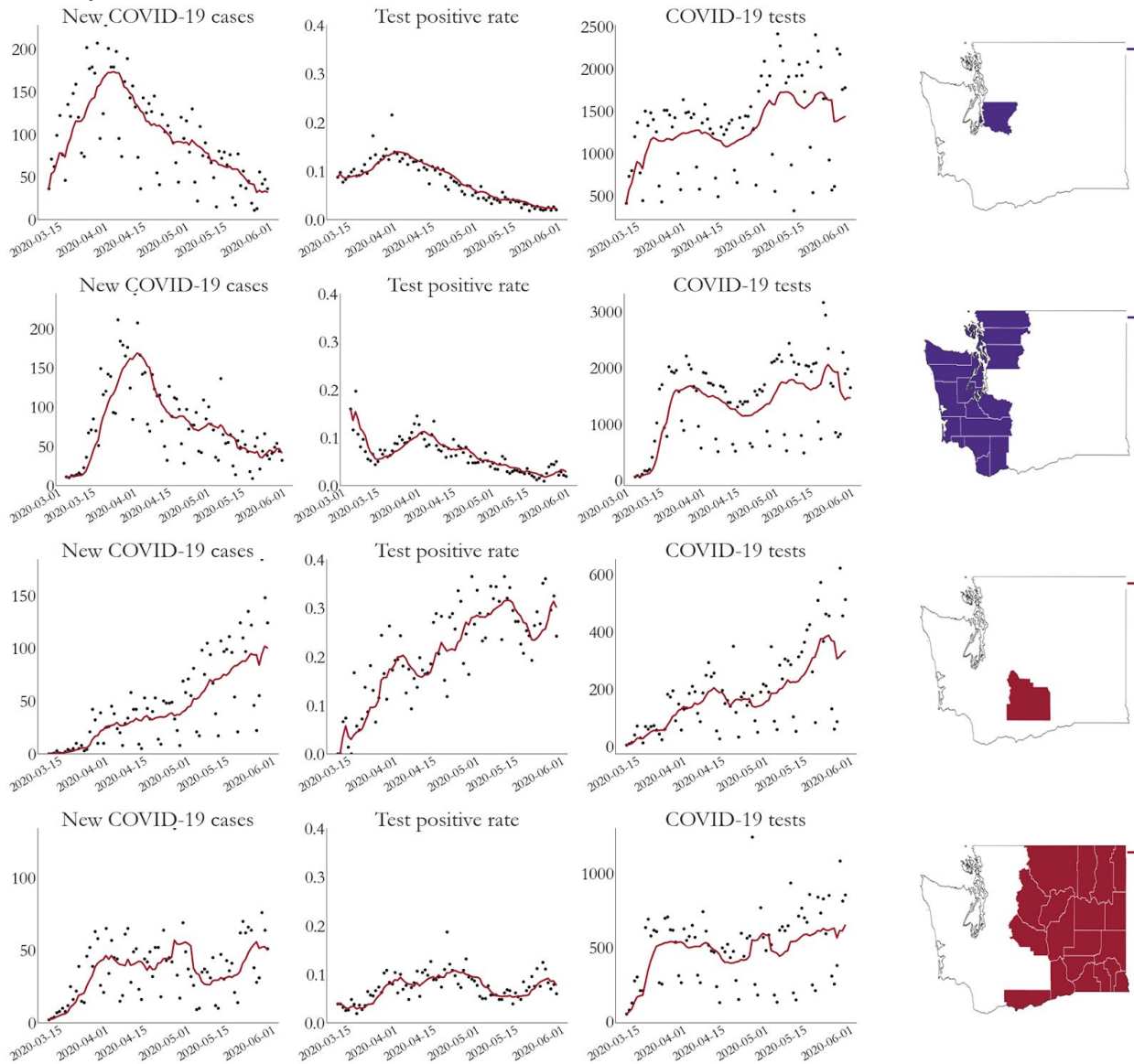

Figure 3: *King County and Yakima County reported the highest average daily case counts from May 22 - May 28. In King county, the trend in new case counts and the test positive rate has in general been declining with some indication that this decline may have leveled out in the most recent week, while in Yakima County the trend in new case counts continues to steadily increase. We dive into this comparison more deeply in our* recent technical report*. In Western WA without King county, new case counts are flattening, with a slight increase in the test positive rate. In Eastern WA without Yakima, new case counts have also flattened. (Left) The daily new case counts (dots) and 7-day smoothed trend (red curves), (middle) the daily test positive rate (dots) and 7-day smoothed trend (red curves), and (right) the daily number of tests (dots) and 7-day smoothed trend (red curves). For the most recent data see the* WA DOH Data Dashboard*.*

