COVID-19 transmission across Washington State

Washington State Department of Health

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SitRep 26: COVID-19 transmission across Washington State

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Results as of February 9, 2021.

We are publishing situation reports on a biweekly schedule on Wednesdays to better accommodate news cycles. If, on an off week, we identify a time-sensitive feature in the data, we will produce an updated report that week to ensure that changes in the situation are reported quickly.

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 January 28, we estimate the reproductive number (R_e) in western Washington on January 22 was likely between 0.59 and 1.01, with a best estimate of 0.80. Meanwhile, we estimate that in eastern Washington, R_e was likely between 0.53 and 1.22, with a best estimate of 0.87 (Figure 1).

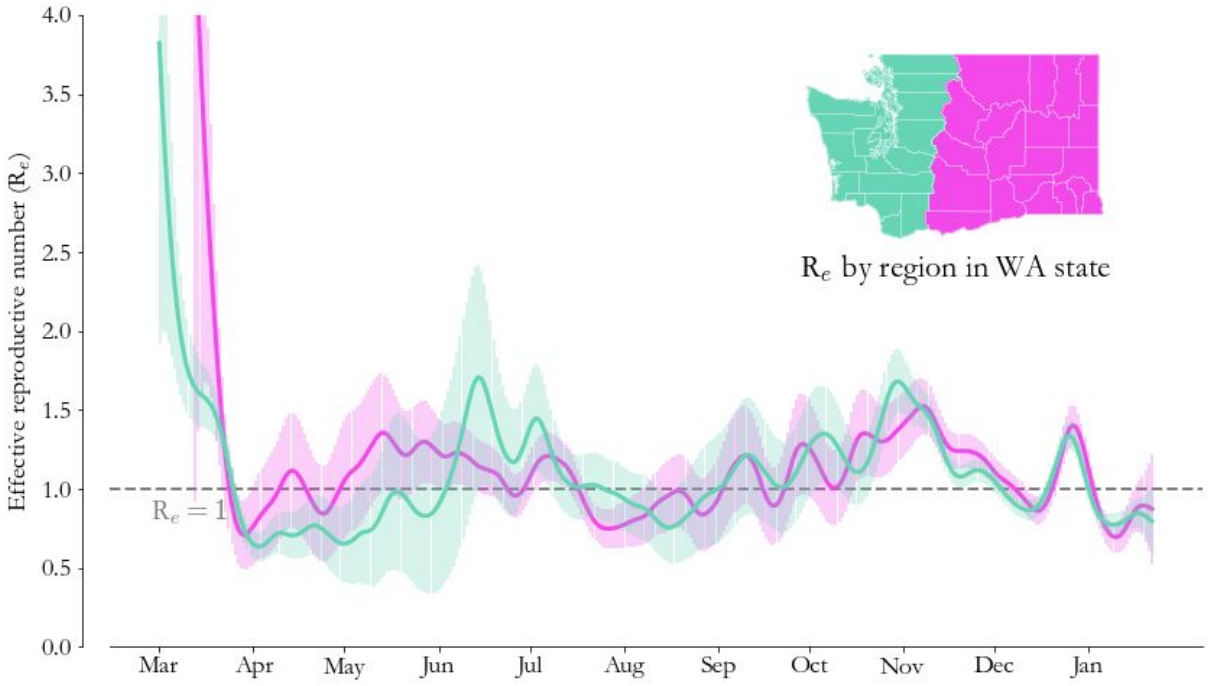

***Figure 1**: R_e estimates for eastern (pink) and western (green) WA, with 2 standard deviation error bars. Our most recent estimates show R_e has decreased in both eastern and western Washington since peaks in late December, but remain close to 1. To reduce levels of cases and hospitalizations, R_e needs to maintain a value substantially below 1 for a sustained period of time.*

