

# COVID-19 Disease Outbreak Outlook Arizona and Pima County

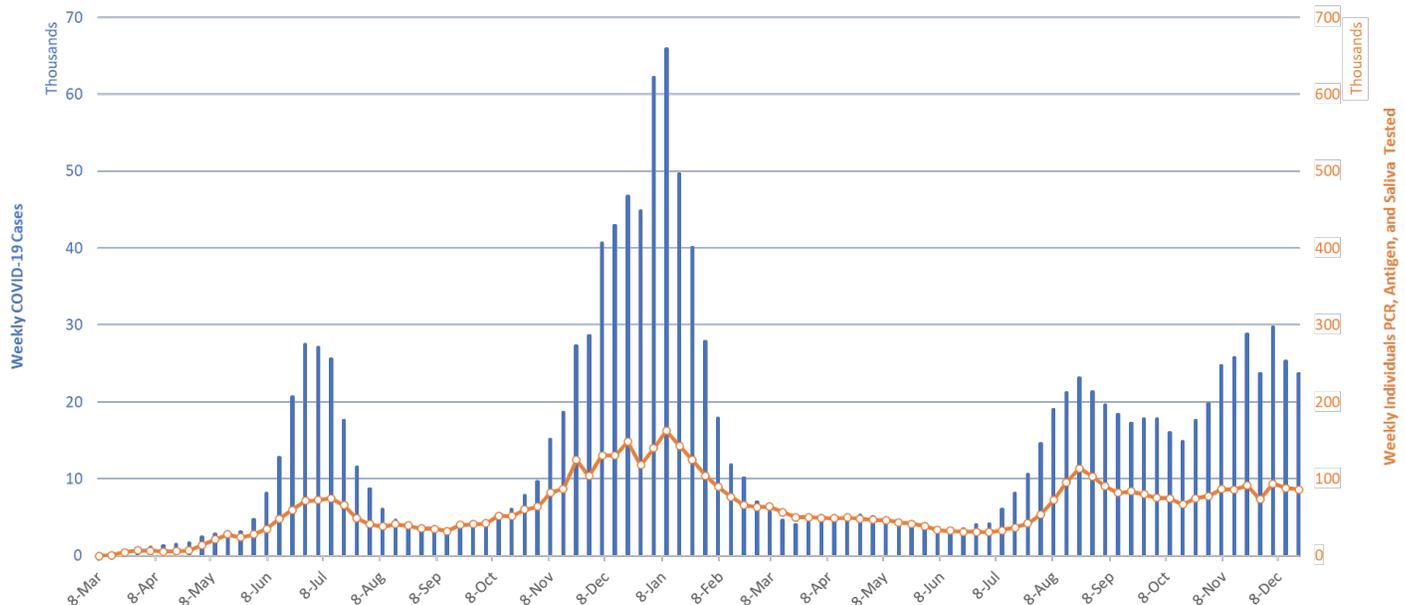
Updated December 24, 2021

**Disclaimer:** This information represents my personal views and not those of The University of Arizona, the Zuckerman College of Public Health, or any other government entity. Any opinions, forecasts, or corresponding recommendations should be considered in conjunction with other corroborating and conflicting data. Past updates can be accessed at <https://publichealth.arizona.edu/news/2021/covid-19-forecast-model>.

