UNIVERSITY of VIRGINIA
BIOCOMPLEXITY INSTITUTE

UVA COVID-19 MODEL WEEKLY UPDATE

VDH VIRGINIA DEPARTMENT OF HEALTH

December 17th, 2021

KEY TAKEAWAYS

- Case rates grew after the Thanksgiving holiday and remain at a high level, with 21 of 35 health districts in surge.
- Though the statewide transmission rate is still above one, and cases continue to grow, the rate of this growth has slowed slightly since last week.
- The Adaptive scenario is converging with the Fall/Winter scenario, projecting a January peak higher than during the Delta wave.
- Delta is still the predominant variant, but Omicron is expected to begin impacting Virginia over the holidays.
- The Omicron's scenario suggests that it will fuel rapid case growth and cause a severe surge in February of 2022 that is likely to exceed that of Winter 2021.

30 per 100k
Average Daily Cases Week Ending Dec. 12, 2021

54 per 100k
Adaptive Scenario Forecast Average Daily Cases, Week Ending on January 23, 2022

7,676 / 9,019
Average Daily 1st / 2nd Doses Dec. 12, 2021

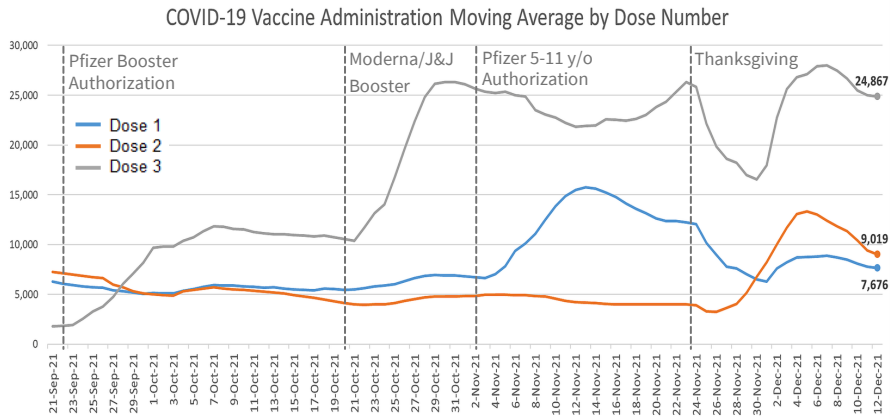
24,867
Average Daily Boosters Dec. 12, 2021

KEY FIGURES

Reproduction Rate
(Based on Confirmation Date)

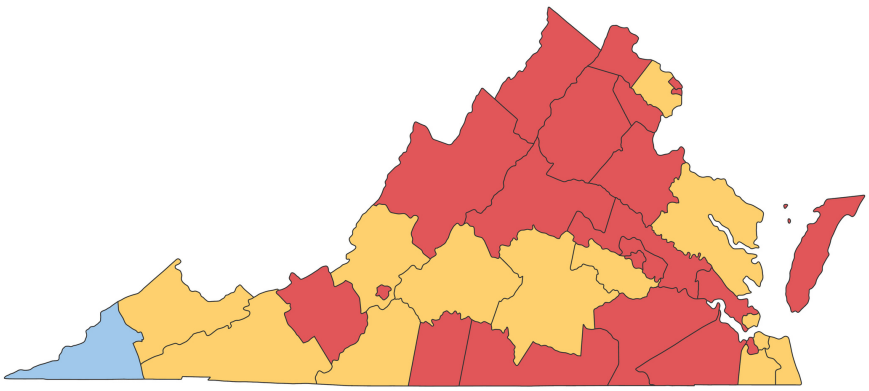
Region	R_e Dec. 13th	Weekly Change
Statewide	**1.119**	**-0.135**
Central	1.056	-0.050
Eastern	1.022	-0.103
Far SW	0.894	-0.207
Near SW	1.009	-0.150
Northern	1.032	-0.128
Northwest	1.052	-0.080

Vaccine Administrations



Growth Trajectories: 21 Health Districts in Surge

Status	# Districts (prev week)
Declining	1 (6)
Plateau	0 (2)
Slow Growth	13 (15)
In Surge	21 (12)



VIRGINIA'S HEALTH IS IN OUR HANDS. Do your part, stop the spread.

