COVID-19 transmission across Washington State

Washington State Department of Health
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SitRep 29: COVID-19 transmission across Washington State

Gitanjali Singh[1], Ian Painter[1], Juan M. Lavista Ferres[2], Ruth Etzioni[3], Barbra A. Richardson[3,4], Cathy Wasserman[1]
[1]Washington State Department of Health; [2]Microsoft AI For Health; [3]Fred Hutch Cancer Center; [4]University of Washington

Results as of March 23, 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 March 11, we estimate the reproductive number (R_e) in Washington state on March 5 was likely between 0.80 and 1.77, with a best estimate of 1.28. 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. Uncertainty in the statewide estimate for R_e is smaller than the uncertainty for separate regional estimates and therefore the statewide estimate provides clearer information regarding the current situation when the trends are similar. However, the most recent R_e estimates have larger uncertainty because of recent variability in hospital admissions, which are consistent with either a flattening or an increasing trend.

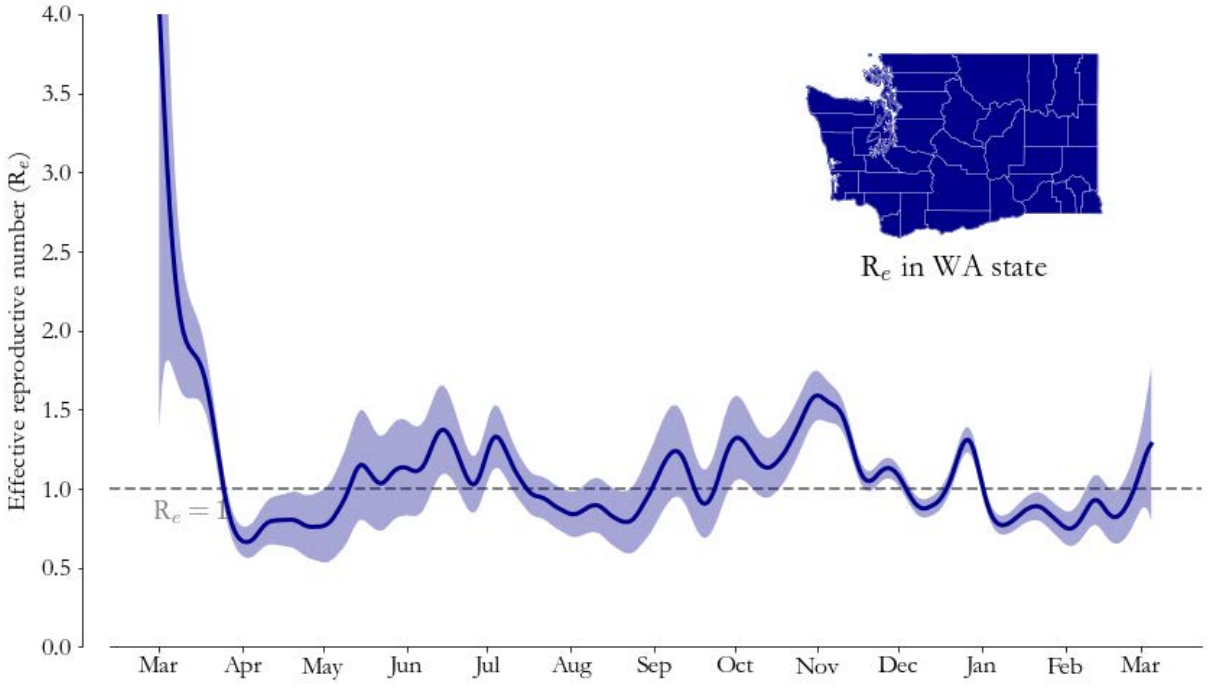

***Figure 1**: estimates for Washington state, with 2 standard deviation error bars. Our most recent estimates show R_e has recently increased, but remains close to 1 with large uncertainty. To reduce levels of cases and hospitalizations, R_e needs to maintain a value substantially below 1 for a sustained period of time.*

Trends in cases, hospital admissions, and deaths

Cases

Across the state, the declines in case counts that started in early January have flattened over the past month at levels last observed in mid-October (Figure 2). The seven-day rolling average case count increased from 384 cases per day on September 12 to a recent peak of 2908 on January 8, and has flattened at around 654 as of March 11.