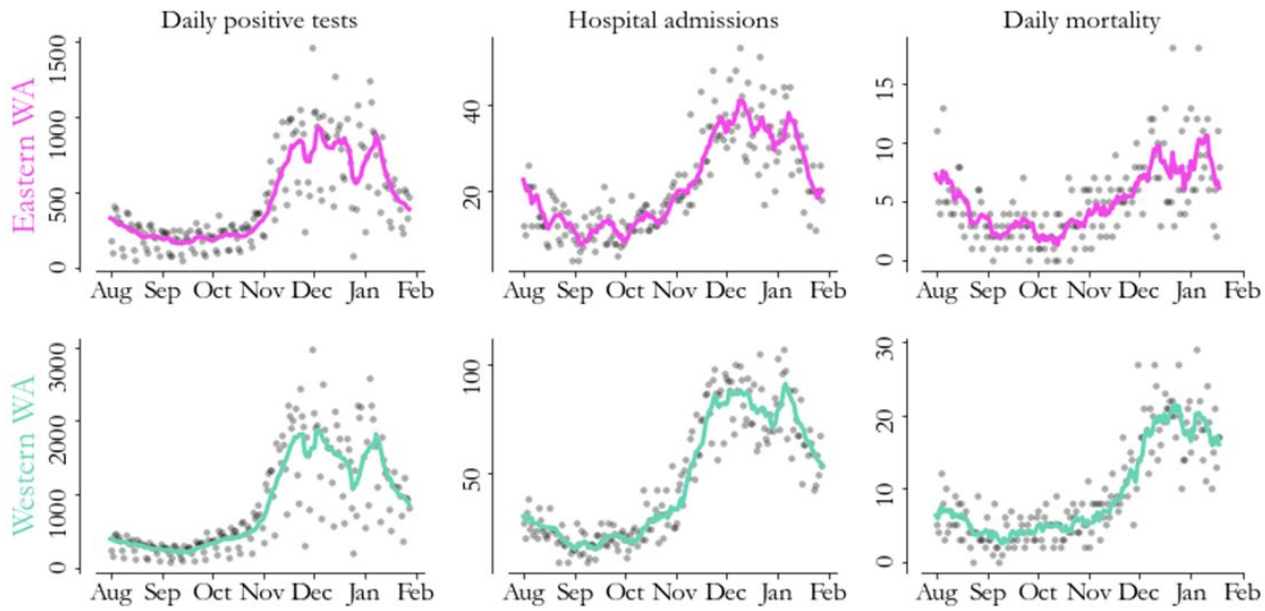

***Figure 2**: Seven-day rolling case counts (left panels), hospital admissions (middle panels) and deaths (right panels) for eastern Washington (top) and western Washington (bottom) through January 28 (cases and hospitalizations) and January 18 (deaths). Because of a change in how confirmed deaths are being reported, we are using an earlier cutoff for the mortality panel.*

Details

In both eastern and western Washington, the declines in case counts that started after the first week of January have continued, though the rate of decline is decreasing as of January 28 (Figure 2). Hospital admissions in eastern and western Washington have also continued to decline, and in eastern Washington a flattening in the decline is evident in late January. This flattening in hospital admissions is also evident in the incomplete data for western Washington for early February. Deaths in both eastern and western Washington have declined since early January, with some flattening in this decline evident for western Washington as of mid-January.

The seven-day rolling average case count in eastern Washington increased from 169 cases per day on September 13 to 1043 on December 4, decreased to 645 as of December 27, rebounded to 992 on January 8, and then decreased to 445 on January 28. Similarly, daily hospital admissions in eastern Washington showed a three-fold increase from early September through early December, with the seven-day rolling average of hospital admissions flattening at around 36, then declining slightly to 31 admissions per day as of Dec. 30, rebounding to 42 as of Jan 8, and then dropping to 23 as of January 28.

Case counts in western Washington rose steadily after September 12, increasing from a seven-day rolling average of 209 cases per day on September 12, to 1929 on December 4, followed by a decline to 1106 around December 25, rebound to 1899 as of January 8, and a recent decline to 914 as of January 28. Daily hospital admissions in western Washington increased after the beginning of October, from a seven-day rolling average of 16 admissions per day on October 3 to 80 on December 4, a decline to 67 as of December 30, rebounding to 85 on January 6 and then declining again to 53 as of January 28.