UVA COVID-19 MODEL WEEKLY UPDATE

THE MODEL

The UVA COVID-19 Model and these weekly results are provided by the UVA Biocomplexity Institute, which has over 20 years of experience crafting and analyzing infectious disease models. It is a county-level **S**usceptible, **E**xposed, **I**nfected, **R**ecovered (SEIR) model designed to evaluate policy options and provide projections of future cases based on the current course of the pandemic. The Institute is also able to model alternative scenarios to estimate the impact of changing health behaviors and state policy.

COVID-19 is a novel virus, and the variant mix changes constantly. The model improves as we learn more.

THE SCENARIOS

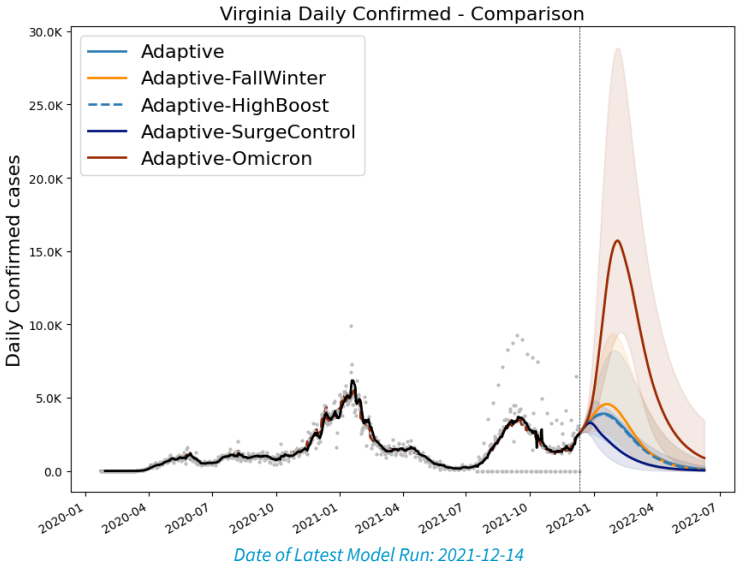
Updated: The models use various scenarios to explore the path the pandemic is likely to take under differing conditions. The **"Adaptive"** scenario takes the current course of the pandemic, including the impact of the Delta variant and vaccines, and projects it forward. The **"SurgeControl"** scenario shows the likely impact of prevention and mitigation efforts (masking, social distancing, testing and isolating, etc.) by employing a 25% reduction in transmission rates starting next week. The **"FallWinter"** scenario captures the transmission drivers of the entire 2020 holiday season and projects them forward. In this scenario, transmission rates from December 2021 to February 2022 are manually set to reflect the transmission rates from the same time period last year, but boosted by Delta's enhanced transmissibility. The new "**Omicron**" scenario is identical to the Adaptive scenario, but adds a 30% immune escape to account for Omicron's enhanced ability to cause reinfections.

All models use COVIDcast surveys to estimate county-level vaccine acceptance. They then assume that vaccination uptake continues in each county until this value is reached. The new "**HighBoost"** scenario modifier is meant to examine the impact of an optimistic increase in booster doses for adults. This should not be confused with the older "VaxOpt" scenario modifier which imagined a significant boost in *first-time* adult vaccinations. Current models assume that 40% of vaccinated individuals will receive a booster. The HighBoost modifier increases this figure to 70%, and doubles the rate of deployment.

MODEL RESULTS

Updated: The "present course" Adaptive scenario (blue) shows a flat trajectory in the short-term, with a gradual rise in cases starting in early 2022 and peaking in April. At this point, the adaptive scenario seems optimistic. The FallWinter scenario (orange), projects a rise in case rates, potentially rivaling the September surge with a peak in the first week of February, 2022. The HighBoost scenario (dashed blue line) shows that in the long-run, increased booster coverage could prevent thousands of cases.