Hospital admissions

Since early March, hospital admissions also appear to be flattening. The seven-day rolling average of hospital admissions increased from 21 per day on September 4 to a peak of 123 on January 6 and have since declined again to 33 as of March 4, and have flattened near that level as of March 11.

Deaths

Deaths have continued to decline through early March. The seven-day rolling average of deaths increased from 5 per day on September 12 to a peak of 32 on January 10 and has since declined to 9 as of March 1 (note that there is an earlier data cut-off date for deaths because of the additional time it takes for deaths to be verified and entered in the state vital records database).

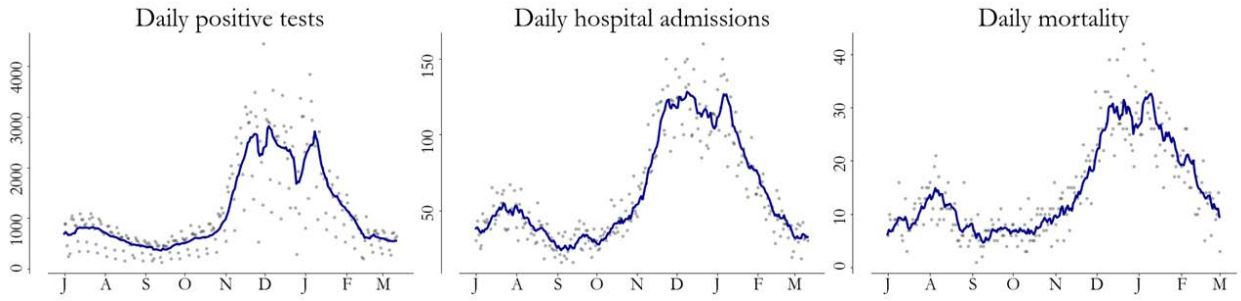

Figure 2*: Seven-day rolling case counts (left panel), hospital admissions (middle panel) and deaths (right panel) for Washington from July 2020 through March 11 (cases and hospitalizations) and March 1 (deaths) 2021. Because of how confirmed deaths are being reported, we are using an earlier cutoff for the mortality panel.*

County-level trends

Across Washington state, there is variation in county-level trends: as of March 11, 3 counties had no new cases over the prior two weeks (Columbia, Garfield, San Juan); 13 counties had 14-day rates of new cases between 100 and 200 per 100,000 people, 2 counties (Franklin, Pierce) had rates between 200 and 300 per 100,000, and 1 county (Whitman) had rates over 400 per 100,000 population (Figure 3).

- In all of the five largest counties (Clark, King, Pierce, Snohomish, and Spokane), the declines in case counts since January have flattened at late-September/early-October levels, with greater variability in the flattening in Pierce county.
- Among medium-sized counties, case counts in Benton, Cowlitz, Franklin, Grant, Kitsap, and Yakima have flattened at October or early November levels. In Skagit, Thurston, and Whatcom, declines in case counts stopped in mid-February, briefly increased in late February, and have since declined again.
- In Whitman county, case counts have steadily increased since mid-February. All other small counties currently have fewer than 10 cases per day, on average.