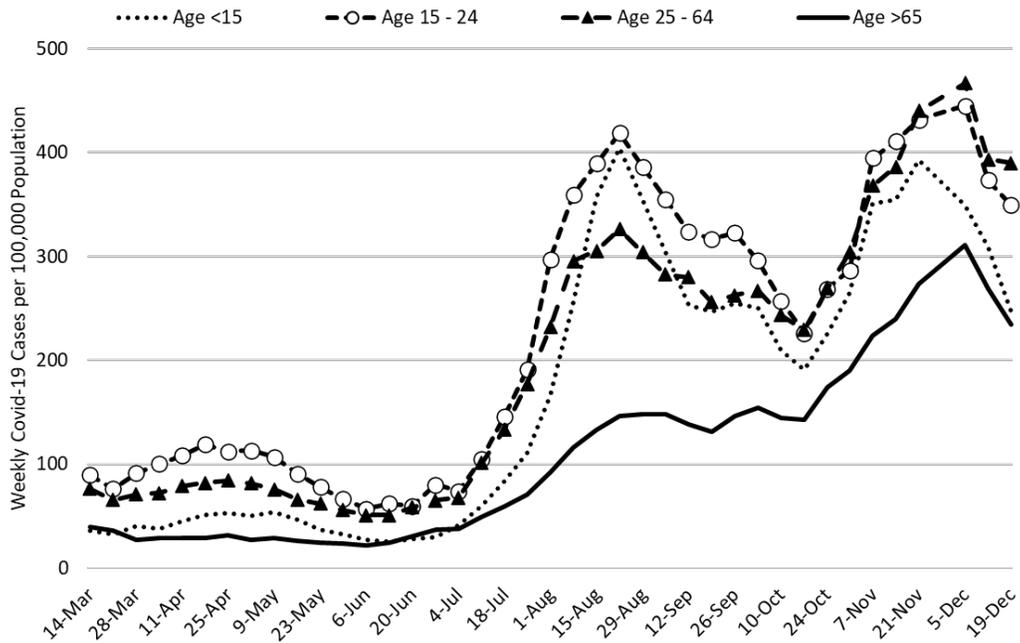
For the week ending December 19th, 23704 Arizonans were diagnosed with COVID-19, a 3% decrease from the 24424 cases initially reported last week (Figure 1). Cases are currently being diagnosed at a rate of 326 cases per 100K residents per week. Rates are highest among those 25 – 64 years and lowest among those ≥65 years, 390 and 234 cases per 100K residents, respectively (Figure 2a following page). As an early harbinger of the imminent *Omicron* wave, rates among those 20 – 39 years are now increasing (data not shown).

Arizona's new case ranking has dropped to 30th. The nation's current leaders are Rhode Island (857), New York (842), New Jersey (643), Illinois (639), and Massachusetts (624). **Note:** New York City (1124) and District of Columbia (1104) have even higher rates as metropolitan subunits. According to the [CDC](#), only 31% of Arizona adults and 50% of its seniors are vaccinated with a third dose booster. The [ADHS Vaccine Dashboard](#) shows weekly doses delivered dropped 20% to 165K doses. The [CDC](#) recommends everyone ≥18 years should receive a booster and has widened eligibility to those 16 – 17 years. With winter here, [waning immunity among those without a booster](#) will place them at risk of breakthrough infection from [the circulating Omicron variant](#).

GROUND HOG DAY → Arizona continues to experience a high number of cases, hospitalizations, and deaths. With [waning vaccine efficacy](#) and a [potentially short duration of acquired immunity](#), [herd immunity is not achievable](#). As time progresses, [more individuals will become susceptible](#). While the [previously vaccinated](#) and [previously infected](#) will remain mostly protected from severe outcomes, they will contribute to community transmission. Unvaccinated Arizonans will not be able to avoid infection by “free riding” on high levels of community immunity. The [decision to remain unvaccinated carries a much greater risk](#) than getting vaccinated. For the vaccinated, [third-shot boosters provide additional protection](#) and should be a [priority](#) for anyone >50 years to ward off infection from the *Delta* variant or the newly dominant *Omicron* variant.

