UNIVERSITY of VIRGINIA
BIOCOMPLEXITY INSTITUTE

UVA COVID-19 MODEL WEEKLY UPDATE

VDH VIRGINIA DEPARTMENT OF HEALTH

July 15, 2022

KEY TAKEAWAYS

- Case rates have remained relatively stable over the last few weeks. But test positivity, wastewater surveillance, and hospitalization trends all suggest growth across Virginia. This matches the trends seen in neighboring states. Hospitalizations continue to climb in Maryland, Washington DC, and West Virginia.
- Seventeen districts are in growth trajectories, with three of these districts surging. Fifty localities are now at "High" community levels. A further sixty are at "Medium" community levels. Residents in these counties should take appropriate preventive measures.
- The BA.4 and BA.5 subvariants have continued to make in-roads and are now dominant in Virginia.
- Models project a small rise in cases in the coming weeks. They also show a potential for future growth in the Fall. This will depend on seasonality and the introduction of potential future variants.

33.2 per 100k
Average Daily Cases Week Ending July 11, 2022

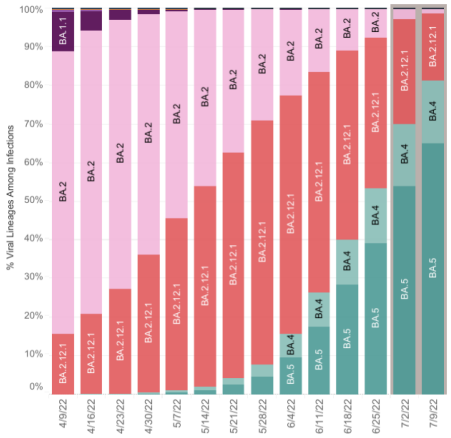
0.988
Statewide Reproductive Number as of July 11, 2022

50
*Virginia Localities at **High** CDC Community Levels as of July 14, 2022*

60
*Virginia Localities at **Medium** CDC Community Levels as of July 14, 2022*

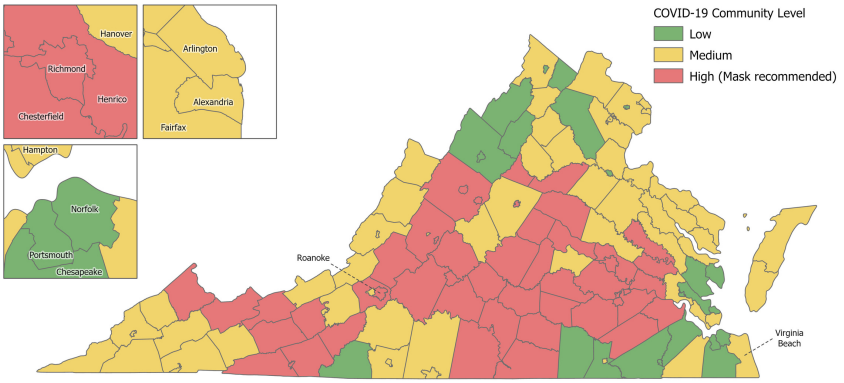
KEY FIGURES

Variant Mix -HHS Region 3



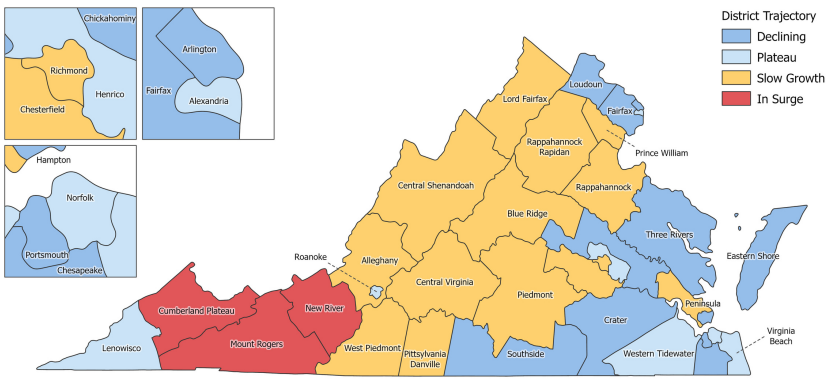
CDC Community Levels

As of July 14, 2022



Growth Trajectories: Three Health Districts in Surge

Status	# Districts (prev week)
Declining	11 (8)
Plateau	7 (1)
Slow Growth	14 (24)
In Surge	3 (2)



UVA COVID-19 MODEL WEEKLY UPDATE

THE MODEL

The UVA COVID-19 Model and 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 health district-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 periodically. These models improve as we learn more.

