

COVID-19 transmission across Washington State

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SitRep 28: COVID-19 transmission across Washington State

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Results as of March 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 February 25, we estimate the reproductive number (R_e) in Washington state on February 19 was likely between 0.59 and 1.33, with a best estimate of 0.96. As of this week, we have moved to reporting R_e estimates for the whole state, instead of separately for eastern and western Washington as trends in R_e have remained largely similar between eastern and western Washington for several months. In addition, uncertainty in the statewide estimate for R_e is smaller than the uncertainty for the regional estimates and therefore the statewide estimate provides clearer information regarding the current situation when the trends are similar.

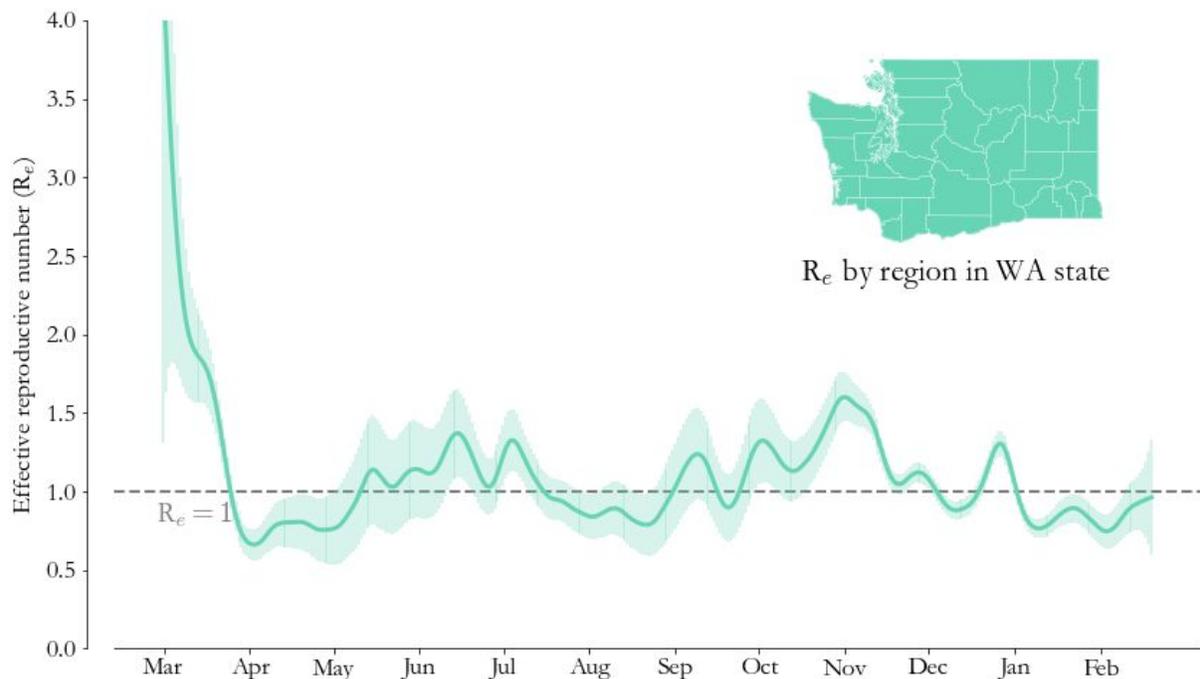


Figure 1: R_e estimates for Washington state, with 2 standard deviation error bars. Our most recent estimates show R_e has decreased since peaks in late December, but remains close to 1. To reduce levels of cases and hospitalizations, R_e needs to maintain a value substantially below 1 for a sustained period of time.