The Omicron scenario (maroon) forecasts a quick rise in cases leading to a peak in early March of 2022 that would greatly exceed both last winter's peak and the recent Delta surge in September of 2021. Please do your part to stop the spread and continue to practice good prevention, including indoor masking, social distancing, and self-isolating when sick, and get vaccinated and boosted when eligible.



Date of Latest Model Run: 2021-12-14

SLICES OF PIES

As the holidays approach, many of us begin contemplating holiday dinners. Thoughts of turkey, ham, or salmon, of potatoes, cranberry sauce, or stuffing, tickle our tongues well before the meal itself. The more intrepid among us, however, have something else in mind: pies. Apple pies, chocolate pies, sweet potato pies. Forget the turkey! Pies are the main course of the holiday meal.

This holiday season, however, many in the public health world will be thinking of something else as they enjoy holiday pie. In the public health world, the seriousness of a disease outbreak can be summed up by two measures: the number of people infected, and share of those people who are hospitalized or die from the disease. These are often described as the size of the pie, and the size of the slice.

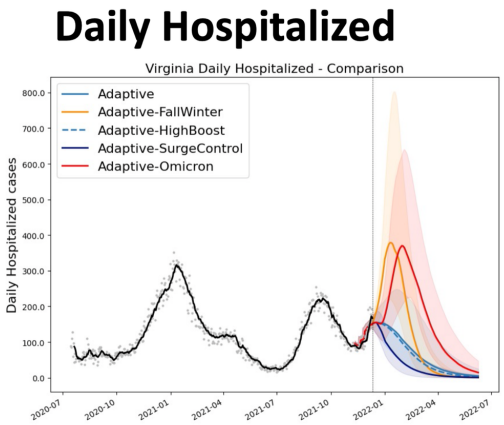
Even a tiny sliver of this giant pie from Traverse Michigan's 1950 Cherry Festival Parade could feed a small army. Cherry Festival Parade Float by Don Harrison. CC BY-NC-ND-2.0.

Big Slices of Big Pies

Early in the pandemic there was a great deal of interest in COVID-19's case fatality rate (CFR) and how it compared to seasonal flu. The CFR for COVID-19 appears to be substantially higher than that of seasonal flu. Public health officials were just as, if not more concerned, about the number of people susceptible to COVID-19. The greater majority of people have some protection from seasonal flu due to repeated exposure and vaccines. No one, however, had exposure to the novel Coronavirus, meaning everyone was susceptible and likely to be infected if exposed. In the world of pies, the number of flu cases expected every year is a normal, holiday pie. Comparatively, the number of people infected by COVID-19 was a roadside attraction. Even if COVID-19's CFR was similar to or lower than seasonal flu, a small slice of a big COVID- 19 pie had the potential to overwhelm hospitals and cause a substantial number of deaths. And it did.

Small(er) Slices of Bigger Pies

Though early and muddled by the current complex immunity profile for COVID-19, it appears that the Omicron variant may cause less severe disease than previous variants. Even if Omicron's severity is similar to or lower than seasonal flu's we find ourselves in much the same place as early in the pandemic. Omicron is showing a propensity to evade immunity provided by natural infection and by unboosted vaccination. In affected countries it has spread much faster than previous variants. As the chart on previous page shows, the pie has the potential to be very big.



According to the model projections, cases may peak almost three times higher than last winter's surge - the worst period of the pandemic. Even a small slice of such a large pie has the potential to overwhelm hospitals and cause a substantial number of deaths. The model's hospital projections include preliminary estimates of Omicron's reduced severity, yet it shows hospitalizations could exceed the high peaks which pushed Virginia's health systems to the limit last winter.