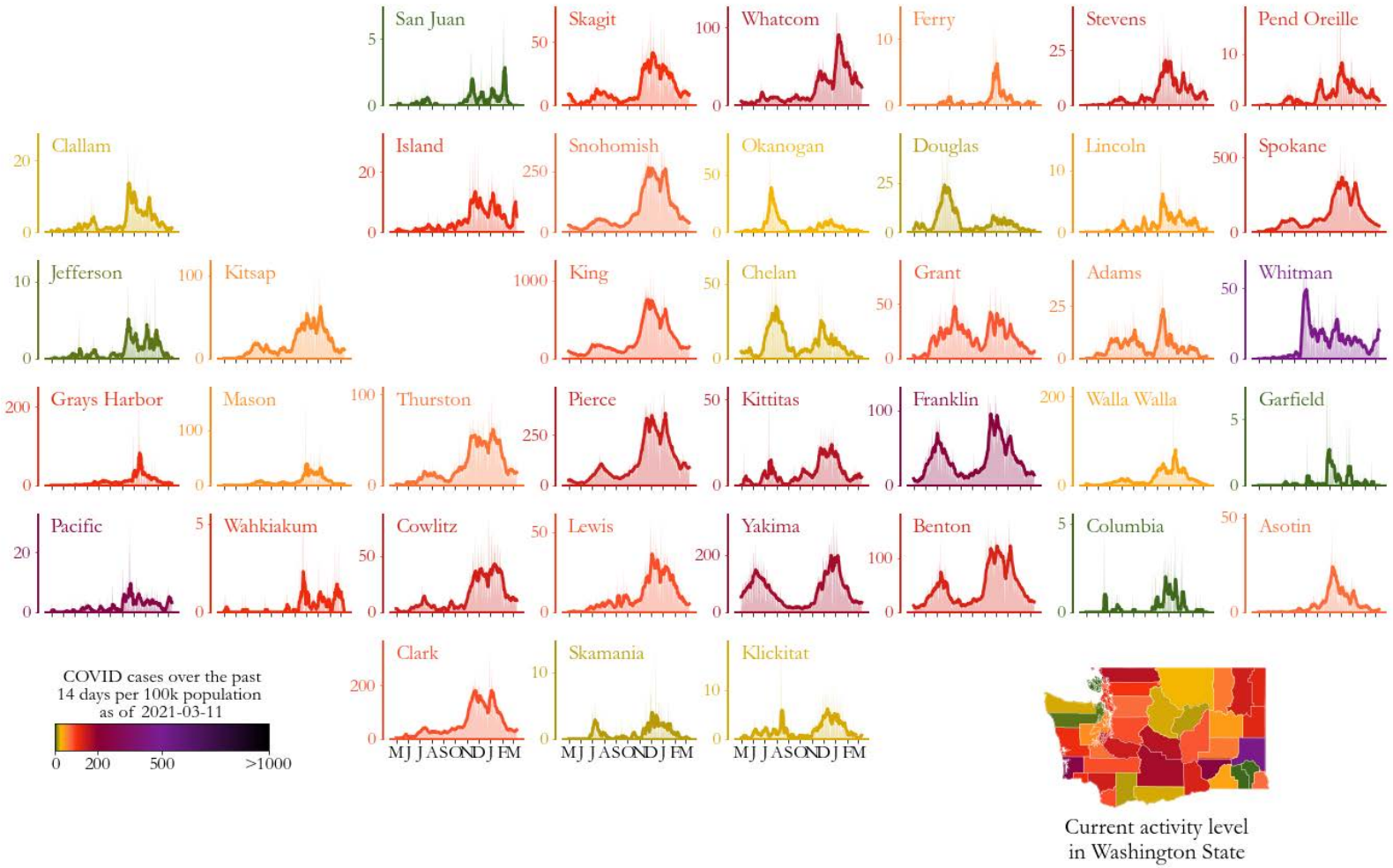

***Figure 3**: Daily COVID-19 positives (shaded areas) and 7-day moving averages (curves) arranged geographically and colored by COVID-19 activity level (total cases from February 26 to March 11 per 100,000 people). Case trends across counties highlight geographic correlations and help us better understand region-level estimates of the transmission rate (see Figure 1). Flattening in case counts is evident in many counties since mid-February.*

Trends in cases and hospital admissions by age group

Across Washington state, declines in case counts across age groups began in early January (Figure 4) and have largely flattened over the last month. Some recent variability is evident among younger adults and youths: for adults aged 20-29, among whom case counts are highest, counts increased temporarily in late February. Similarly, among youths aged 10-19, a temporary increase was evident through early March.