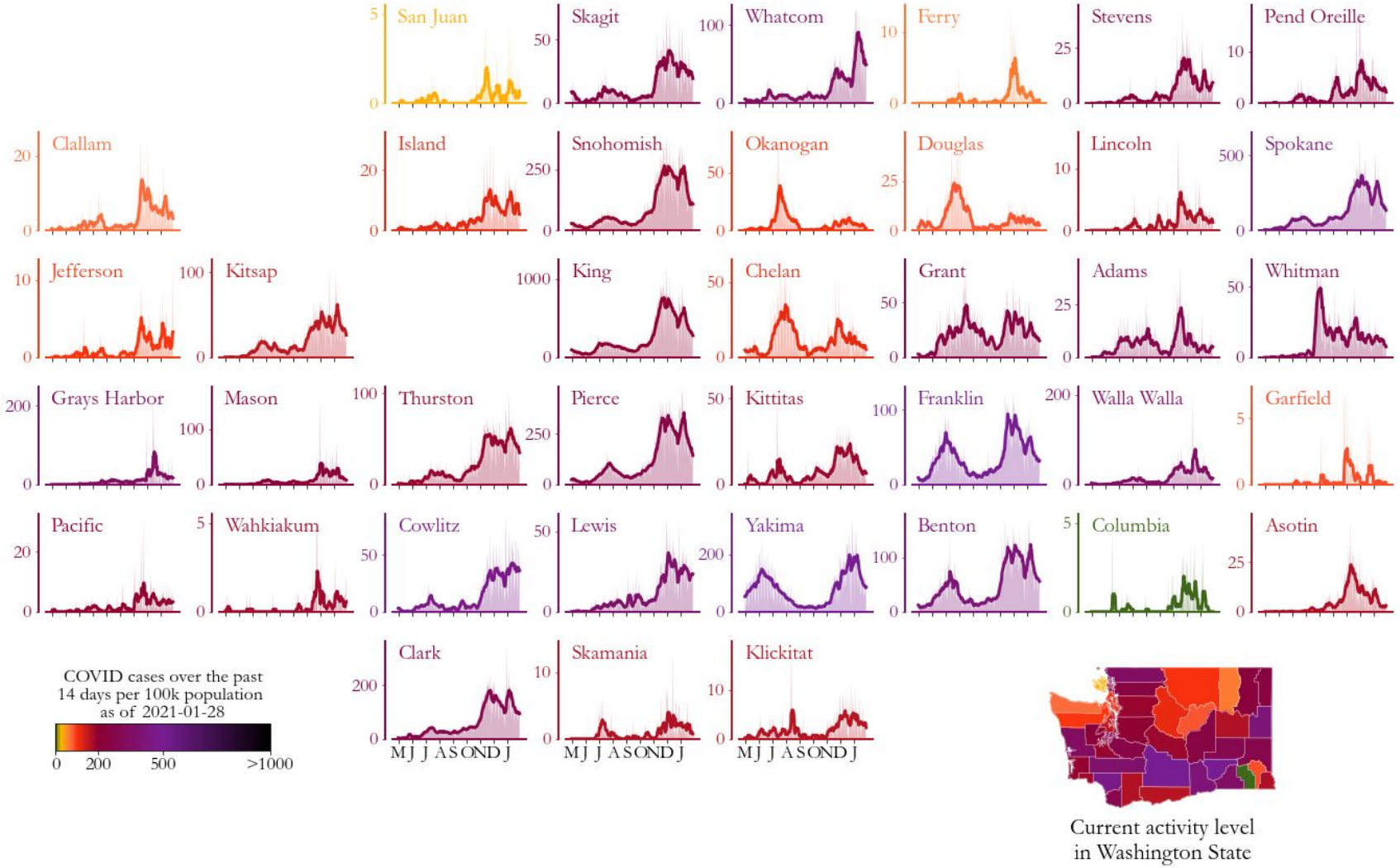

***Figure 3**: Daily COVID-19 positives (shaded areas) and 7-day moving averages (curves) arranged geographically and colored by COVID-19 activity level (total cases from January 15 to January 28 per 100,000 people). Case trends across counties highlight geographic correlations and help us better understand region-level estimates of the transmission rate (see Figure 1). Reductions in case counts are evident in many counties after the first week of January, though some flattening in these declines is apparent; however, cases per 100,000 people remain high in many counties as of January 28.*

Absolute case rates remain high across Washington state, but continue moving mostly in the right direction, with 18 of 39 counties showing 14-day average rates of new cases above 200 per 100,000 population, and 2 of 39 counties above 500 per 100,000 population (Figure 3).

- All of the five largest counties (Clark, King, Pierce, Snohomish, and Spokane) have seen declines in case counts after the first week of January and are now approaching levels similar to those observed in early November. The declines in Clark and Snohomish counties have flattened, while those in King, Pierce, and Spokane counties continue, though at a slower rate.