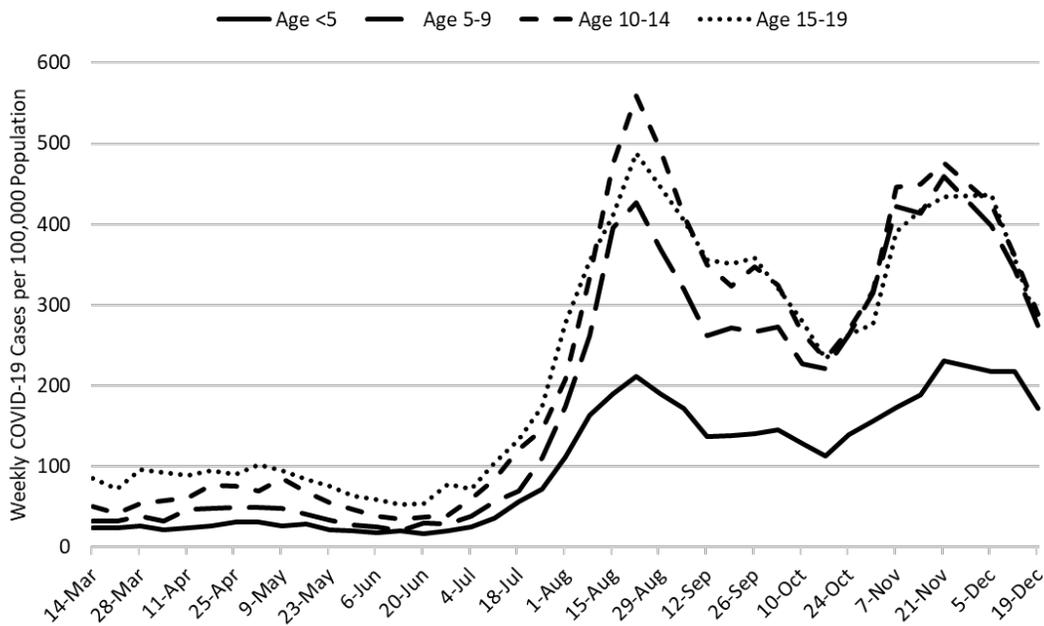


**Figure 1. Weekly COVID-19 Cases in Arizona and Number of Individuals Undergoing COVID-19 Diagnostic Testing March 1, 2020 – December 19, 2021.**



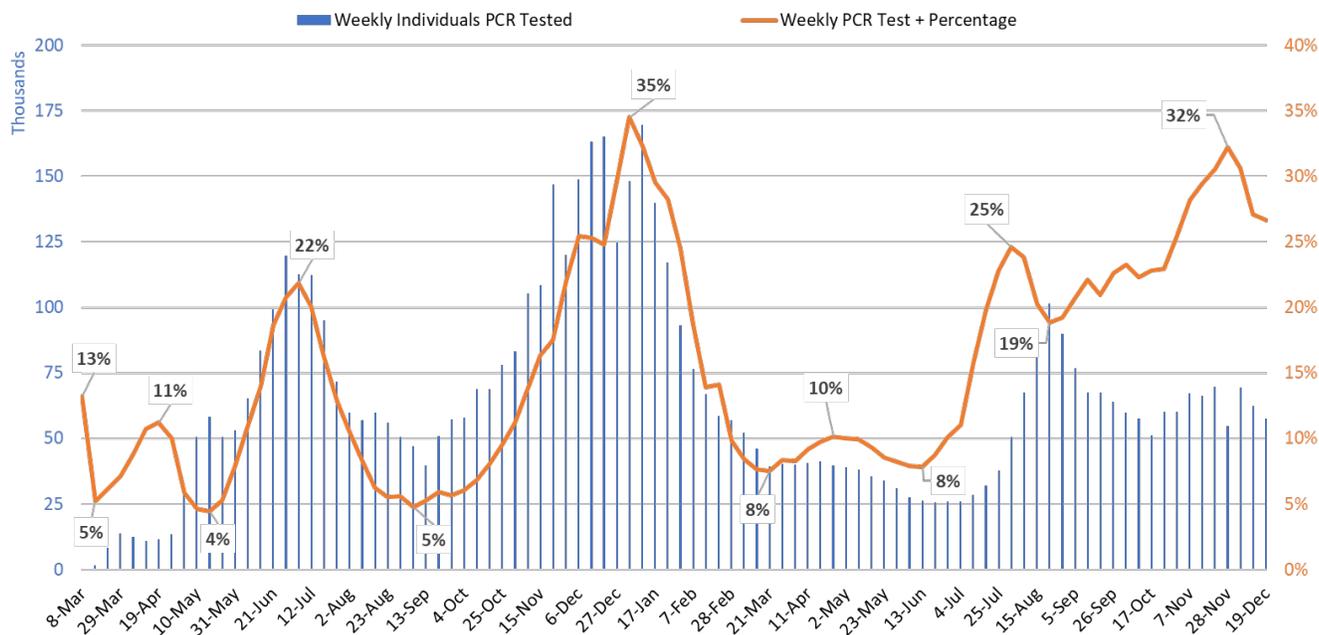
**Figure 2a. COVID-19 Cases in Arizona by Age Group March 7 – December 19, 2021** (Data from week ending November 28 suppressed).