We expect a more rapid decline in cases over age 60 as the proportion of vaccinated individuals in this age range increases compared to age groups in which a smaller proportion have been vaccinated. This is evident in Figure 5. The top panel shows a smaller proportion of adults 60 and older have tested positive since mid February in comparison to the proportion of the population belonging to this age group. The bottom panel shows that overall testing by age has remained proportional to the population distribution. Conversely, the 20-29 year old age group now accounts for a disproportionately large fraction of cases in comparison to the population fraction for this age group.

Hospital admission rates (admissions per 14-day period per 100,000 population) across Washington state have declined since early January among all age groups. The top panel of Figure 6 shows the highest hospital admission rates and steepest drops in rates since January among the 70-79 and 80 and over age groups (the age groups at greatest risk for severe disease) potentially because those age groups were among the first to be vaccinated (Figure 6). The bottom panel of Figure 6, which shows the rates on a log scale, indicates that declines have been occurring across all age groups since January. However, recent flattening in the declines in the 80 and over age group are concerning, although it remains to be seen whether this flattening is temporary or sustained. Among ages 40-49, an age group which does not have a high proportion of people vaccinated, sustained flattening in hospitalization rates is evident since late February.

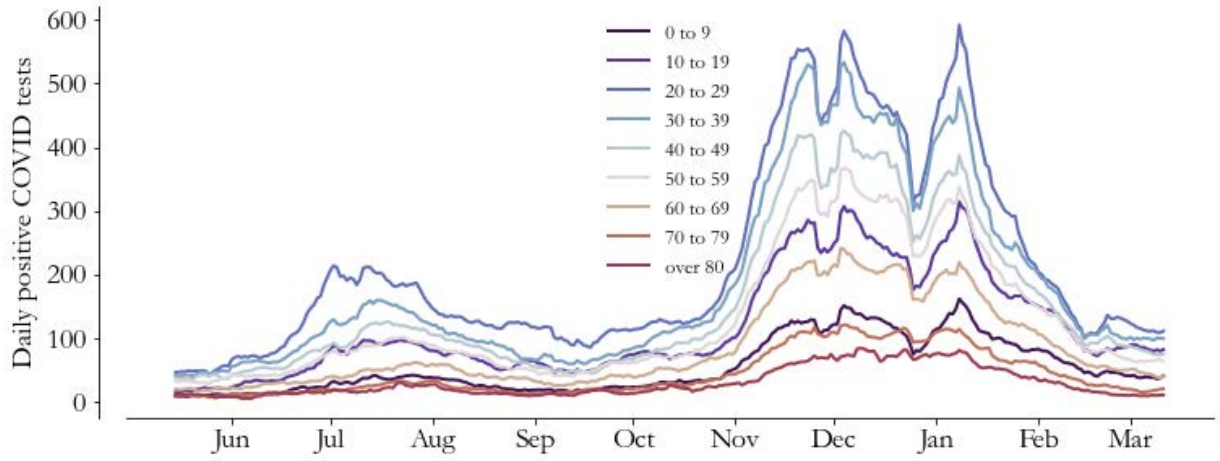

Figure 4. *Seven-day rolling average case counts by 10-year age group across Washington state. The declines in case counts have flattened in most age groups , with some variability among younger adults and youths.*