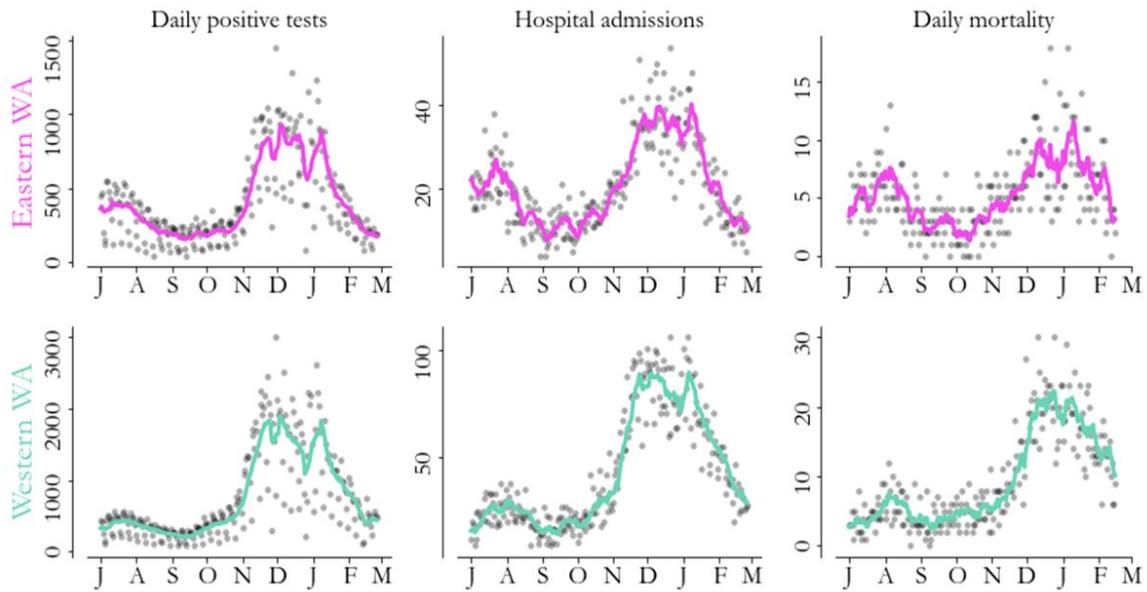


Figure 2: Seven-day rolling case counts (left panels), hospital admissions (middle panels) and deaths (right panels) for eastern Washington (top) and western Washington (bottom) from June 2020 through February 25 (cases and hospitalizations) and February 15 (deaths) 2021. Because of how confirmed deaths are being reported, we are using an earlier cutoff for the mortality panel.

Trends by region

In both eastern and western Washington, the declines in case counts that started after the first week of January have flattened at levels last observed in late October (Figure 2). Hospital admissions in eastern Washington are flattening at late October levels, but continue to decline in western Washington. Deaths in both eastern and western Washington have declined since early January.

The seven-day rolling average case count in eastern Washington increased from 169 cases per day on September 13 to 1051 on December 4, decreased to 671 as of December 27, rebounded to 998 on January 8, and then decreased to 212 through February 25. 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 40, then declining slightly to 33 admissions per day as of December 30, rebounding to 43 as of January 8, and then dropping to 10 as of February 25.

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 1935 on December 4, followed by a decline to 1125 on December 25, a rebound to 1904 as of January 8, a decline to 469 as of February 15, and show a slight recent increase to 508 as of February 25. 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 66 as of December 30, rebounding to 82 on January 6 and then declining again to 29 as of February 25.