THE SCENARIOS

Updated: The model uses scenarios to explore the potential paths the pandemic may take under different conditions. Model projections take a variety of factors into account, including current variants, vaccine uptake, vaccination rates (including boosters), previous infection, waning immunity, weather, and behavioral responses (e.g., mask-wearing, social distancing). The "**Adaptive**" scenario represents the current course of the pandemic, projecting it forward with no major changes. It now includes the impact of the BA.4 and BA.5 Omicron subvariants which together are dominant in Virginia. As such, the old BA.4_BA.5 scenario has been retired. The new "**Adaptive-VariantX**" is a *speculative* scenario to explore the potential impact of a new variant emerging in three months. This hypothetical variant is imagined as having the same immune escape and transmissibility advantages over BA.4/5 that BA.4/5 did over the earlier BA.2. See page three for further discussion. Both scenarios have an associated "**FallWinter**" modifier like the one used last year. This modifier layers seasonal increases associated with colder weather, indoor gatherings, and holiday travel on top of the base scenarios. It does this by artificially adjusting transmissibility between September and January to match transmissibility from the same time last year.

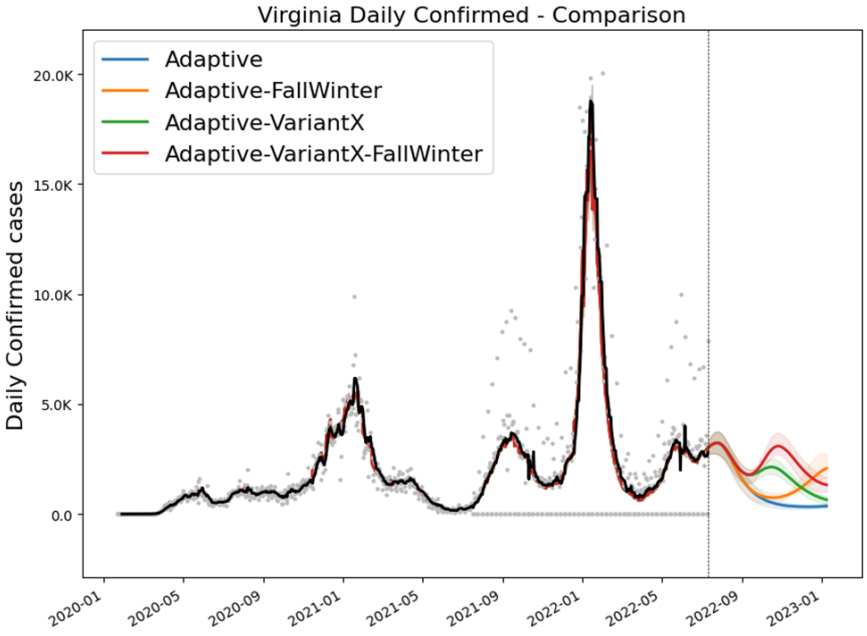
MODEL RESULTS

Updated: As always, the current course "**Adaptive**" scenario is shown in blue. If the current course persists, this scenario projects a short-term bump in cases, followed by a slow but steady decline. In this scenario, we peak in late July and fall below 1,000 daily cases in September.

The new "**Adaptive-FallWinter**" scenario, shown here in orange, follows the same course until September. From there it continues to rise, peaking in December at 2,000 daily cases.

The new *hypothetical* "**Adaptive-VariantX**" scenario, shown in green, is identical until September. From there it projects another small surge, peaking in mid-October at about 2,500 daily cases.

The "**Adaptive-VariantX-FallWinter**" (red) follows the same course until September. From there it projects a rapid rise, peaking at 3,000 daily cases in November.



Date of Latest Model Run: July 13, 2022
Date of Next Model Run: July 27, 2022

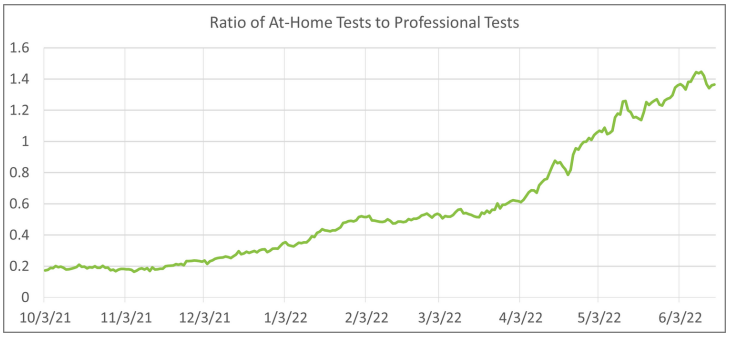
Please note: The data and projections shown here reflect reported cases. During the Omicron wave, testing shortages resulted in far fewer infections being reported as cases. This suggests fewer total infections than experienced in January. Please see page three of the May 13th modeling report for more details.