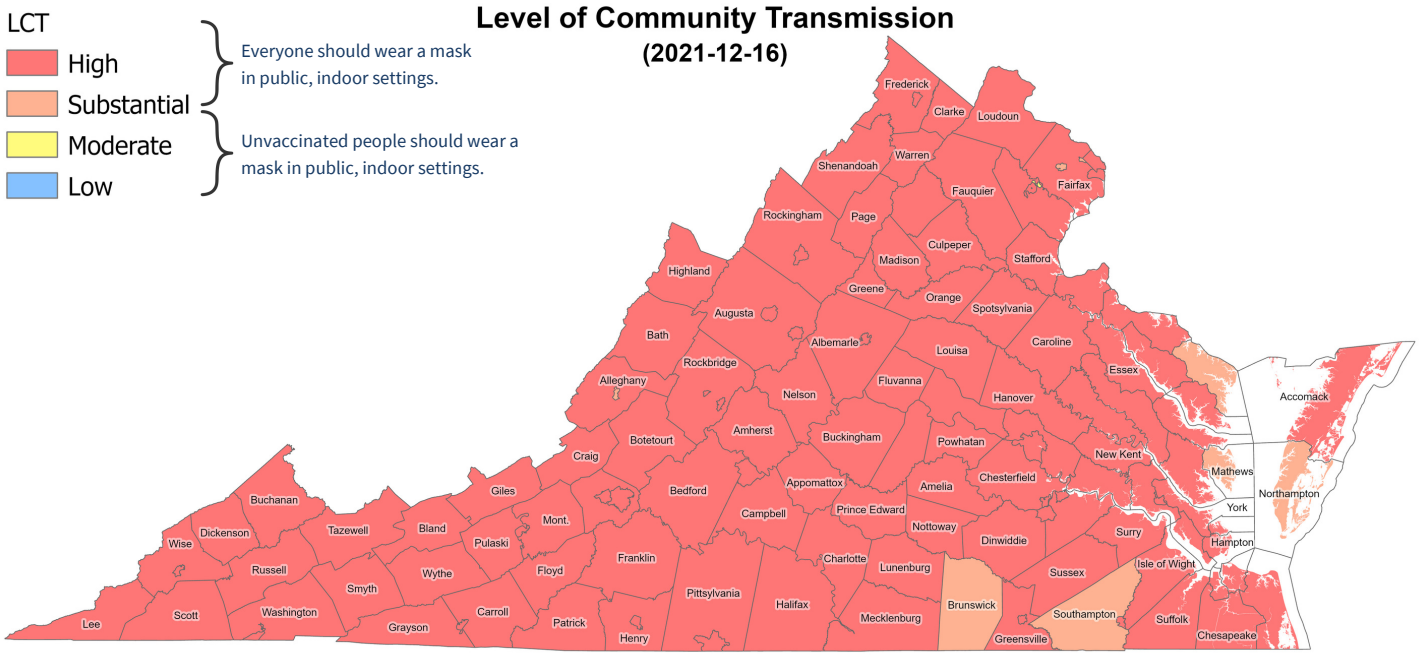
The good news is that each of us have more tools available to limit the number of infections this holiday season. Though reduced, vaccination does provide protection from Omicron. While not 100 percent, boosters appear to be effective at preventing infection and severe disease by Omicron. The advice for preventing Omicron remains the same as with other COVID-19 variants. Please do your part to stop the spread. Continue to practice good prevention, including indoor masking, social distancing, and self-isolating when sick. Get vaccinated and boosted when eligible. And enjoy a delicious slice of pie over the holidays!

STAYING SAFE DURING THE HOLIDAYS

The Omicron variant was first detected in Virginia on December 9th, just about two weeks before the holiday gatherings. Though there is some preliminary evidence that it may not be quite as severe as Delta, it still poses a serious health risk. Furthermore, with its increased immune escape, it has the potential to cause a significant number of reinfections, as well as another major surge. As such, we hope that you can celebrate the holidays carefully.