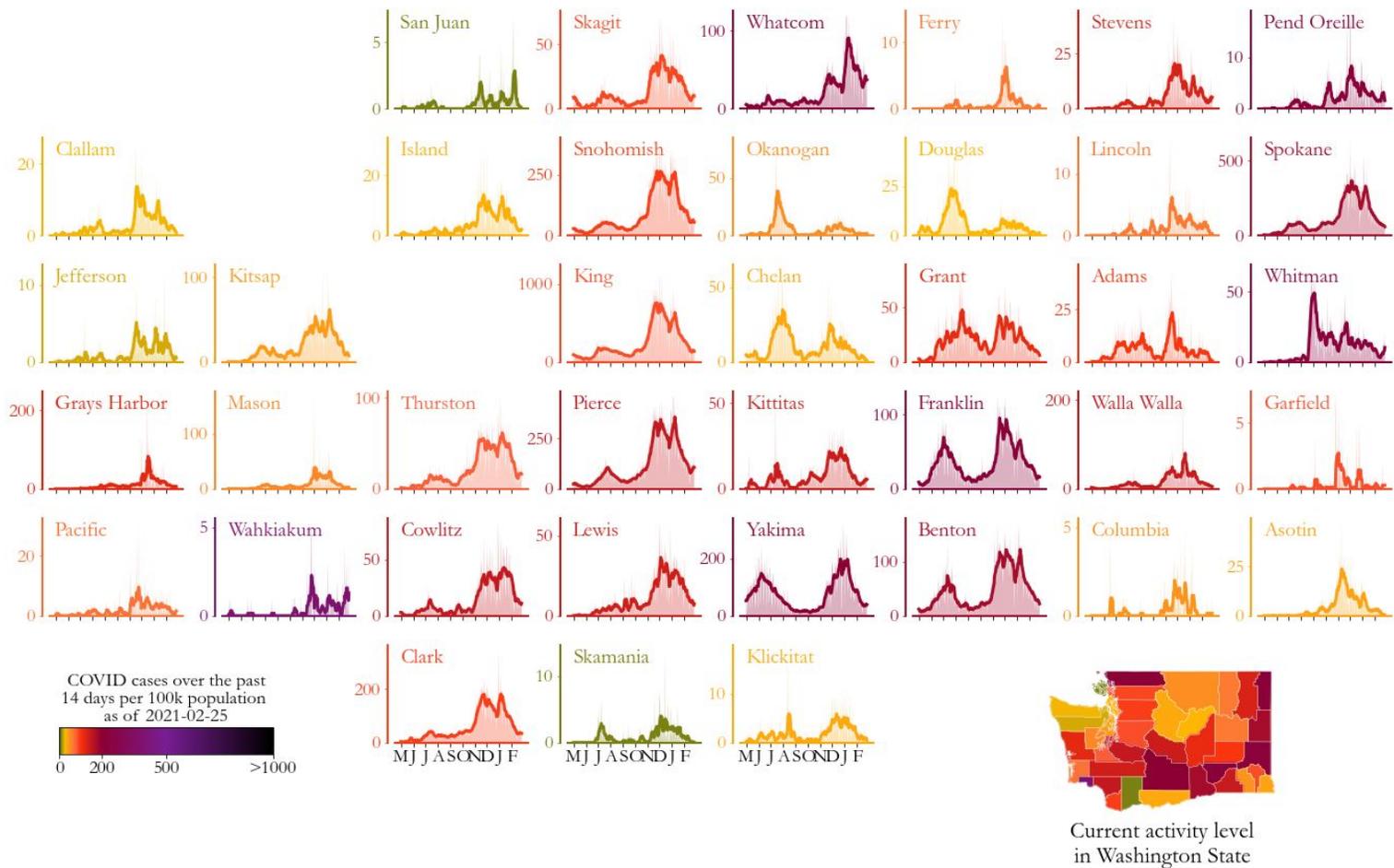


Figure 3: Daily COVID-19 positives (shaded areas) and 7-day moving averages (curves) arranged geographically and colored by COVID-19 activity level (total cases from February 12 to February 25 per 100,000 people). Case trends across counties highlight geographic correlations and help us better understand region-level estimates of the transmission rate (see Figure 1). Reductions in case counts are evident in most counties since the first week of January, however these reductions have flattened in several counties and are starting to increase again in others.

County-level trends

Absolute case rates remain high across Washington state with 6 of 39 counties showing 14-day average rates of new cases above 200 per 100,000 population, but no counties above 500 per 100,000 population (Figure 3).

- In four of the five largest counties (Clark, King, Snohomish, and Spokane), the declines in case counts after the first week of January have flattened at early to mid-October levels. The declines in case counts in Pierce county stopped in mid-February, and case counts have increased since then.
- Among medium-sized counties, only Grant has continued to see declines in case counts, which are now approaching early-November levels. Case counts in Benton, Cowlitz, and Yakima have flattened at late October/early November levels. In the majority of mid-sized counties, the declines in case counts stopped in mid-February, and have subsequently started to increase again (Franklin, Kitsap, Skagit, Thurston, Whatcom).
- All small counties currently have fewer than 10 cases per day, on average. However increases in the incomplete data are evident for Island, Stevens, Whitman, and Pacific counties, although at such low counts that trends cannot be reliably assessed.