- In most medium-sized counties (Benton, Franklin, Grant, Kitsap, Skagit, Thurston), the declines since the first week of January have continued, though the rate of decline appears to be slower than earlier in January, and flattening in these declines is evident in the incomplete data for some of these counties. Case counts in Yakima are flattening at mid-November levels, after declines earlier in January. Some areas of concern include Cowlitz where case counts have flattened at peak levels, and Whatcom where case counts declined through late January, but appear to be increasing in the incomplete data.

- Several small counties (Douglas, Walla Walla, Whitman) saw declines in case counts earlier in January, which have now flattened at levels last observed in early November. Chelan continues to see steady declines in case counts, also to early-November levels. Case counts in Grays Harbor and Mason have been fairly flat for several weeks. In Lewis county, case counts have fluctuated, with some recent increases. Most other small counties currently have fewer than 10 cases per day.

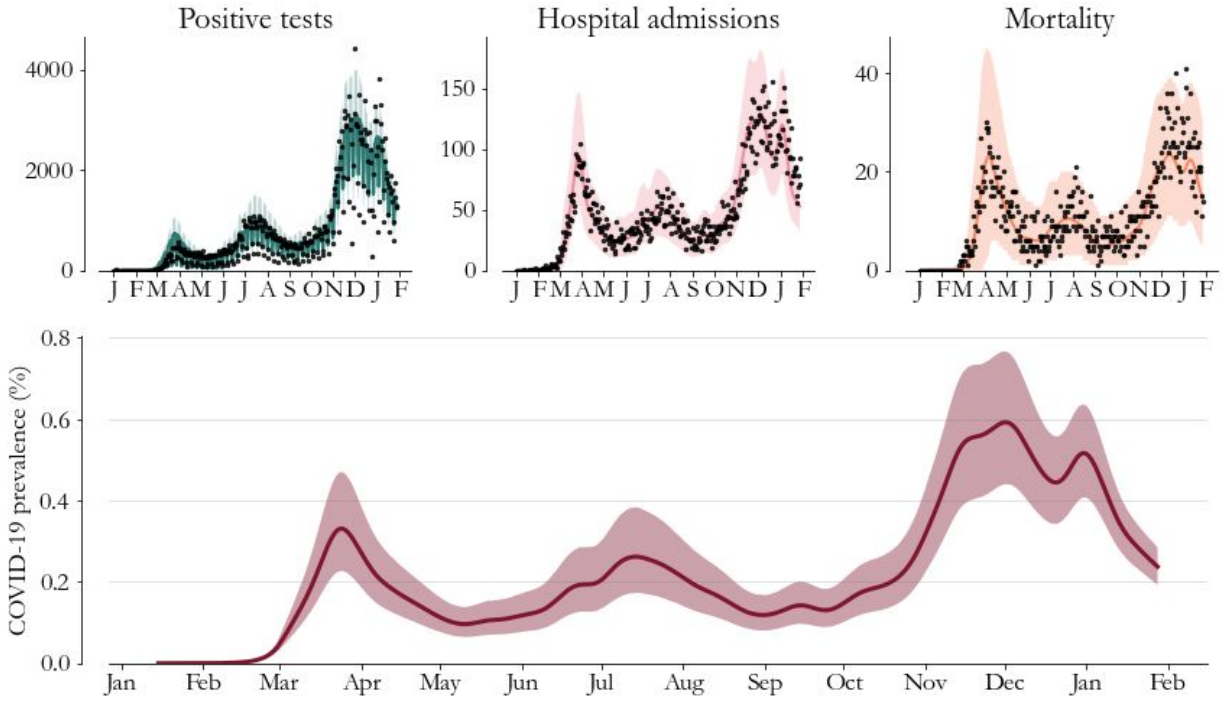

Figure 4*: Model-based prevalence estimates (bottom, 95% CI shaded) and model fit to cases (top left), hospitalizations (top middle) and deaths (top right) for Washington state. Prevalence is the percentage of Washington state residents with active COVID-19 infection.*

After sharp increases in October and early November, prevalence estimates flattened in mid-November, and declined through December. However, the drop in prevalence in late December could be related to reductions in healthcare-seeking behavior prior to the holidays, and the subsequent rebound could be related both to delayed healthcare-seeking after the December holidays and to temporary increases in transmission due to holiday gatherings.