Figure 2a shows transmission among all age groups is declining. However, rates among those 25 – 64 years are flattening driven by increases among those 20 – 39 years (data not shown). With *Omicron* being the dominant variant, expect cases among working age adults to sharply increase in the coming days. Changing testing patterns during Christmas and the New Year’s holidays will tend to underestimate increases in viral transmission. Hospital COVID-19 occupancy, a consistent but lagging indicator, will be less useful in the weeks ahead because of how rapidly *Omicron* transmits.



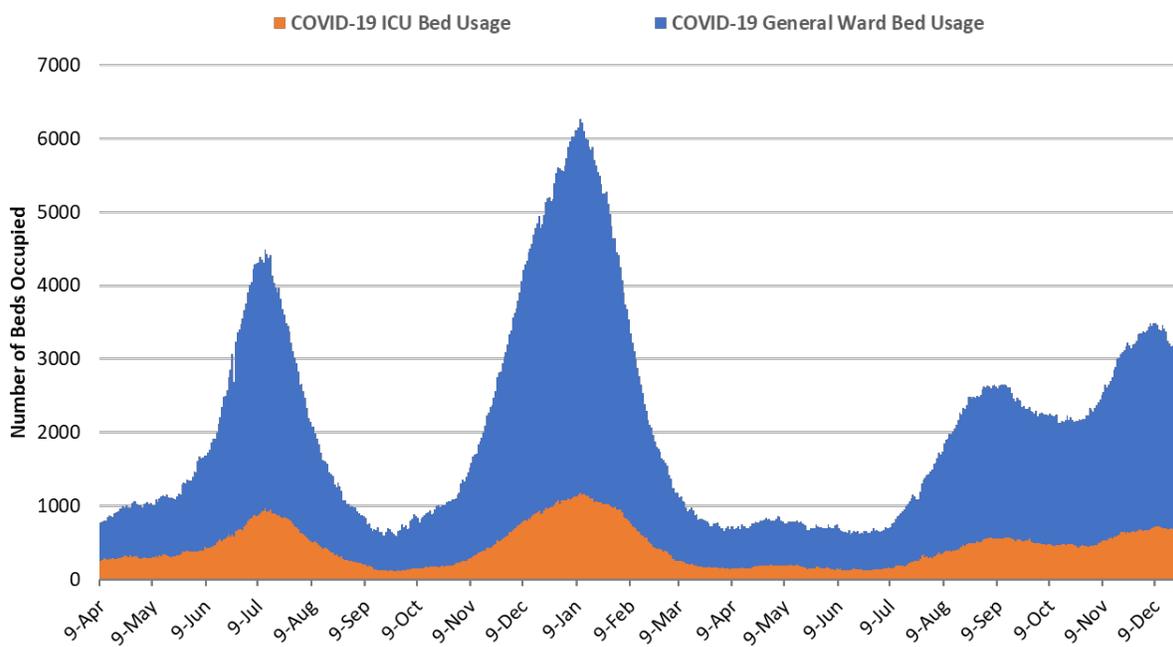
**Figure 2b. COVID-19 Cases in Arizona among Children by Age Group March 7 – December 19, 2021.** (Data from week ending November 28 suppressed).