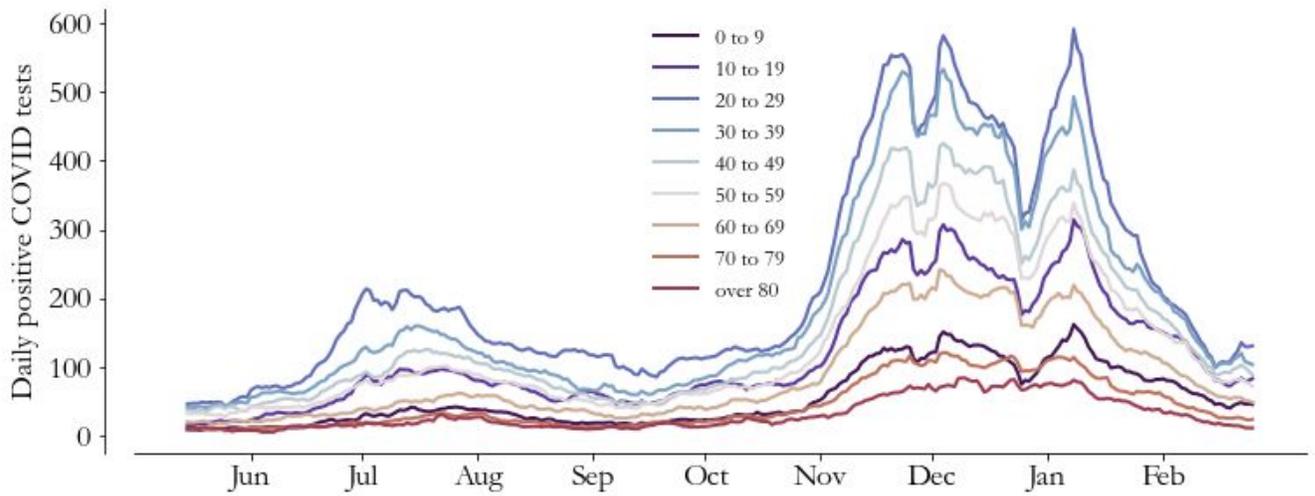


Figure 4. Seven-day rolling average case counts by 10-year age group across Washington state. The declines in case counts have flattened in most age groups, with upticks in case counts among younger adults, who also have the largest numbers of cases.

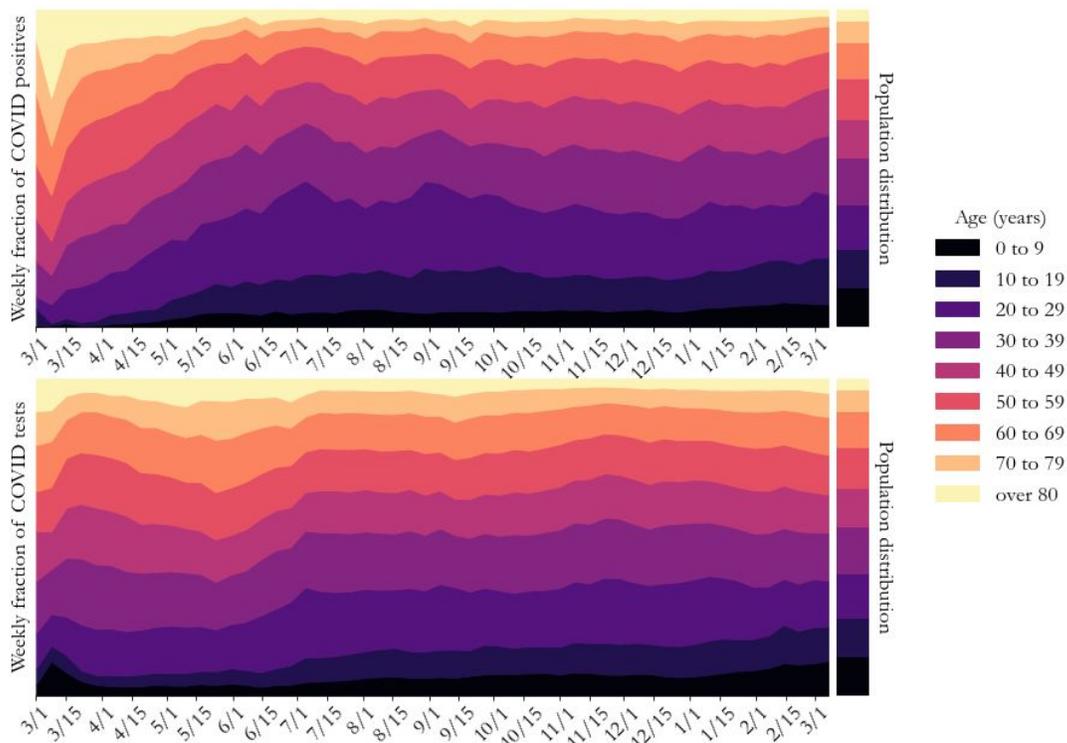


Figure 5. The top panel of this graph indicates the weekly age distribution of COVID-19 cases and the bottom panel indicates COVID-19 tests. The colors represent 10 year age groups. Earlier in the pandemic, populations over age 60 represented a greater fraction of total COVID-19 cases relative to their fraction of the population as a whole. Over time, the age distribution of cases has shifted towards younger individuals (shown in darker colors). In comparison, the bottom panel indicates that this trend is generally not present in the distribution of tests, which indicates that the age-distribution of the underlying infected population is changing over time.