On January 22, overall prevalence (the percentage of Washington state residents with active COVID-19 infection) in Washington state was likely between 0.19% and 0.29%, with a best estimate of 0.24% (Figure 4). The current prevalence estimate remains only slightly below the peak prevalence estimate in late March, and hospital admissions in late January are similar to the peak levels in late March.

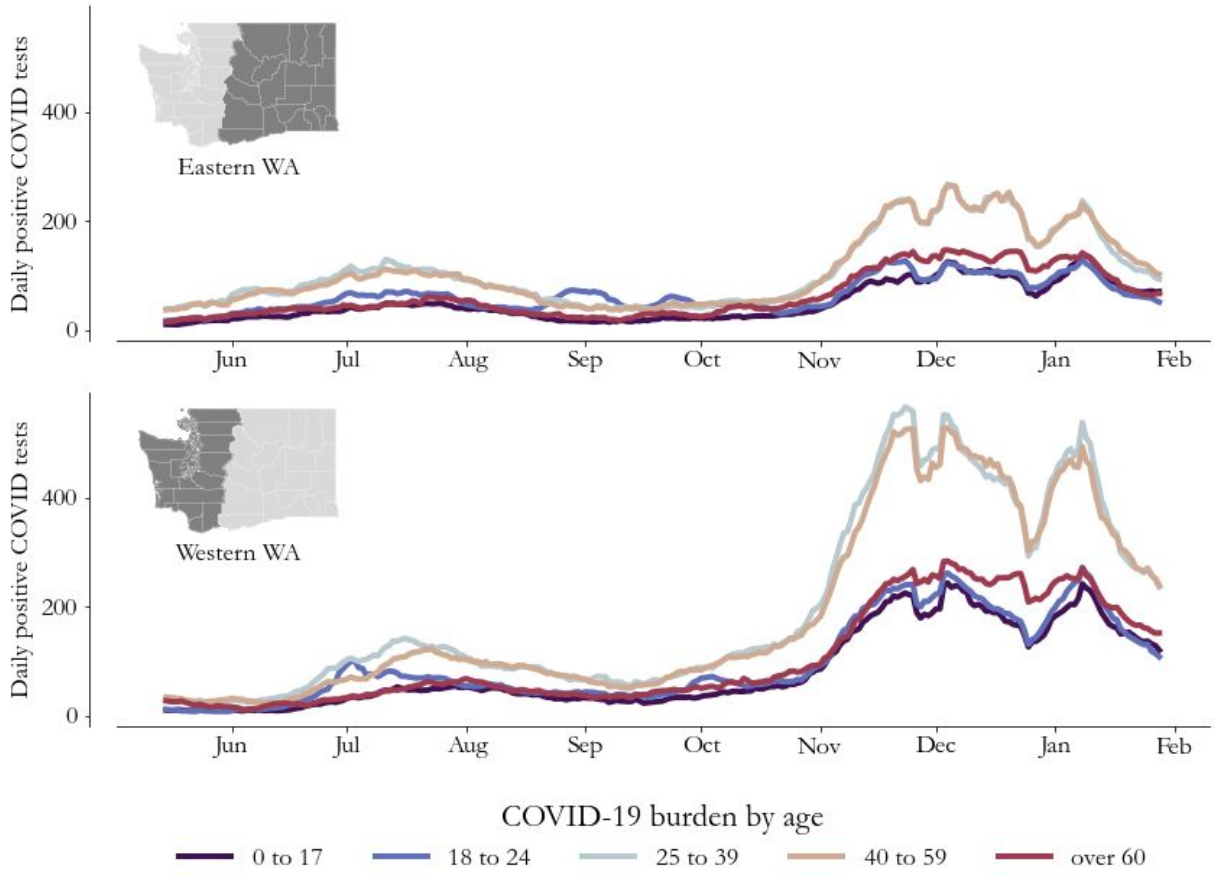

Figure 5. *Seven-day rolling average case counts by age group for eastern Washington (top) and western Washington (bottom) showing declines in case counts since early January with flattening of those declines evident in some age groups.*

In both eastern and western Washington, case counts rebounded after the December holidays in all age groups, followed by declines in early January. These declines have continued through late January, though the rate of decline has slowed since mid-January. The declines have largely flattened among ages 0-24 and 60 and over in eastern Washington, as well as among those aged 60 and over in western Washington.