From May 22-28, population adjusted testing, and the test positive rate, is high in Yakima County
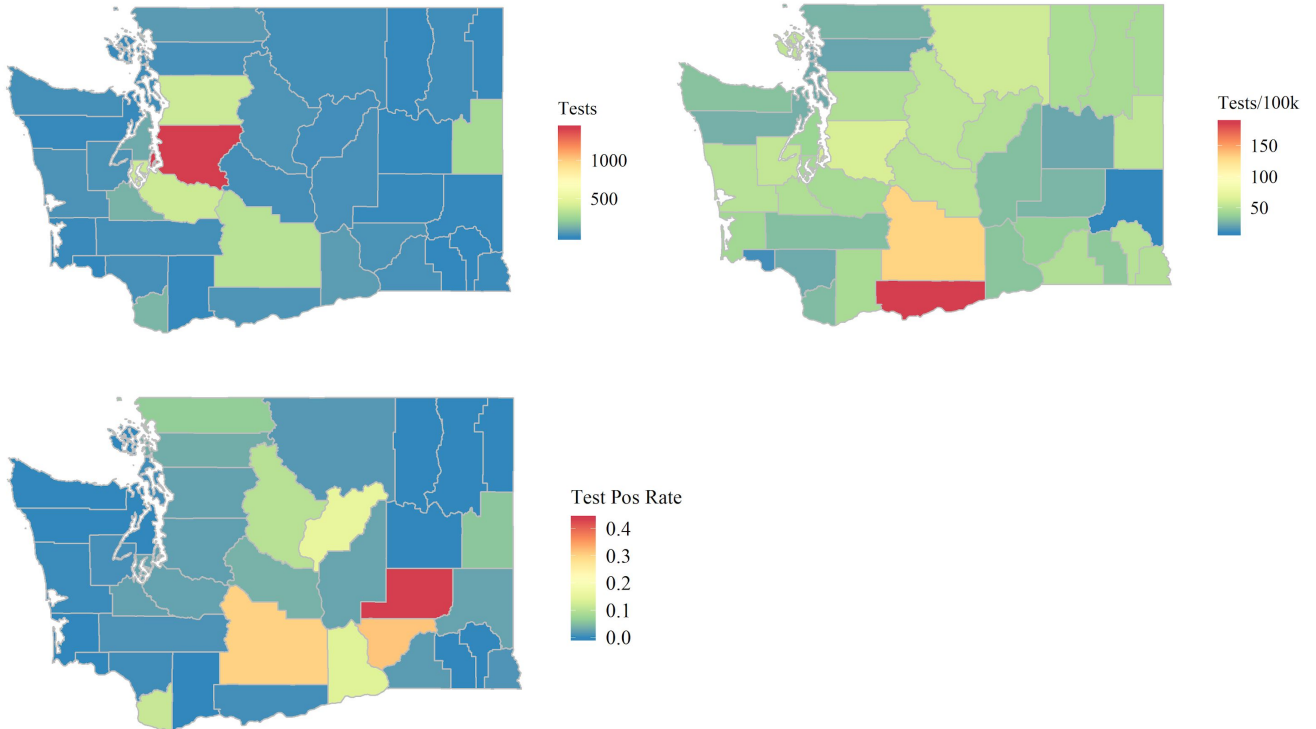

Figure 4*: Average daily tests per county (top left), average daily tests per 100k population per county (top right), and average daily test positive rate per county (bottom left) using data from May 22-May 28. The majority of tests were done in King County. Yakima County had a high testing rate per capita, and a high test positive rate. For the most recent data see the [WA DOH Data Dashboard](#).*