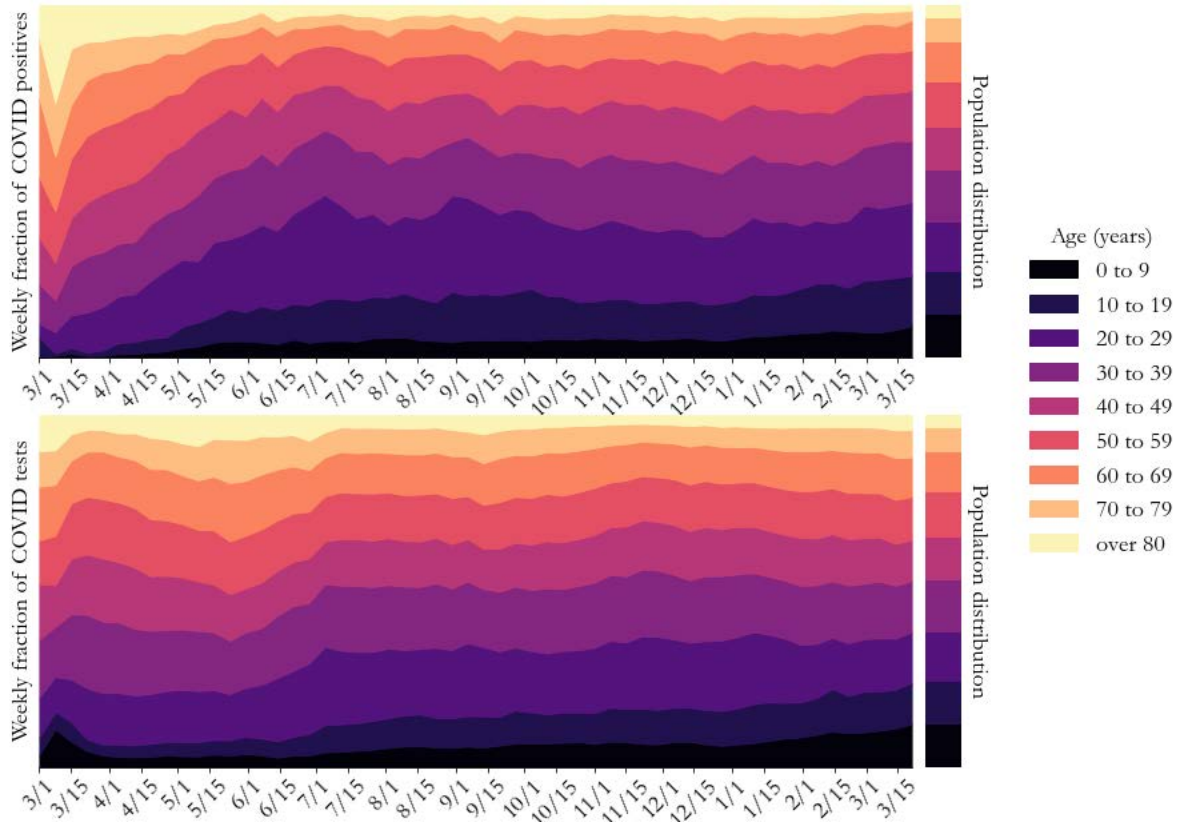

Figure 5. *The top panel of this graph indicates the weekly age distribution of COVID-19 cases and the bottom panel indicates COVID-19 tests. The colors represent 10 year age groups. Earlier in the pandemic, populations over age 60 represented a greater fraction of total COVID-19 cases relative to their 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.*