It is useful to note that the rebounds in case counts in late December were shallower among those aged 60 and over in comparison to other age groups, similar to what was seen over the Thanksgiving holiday. This suggests that in this age group, where vulnerability to severe disease is highest overall, holiday-related changes in health-seeking behaviour are smaller, and the trend may better reflect underlying transmission.

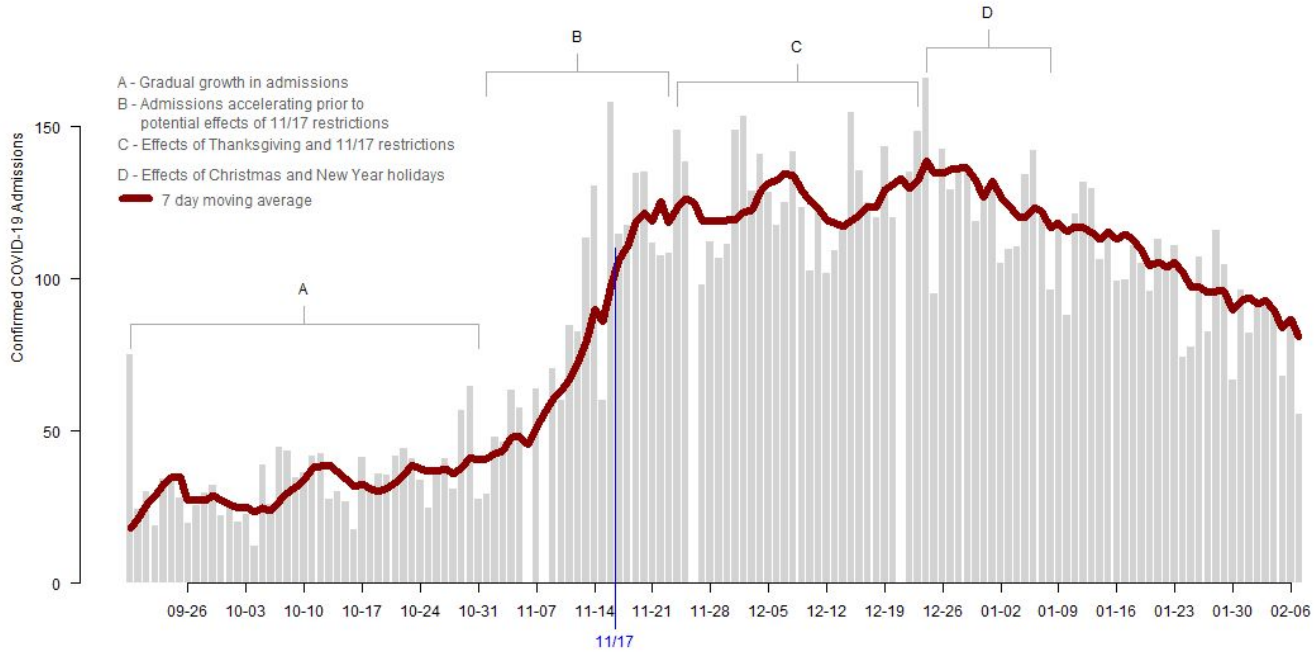

Figure 6. *Hospital admissions for patients with confirmed COVID-19 infections reported by hospitals through the WA Health system from October 19 to February 6. Through the WA Health system, hospitals report the daily numbers of admissions for confirmed COVID-19 the previous day, as well as the number of staffed acute-care ICU beds currently occupied by confirmed and suspected COVID-19 patients. The blue line indicates the renewed restrictions that went into effect on November 17. As part of data quality assurance, only dates on which over 75% of hospitals reported data to the WA Health system are included in this graph.*

Figure 6 highlights recent trends in hospital admissions in Washington state using aggregate daily hospital admissions data reported through the WA Health system. These data provide a more timely assessment of hospital admissions than the hospitalization data used to estimate R_e and prevalence. However, the WA Health data do not distinguish between patients with confirmed COVID-19 who require hospitalization because of COVID-19 symptoms and patients admitted for other reasons who test positive for COVID-19. Additionally, the WA Health data assess total hospital admissions, including readmissions, while the WDRS hospital admission data only include first admissions, which better reflects disease transmission dynamics in the population, but have a longer time to data completion. For these reasons, we use the WDRS hospital admission data as the basis for our model-based estimation of R_e and prevalence. We use the WA Health admission data as a check against major changes in admission trends that have not yet been observed in the WDRS hospital admission data.