Test positivity held steady at 27% this week. Testing remains inadequate for public health practice and many cases are going undiagnosed (Figure 3).



**Figure 3. Weekly Number of Patients Undergoing Traditional Nasopharyngeal PCR Testing and Associated Percent Positivity March 1, 2020 – December 19, 2021.**

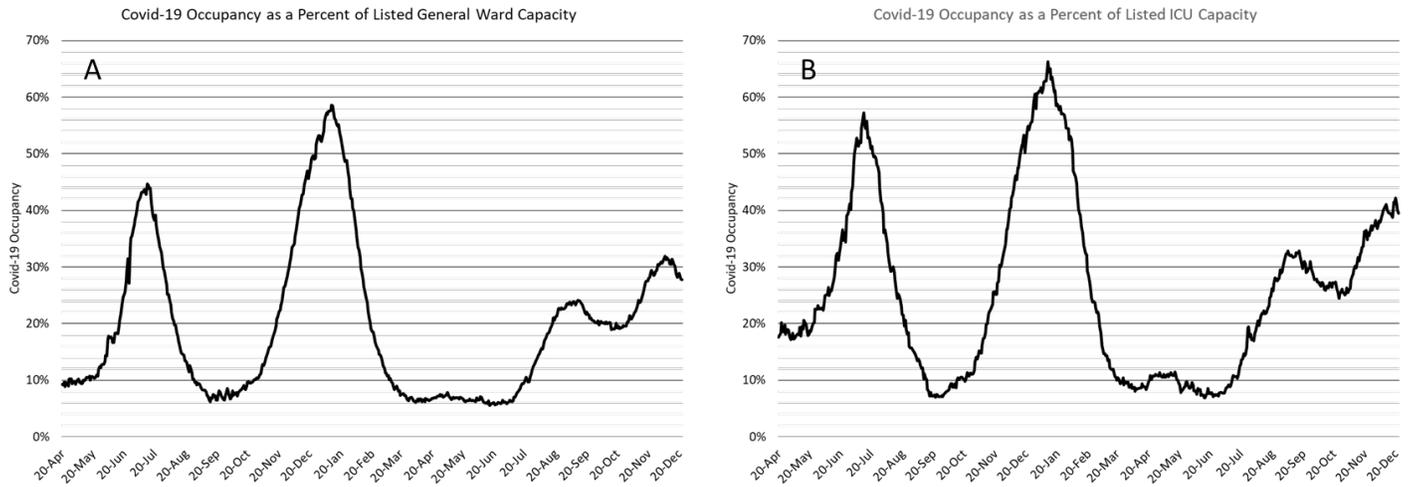
As of December 23rd, 2440 (28%) of Arizona’s 8796 general ward beds were occupied by COVID-19 patients, a 5% decrease from last week’s 2569 occupied beds (Figure 4 and Figure 5 Panel A). Another 534 (6%) beds remained available for use which is higher last week’s 418 available beds. Six-hundred fifty-nine (659, 40%) of Arizona’s 1670 ICU beds were occupied by COVID-19 patients, a 4% decrease from last week’s 684 occupied beds (Figure 4 and Figure 5 Panel B). An additional 93 (6%) ICU beds remained available for use which is higher than last week’s 83 beds. For the past week, 100 ICU beds stopped reporting or were taken out of circulation; therefore, these numbers may underestimate ICU utilization.