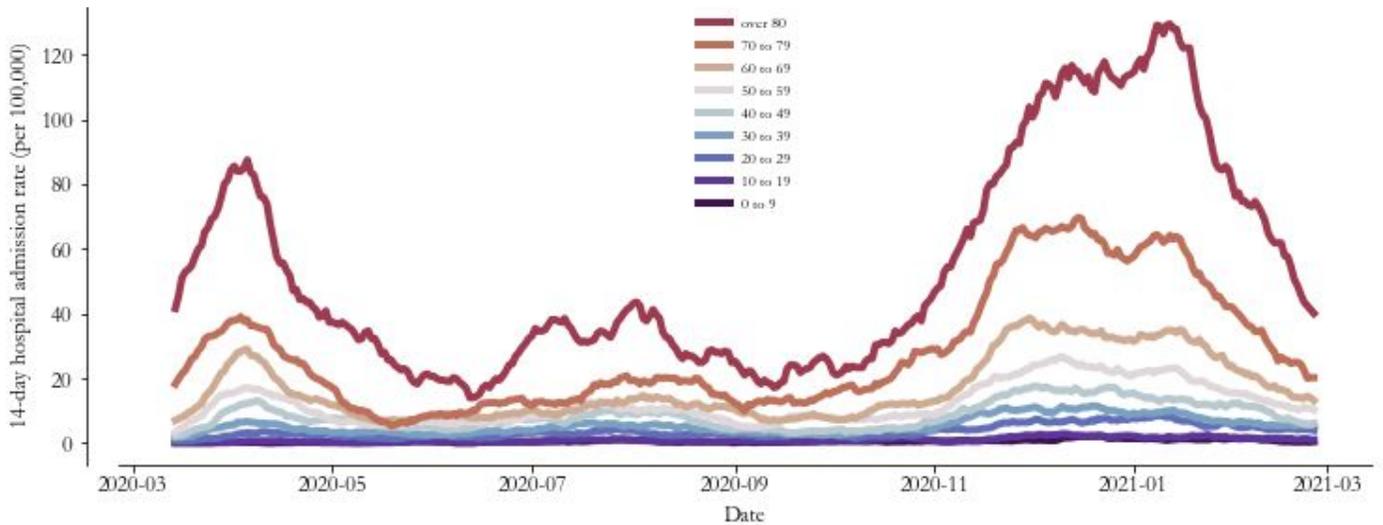


Figure 6. Statewide 14-day hospital admission rate per 100,000 population by 10-year age group. Declines in hospital admission rates are apparent in the oldest age groups since early January.

Trends in cases and hospital admissions by age group

Across Washington state, case counts rebounded after the December holidays in all age groups, followed by declines in early January (Figure 4). These declines have largely flattened, and increases are apparent among younger adults, aged 20-29 and 30-39. Notably, in prior surges, increases in case counts among younger adults have been an advance warning of increases across the population as a whole.

As the proportion of vaccinated individuals increases among the population over age 60, it is expected that a more rapid decline in cases in this population will occur in comparison to age groups in which a smaller proportion have been vaccinated. Figure 5 shows that the age distribution of positive tests (top panel) has shifted since mid-February such that a smaller proportion of adults aged 60 and over have tested positive in comparison to the proportion of the population belonging to this age group, while overall testing by age (bottom panel) has remained proportional to the population distribution.

Hospital admission rates (admissions per 14-day period per 100,000 population) across Washington state have declined since early January with varying rates of decline across age groups. The two oldest age groups, ages 70-79 and age 80 and over, which are the age groups at greatest risk for severe disease, show the fastest declines in hospital admissions, potentially because those age groups were among the first to be vaccinated (Figure 6).