Four distinct time periods are apparent in these data: (A) a gradual increase in hospital admissions through October 31, (B) a period of accelerating admissions through November 23, (C) a time period that includes the combined effects of Thanksgiving and reductions in transmission (R_e) that started in mid-November, and (D) the time period including the combined effects of the Christmas and New Year's holidays. Total hospital admissions have steadily declined since early January. The trends apparent in the WA Health data differ from those in the WDRS hospital admissions data primarily because WA Health data include readmissions which, by definition, lag the first admission by varying time spans. For example, the spike and subsequent decline evident in first admissions in late December/early January in WDRS hospital admissions (Figure 2) are not apparent in the WA Health data as that trend is "filled in" by readmissions.

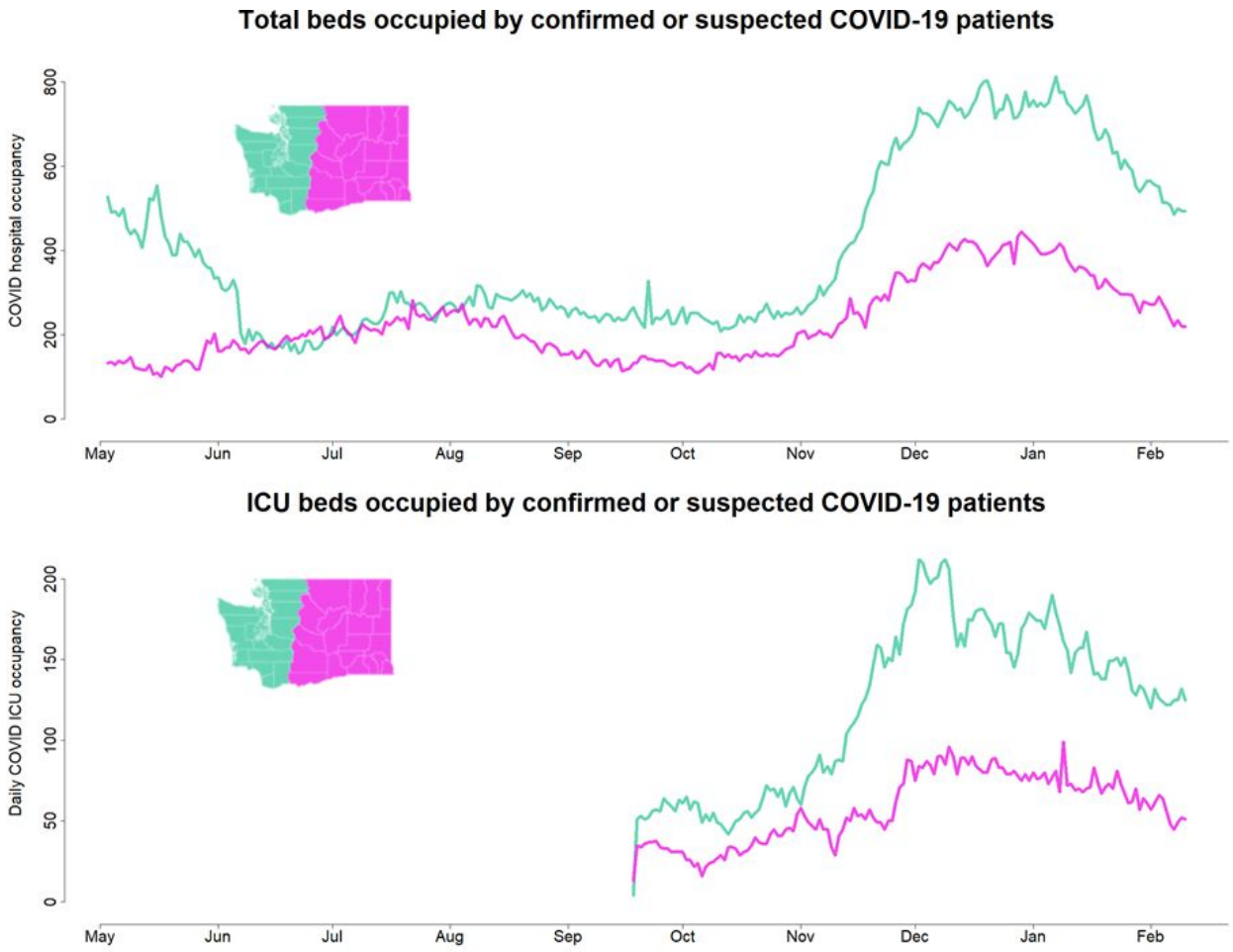

Figure 7. *Hospital beds occupied by confirmed or suspected COVID-19 patients (top, western Washington hospitals indicated by the green line, eastern Washington hospitals indicated by the pink line) and ICU beds occupied by COVID-19 patients (bottom) reported through the WA Health system. Data collection for ICU beds occupied by COVID-19 patients started September 17. Hospital occupancy data has minimal reporting lag, and is shown here using data up to February 6. Both confirmed and suspected cases are included, rather than just confirmed cases, since this best reflects total resources being used. Note that bed occupancy would continue to increase for a period of time even if admissions plateau since patients being treated for COVID-19 generally stay in the hospital for several days.*

In western Washington the rapid increase in the number of occupied hospital beds that started in early November slowed substantially in early December and remained fairly flat until mid-January, with steady declines thereafter (Figure 7). The slower increase that occurred in eastern Washington continued until mid-December, flattened through early January, and has also steadily declined subsequently.

ICU beds occupied by confirmed or suspected COVID-19 patients flattened in western Washington at the start of December, followed by a drop in mid-December and a plateau, with some variability, through January, after which a generally declining trend is evident. In eastern Washington the number of occupied ICU beds remained fairly flat through December and has declined slightly through January.

Implications for public health practice

Although the recent declines in transmission and prevalence across Washington state have been promising, case counts and hospital admissions remain high, making the recent flattening in declines in cases and hospital admissions concerning. This emphasizes the necessity of further reducing transmission in order for declines in daily case counts and hospital admissions to continue to the levels they were in September. These recent trends suggest that the sharp decline seen in early January may have been related to post-holiday behaviors characterized by fewer social interactions, while the slowdowns in these declines may suggest returns to usual behaviors.