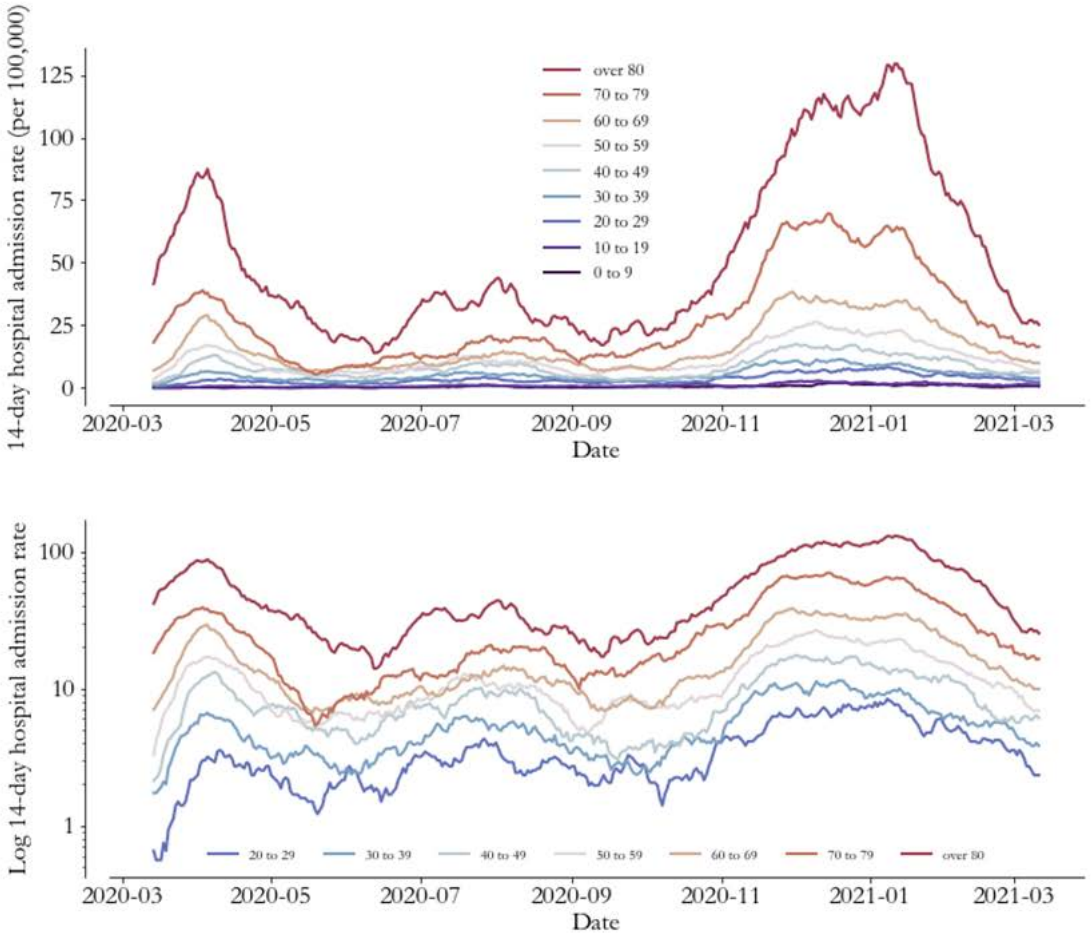

Figure 6. *Statewide 14-day hospital admission rate per 100,000 population by 10-year age group. The top panel shows the rates on a standard numeric scale, and the bottom panel shows the rates on a log scale to be able to better compare the rate of decline between age groups that have large differences in rates. Declines in hospital admission rates are apparent across age groups since early January, however some flattening is evident in some age groups.*

Model-based statewide prevalence

On March 5, 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 late February.