The VDH has detailed recommendations on how to stay safe this holiday season, most notably: 1. Get vaccinated as soon as possible and get a booster when eligible. 2. Wear a mask in indoor public places and reconsider public indoor activities where masking is difficult (eg. indoor dining). 3. Gather outside or in well ventilated areas and maintain distance when possible. 4. Stay home if you have any symptoms of COVID-19 or other illness.

This map and table shows the level of community transmission in the Commonwealth, as calculated by the CDC on December 16th, 2021. You can also lookup your own county on the CDC website linked here. Stay safe and Happy Holidays from VDH!



Data Source: https://covid.cdc.gov/covid-data-tracker/

Locale	LCT
Accomack Co.	High
Albemarle Co.	High
Alexandria City	High
Alleghany Co.	High
Amelia Co.	High
Amherst Co.	High
Appomattox Co.	High
Arlington Co.	High
Augusta Co.	High
Bath Co.	High
Bedford Co.	High
Bland Co.	High
Botetourt Co.	High
Bristol City	High
Brunswick Co.	Substantial
Buchanan Co.	High
Buckingham Co.	High
Buena Vista City	High
Campbell Co.	High
Caroline Co.	High
Carroll Co.	High
Charles City Co.	High
Charlotte Co.	High
Charlottesville City	High
Chesapeake City	High
Chesterfield Co.	High
Clarke Co.	High

Locale	LCT
Colonial Heights City	High
Covington City	Substantial
Craig Co.	High
Culpeper Co.	High
Cumberland Co.	High
Danville City	High
Dickenson Co.	High
Dinwiddie Co.	High
Emporia City	High
Essex Co.	High
Fairfax City	Substantial
Fairfax Co.	High
Falls Church City	Substantial
Fauquier Co.	High
Floyd Co.	High
Fluvanna Co.	High
Franklin City	High
Franklin Co.	High
Frederick Co.	High
Fredericksburg City	High
Galax City	High
Giles Co.	High
Gloucester Co.	High
Goochland Co.	High
Grayson Co.	High
Greene Co.	High
Greensville Co.	High

Locale	LCT
Halifax Co.	High
Hampton City	High
Hanover Co.	High
Harrisonburg City	High
Henrico Co.	High
Henry Co.	High
Highland Co.	High
Hopewell City	High
Isle of Wight Co.	High
James City Co.	High
King and Queen Co.	High
King George Co.	High
King William Co.	High
Lancaster Co.	High
Lee Co.	High
Lexington City	High
Loudoun Co.	High
Louisa Co.	High
Lunenburg Co.	High
Lynchburg City	High
Madison Co.	High
Manassas City	High
Manassas Park City	Moderate
Martinsville City	High
Mathews Co.	Substantial
Mecklenburg Co.	High
Middlesex Co.	High

Locale	LCT
Montgomery Co.	High
Nelson Co.	High
New Kent Co.	High
Newport News City	High
Norfolk City	High
Northampton Co.	Substantial
Northumberland Co.	Substantial
Norton City	High
Nottoway Co.	High
Orange Co.	High
Page Co.	High
Patrick Co.	High
Petersburg City	High
Pittsylvania Co.	High
Poquoson City	High
Portsmouth City	High
Powhatan Co.	High
Prince Edward Co.	High
Prince George Co.	High
Prince William Co.	High
Pulaski Co.	High
Radford City	High
Rappahannock Co.	High
Richmond City	High
Richmond Co.	High
Roanoke City	High
Roanoke Co.	High

Locale	LCT
Rockbridge Co.	High
Rockingham Co.	High
Russell Co.	High
Salem City	High
Scott Co.	High
Shenandoah Co.	High
Smyth Co.	High
Southampton Co.	Substantial
Spotsylvania Co.	High
Stafford Co.	High
Staunton City	High
Suffolk City	High
Surry Co.	High
Sussex Co.	High
Tazewell Co.	High
Virginia Beach City	High
Warren Co.	High
Washington Co.	High
Waynesboro City	High
Westmoreland Co.	High
Williamsburg City	High
Winchester City	High
Wise Co.	High
Wythe Co.	High
York Co.	High