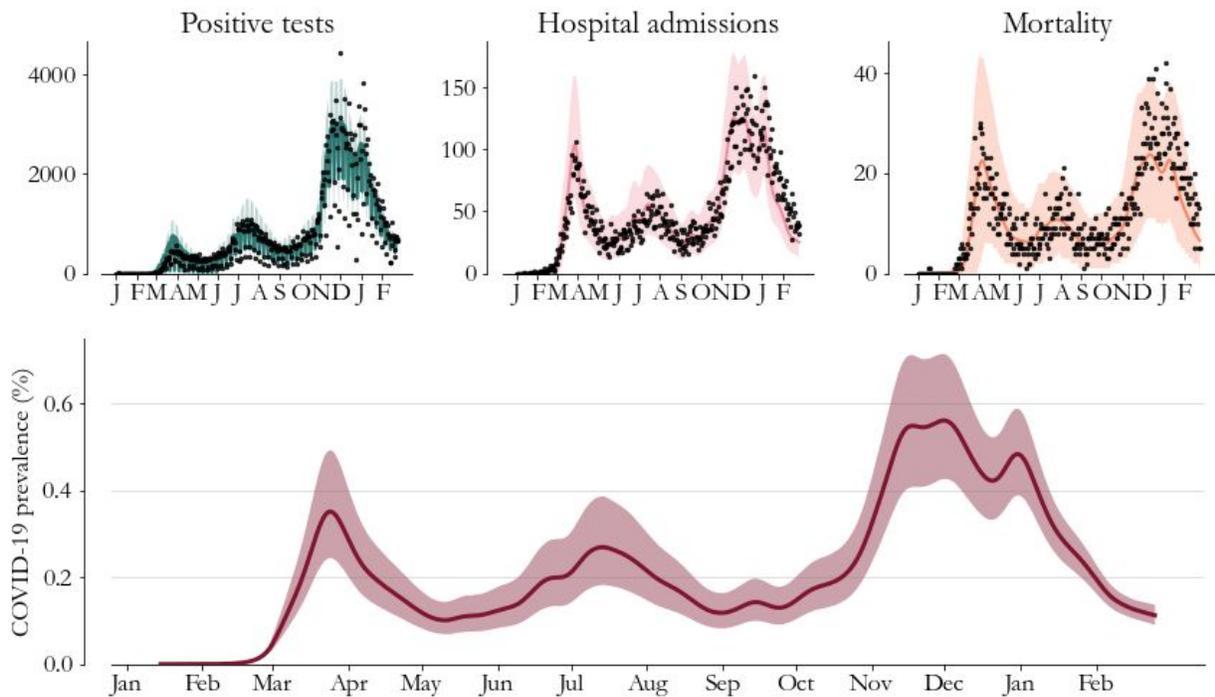


Figure 7: Model-based prevalence estimates (bottom, 95% CI shaded) and model fit to cases (top left), hospitalizations (top middle) and deaths (top right) for Washington state. Prevalence is the percentage of Washington state residents with active COVID-19 infection.

Model-based statewide prevalence

On February 19, overall prevalence (the percentage of Washington state residents with active COVID-19 infection) in Washington state was likely between 0.09% and 0.14%, with a best estimate of 0.11% (Figure 7). The declines in prevalence that were apparent since early January have flattened since the beginning of February.