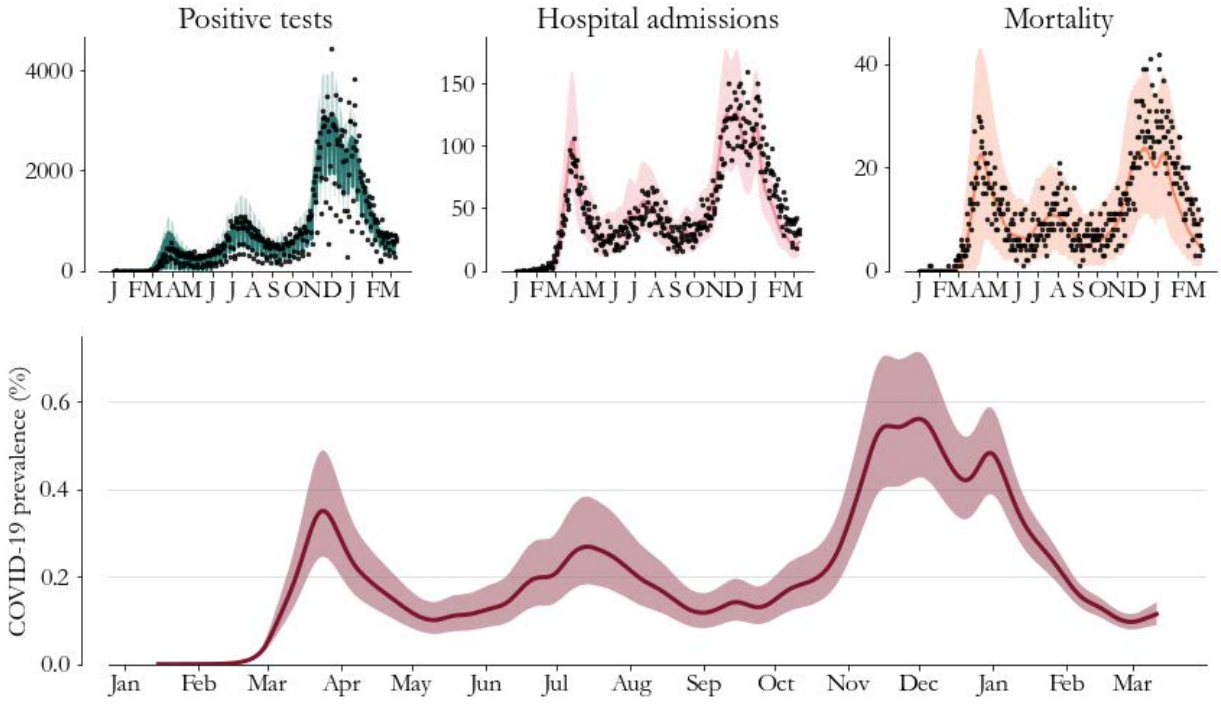

Figure 7*: Model-based prevalence estimates (bottom, 95% CI shaded) and model fit to cases (top left), hospitalizations (top middle) and deaths (top right) for Washington state. Prevalence is the percentage of Washington state residents with active COVID-19 infection.*

Hospital occupancy

Across the state, 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 until mid-March, after which an uptick is apparent.

ICU beds occupied by confirmed or suspected COVID-19 patients increased through early December, flattened thereafter, and declined from January until mid-March, at which point an increasing trend is again evident.