Cause for concern is mounting due to further circulation of SARS-CoV-2 variants, including the B.1.1.7, B.1.351, and P.1 across the United States. Current evidence indicates that the B.1.1.7 strain is substantially more infectious than prior strains, with estimates of a 1.5 - 1.7 fold increase in transmissibility over pre-existing strains in England, and 1.35 to 1.5 fold increase over pre-existing strains in the United States; some evidence suggests the P.1 variant may also have increased transmissibility. Recent estimates suggest a doubling time of 10 days for the B.1.1.7 variant. Approved vaccines remain highly effective against the B.1.1.7 strain, but are less effective against the B.1.351 strain.

In combination, these data indicate the critical need to maintain a window of low transmission during which mass vaccination can be achieved prior to B.1.1.7 predominance. As of February 6, 942,166 doses of vaccine have been administered in Washington state at a current rate of 26,857 per day; 9.8% of the state population have received a first dose, and 2.6% have been fully vaccinated. Effective masking and social distancing remain crucial in order to maintain declines in transmission. Further efforts to protect essential workers who may work in crowded indoor settings, including food service workers, factory and warehouse employees, and agricultural workers are also critical to keep levels of transmission as low as possible.

In the short term, the recent flattening in the declines in cases and hospitalizations observed since early January are cause for concern, particularly with R_e close to one. The longer term outlook is highly dependent on the rate at which the population can be vaccinated in order to mitigate severe disease and mortality associated with a fourth wave of disease due to the new variant, even if this wave is not avoidable.

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 February 7, and to hedge against delays in reporting, we analyze data as recent as January 28 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. The WA DoH wishes to thank IDM for their support in model development and implementation for this report, in particular, Niket Thakkar, PhD, of IDM, who developed and shared software and programming scripts and provided technical and scientific advice to the WA DoH. 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.

These reports were previously published on the IDM InfoHub. Going forward, as of December, 9, 2020, new reports will be published on the DOH website. IDM will continue to provide technical assistance for the reports, as part of this collaboration.