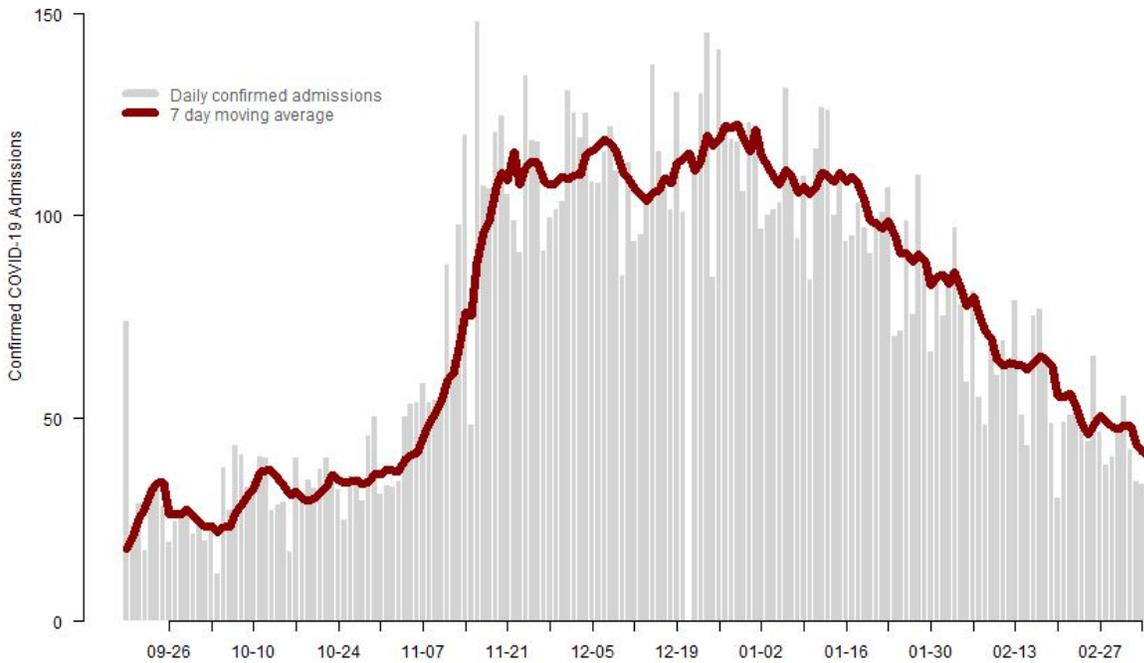


Figure 8. Hospital admissions for patients with confirmed COVID-19 infections reported by hospitals through the WA Health system from October 19 to March 6. Through the WA Health system, hospitals report the daily numbers of admissions for confirmed COVID-19 the previous day, as well as the number of staffed acute-care ICU beds currently occupied by confirmed and suspected COVID-19 patients. 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.

Hospital admissions

Figure 8 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.

Total hospital admissions have steadily declined since early January, although the rate of decline since January has been much slower than the rate of increase in October and November. 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.

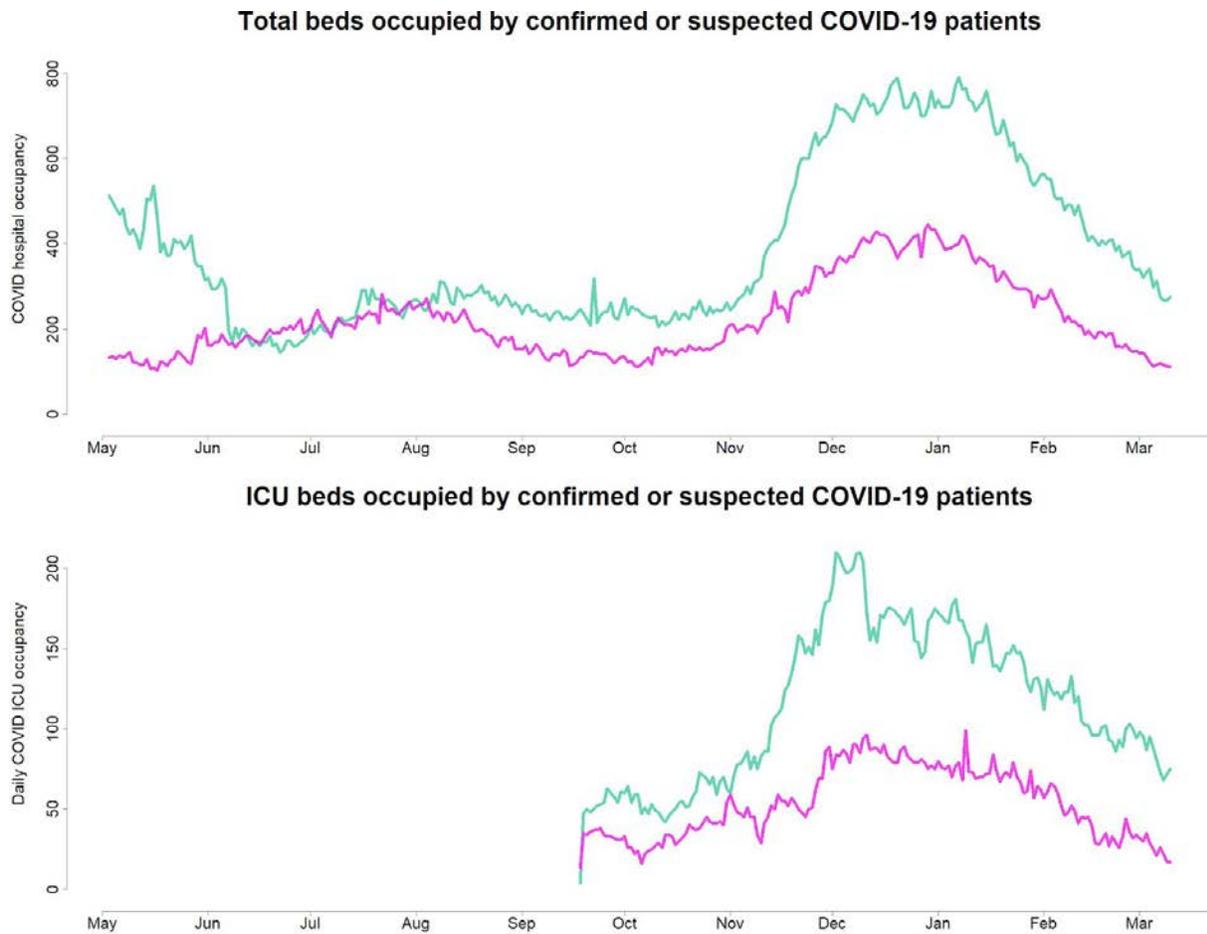


Figure 9. Hospital beds occupied by confirmed or suspected COVID-19 patients (top, western Washington hospitals indicated by the green line, eastern Washington hospitals indicated by the pink line) and ICU beds occupied by COVID-19 patients (bottom) reported through the WA Health system. Data collection 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 March 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.