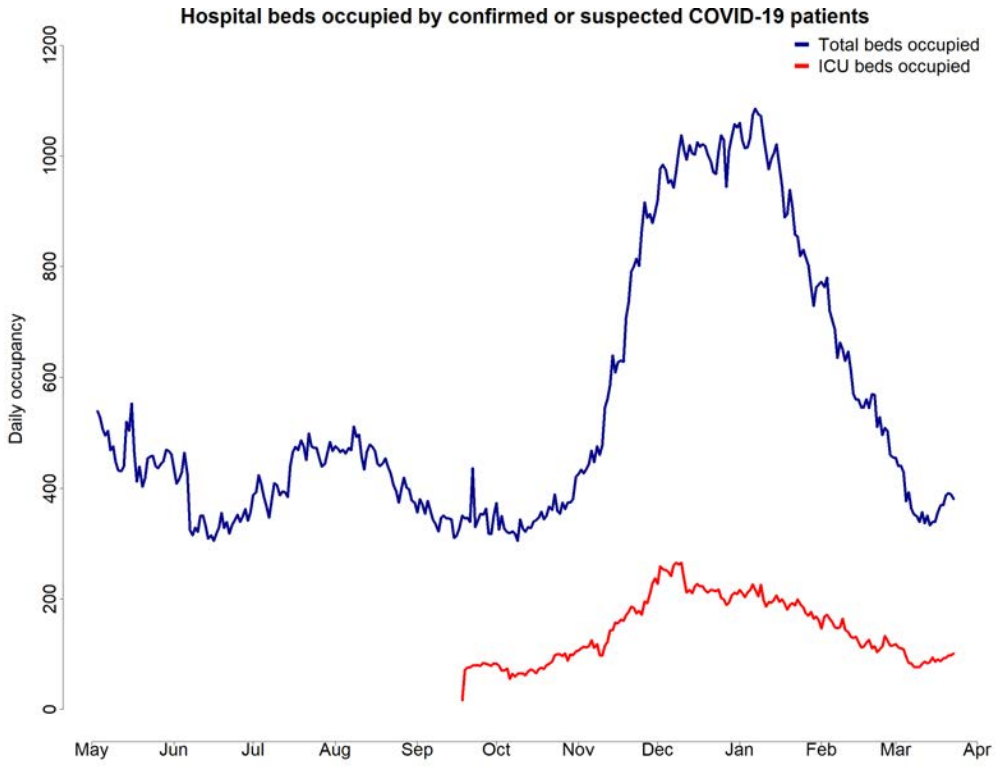

Figure 9. *Total hospital beds and ICU beds occupied by confirmed or suspected COVID-19 patients reported through the WA Health system. Data collection for ICU beds occupied by COVID-19 patients started September 17. Hospital occupancy data has minimal reporting lag, and is shown here using data up to March 20. 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.*

Implications for public health practice

Across Washington state, daily case counts and hospital admissions have flattened, with some recent increases evident, prevalence has flattened, and R_e remains near one. In addition, hospital admission rates among vulnerable adults aged 80 and over, as well as among adults aged 40-49 have plateaued and overall hospital and ICU occupancy have increased. In combination, multiple sources of evidence point to a potential inflection point in recent trends. Several factors occurring at the same time make it

challenging to assess trends and warrant closely watching the data. These include the growing prevalence of SARS-COV-2 variants, COVID fatigue in the population and further reopening the state.

Vaccination remains the most critical factor in preventing severe disease and fatalities in the population, particularly among those over age 65. As of March 20, 69.9% of persons aged 65 and over in Washington state have initiated vaccination and 45.9% have completed vaccination. Over 45,000 doses of vaccine are administered per day across the state and nearly 14% of the overall population have been fully vaccinated. The rate of vaccination could increase substantially in April with the influx of several hundred thousand additional doses of vaccine from the federal government. However, less than 20% of adults in age groups under 65 have completed vaccination, leaving these populations susceptible to COVID-19, particularly given the greater transmissibility and severity of disease caused by several of the SARS-CoV-2 variants.

The CDC has recently provided a new classification of SARS-CoV-2 variants into categories based on the level of concern they warrant: Variants of Interest, Variants of Concern, and Variants of High Consequence. Variants of Interest are those that may result in increased transmission and impacts on diagnostics, therapeutics, or immune escape, and include B.1.526, B.1.525, and P.2, which carry mutations that may reduce impact of treatment by monoclonal antibodies. Variants of Concern are those which are likely to have increased transmissibility, disease severity, and impact on diagnostics, treatments, and vaccines, and include B.1.1.7, P.1, B.1.351, B.1.427, and B.1.429. There are currently no Variants of High Consequence, a category which will include variants for which there is clear evidence that preventive or medical countermeasures have significantly reduced effectiveness. In Washington state, the B.1.1.7, B.1.427, and B.1.429 variants currently comprise the greatest fraction of circulating strains.

In combination, given the spread of variants across the state, including those with greater transmissibility and disease severity such as B.1.1.7, recent flattening or upticks in hospital admissions, and the fact that a large proportion of the population in Washington state is not yet vaccinated, significant caution is necessary as reopening proceeds. While nearly half of the population over 65 is fully vaccinated, younger populations who remain susceptible can also suffer severe disease and die of COVID-19. This is concerning given that the increased transmissibility of B.1.1.7 could result in many more cases among younger adults and because B.1.1.7 is known to cause more severe disease. Evidence from countries in Europe indicate that disease surges related to B.1.1.7 grow faster than those experienced previously, and even small upticks in cases and hospital admissions may be a signal of increasing transmission. Additionally, any further reopening should be carried out with clear messaging that the pandemic is not waning, significant risk remains, and caution and use of non-pharmaceutical interventions remains critical.

The short-term outlook depends on multiple factors including spread of variants, vaccination rate, and human behavior during reopening, as well as on how quickly policies can be implemented if cases and hospital admissions begin increasing.

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 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 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 21, and to hedge against delays in reporting, we analyze data as recent as March 11 across the state.** This relatively conservative hedge against lags is in response to reports of increasing test delays.
- Estimates of 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 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.