MIXED SIGNALS

The last modeling report discussed how changing ascertainment rates have made modeling more difficult. Ascertainment measures the ratio of detected cases to total cases. Basically, for every recorded case, how many others go undetected? The ascertainment rate seems to drop, sometimes significantly, during large surges. As imposing as the surge of cases in January appears, it is likely many more cases were never identified. But even with these fluctuations in ascertainment, reported cases generally tracked the trends of our other surveillance mechanisms. This may no longer be the case.

For the last two weeks, other metrics of disease burden have shown signs of growth, while case rates remain reasonably steady. COVID19 hospitalizations in Virginia are still low but have slowly climbed back to levels not seen since early March. Test positivity has also climbed quickly, nearly doubling from 12.0% to 23.8% in that same time. Wastewater surveillance suggests viral loads as high as in early February. But looking at reported cases alone, things seem relatively stable. Though quite a few districts are in slow growth, the statewide reproductive number (R_e) remains below one.

Reported case data are likely being affected by the rise of at-home testing. To account for this, UVA has adjusted their ascertainment rate based on blood serology surveys. The models now assume that there are between six and ten undetected cases for every one reported. Virginia's should continue to practice appropriate preventive measures and get a booster as soon as eligible. Also keep an eye on your local community levels. Case rates are still far higher than they were in Summer of 2021 even without accounting for ascertainment rates. Given the trajectories of neighboring states, we may be in the beginnings of another surge.

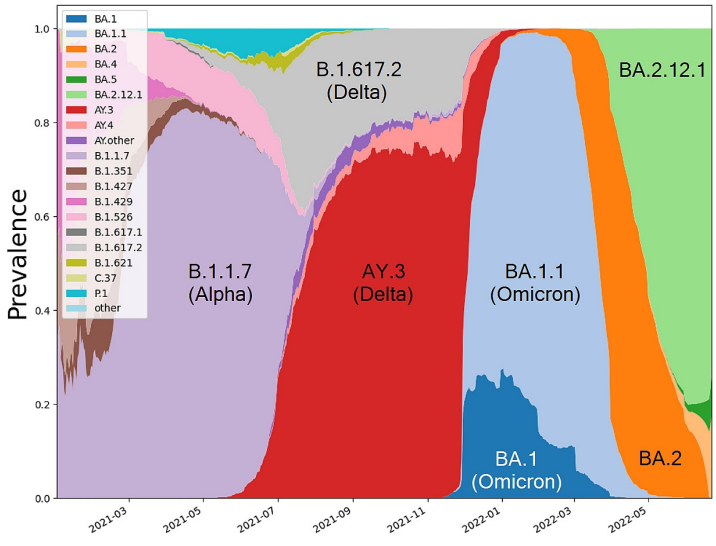


At-home tests are a good tool to help protect you and your family. But results are rarely reported. In the last year the rate of at-home testing has increased almost 10x, decreasing the ascertainment rate. (Data from OutbreaksNearMe.org)

The Next Variant (X)

COVID19 continues to adapt to natural and vaccine-induce immunity, and new Variants of Concern continue emerge. The BA.1.1 Omicron variant out-competed Delta and gave us the January surge. A few weeks later BA.2 took over, followed by BA.2.12.1 that was even better at immune escape. Since then, BA.5 has taken the driver's seat in Virginia and brought its cousin BA.4 along for the ride. Though still only a "variant under monitoring", BA.2.75 is the newest newsworthy variant. We cannot say with certainty what the next dominant variant will be like, but it is almost certain new ones will continue to emerge.

After a surge, a portion of the population will gain immunity to the dominant variant, decreasing transmission rates and creating a momentary lull. In that environment, a new variant with strong immune-escape characteristics can thrive. Once such a variant arises, it spreads quickly and the entire process repeats. We've experienced this in Virginia several times in the last year. Each new variant has had the capacity to cause reinfections among those previously infected by the last variant. Vaccines and previous infections do confer protection, particularly against severe disease and death, but infections may still occur.



This graph represents the percentage of new cases caused by a specific variant on a specific date. A new variant arises and becomes dominant every three to six months in the Commonwealth. This trend may very well continue.

The hypothetical "Variant X" scenarios model this pattern. The model assumes Variant X will have immune-escape advantages similar to earlier variants. It also assumes it will arrive three months after BA.5 becomes dominant. The "Fall/Winter" scenarios layer on the effect of cooler weather and holiday travel. Though not a given, these scenarios demonstrate what could happen if past patterns continue.