Hospital occupancy

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 9). 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 steadily through early March.

Implications for public health practice

Although COVID-related hospital admissions and deaths continue to decline across Washington state, the declines in cases have flattened in eastern Washington and case counts have increased slightly in western WA as of late February. In particular, cases among younger adults, aged 20-29 and 30-39, in western WA appear to be on the increase, which in prior disease surges has often been an early warning of larger increases to come in the population as a whole. The reasons for this uptick are not known, but could be related to phase II reopening in all regions of the state as of February 14, lower adherence to NPIs due to pandemic fatigue in the population, and the increased transmissibility of the B.1.1.7 variant of SARS-CoV-2, which is now spreading in Washington state. However, sharp declines in hospital admission rates among the population aged 70 and older are promising signs that despite potential increases in community transmission, older populations may be protected through vaccination. A [recent report from the CDC](#) based on data from nearly 98% of US counties, indicates that daily COVID-19 case growth rates and death growth rates increased within 41-100 days (cases) or 61-100 days (deaths) after allowing restaurant dining on-site, suggesting restaurant closures as a key preventive measure.

[In Washington state as of March 3, 70 cases](#) of the B.1.1.7 variant have been identified and 5 cases of the B.1.351 variant have been identified [Across the US as of March 7](#), there are currently 3073 cases of B.1.1.7, 81 cases of B.1.351, and 15 cases of P.1 variants of SARS-CoV-2, with estimates of [around 25% prevalence nationwide](#), and higher for particular states. Globally, among countries that have robust genomic sequencing data and where B.1.1.7 accounts for 50% or more of cases, such as Italy, Netherlands, Denmark, and Norway, case rates are now increasing despite declines a month earlier. Countries such as the UK and Ireland, which crossed 50% in late December, had huge resurging epidemics, although both have regained control, through a combination of strict lockdown (2 months in UK), and vaccination. Concerningly, several analyses from the UK have suggested that the B.1.1.7 variant may cause [greater incidence of severe disease](#) and higher case fatality rates than the ancestral strain of SARS-CoV-2, and an additional [recent](#) analysis suggests that the B.1.1.7 variant may increase risk of death by 67% over the ancestral strain.

Vaccination remains the most critical factor in preventing severe disease and fatalities in the population, particularly among those over age 65. As of March 6, 57% of persons aged 65 and over in Washington state have initiated vaccination and 32% have completed vaccination. Over 45,000 doses of vaccine are administered per day across the state and nearly 10% of the overall population have been fully vaccinated. In clinical trials of the [Pfizer](#), [Moderna](#), and [Johnson & Johnson](#) vaccines, there were no COVID-19 related deaths in the active arms of the trials, and a [recent study](#) has indicated that in a laboratory assay, serum from individuals who had been given the Pfizer vaccine 2 or 4 weeks ago successfully neutralized all three SARS-CoV-2 variants of concern.

Unsurprisingly, the short-term outlook depends on whether the population can continue to adhere to NPIs while participating in a more open economy, and whether essential workers, who shoulder the burden of maintaining open economies, are appropriately protected. Additionally, warmer spring weather may have the positive effect of encouraging outdoor gatherings to replace indoor gathering, but it also signals the start of growing season and crowded indoor living conditions among migrant [farmworkers](#). Signs of increases in cases among younger adults foreshadow similar increases in other non-vaccinated populations, and even if these populations are younger, the increased transmissibility (and possibly, fatality) of the new variant portends greater burdens of severe disease and death. Lessons from other countries have indicated that if transmission cannot be rapidly controlled, surges in severe disease and deaths will likely necessitate strict lockdowns. This emphasizes the need for swift action in controlling transmission through active protection of essential workers, strict adherence to non-pharmaceutical interventions, and limitation of high-transmission indoor activity.

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 March 7, and to hedge against delays in reporting, we analyze data as recent as February 25 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, Dr. 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.