**Figure 4. Arizona Daily COVID-19 General Ward and ICU Census April 9, 2020 – December 23, 2021.**

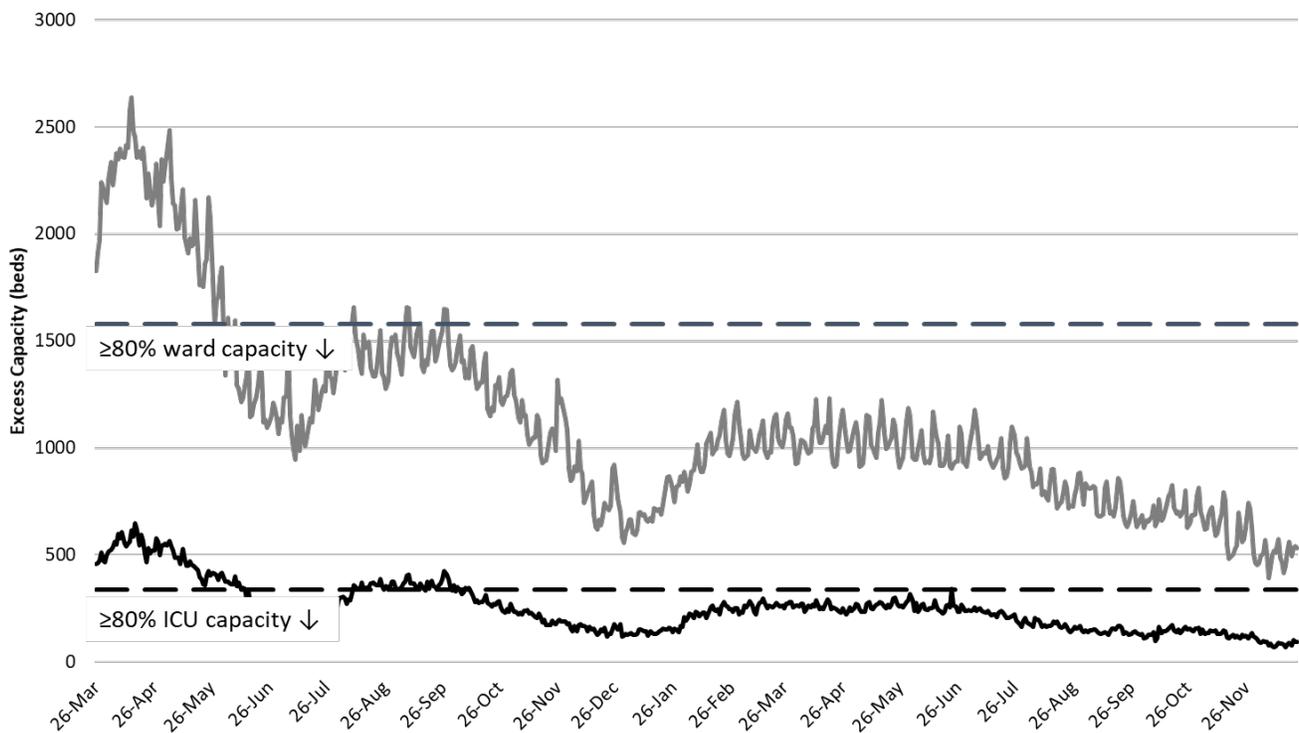
Created by Joe K. Gerald, MD, PhD (Associate Professor, Zuckerman College of Public Health, [geraldj@email.arizona.edu](mailto:geraldj@email.arizona.edu)) with assistance from Patrick Wightman, PhD from the UA Center for Population Health Sciences.

While peak occupancy will not reach prior levels, the base of the *Delta* wave is broader. **The *Delta* wave has so far seen 133 days with a combined occupancy >2000 patients** whereas the summer 2020 and winter 2021 waves saw 57 and 98 days, respectively. We have now had >3000 combined occupancy for 37 days whereas the summer 2020 and winter 2021 waves saw 35 and 78 days, respectively. With *Omicron* overtaking *Delta*, expect occupancy to remain relatively stable until mid-late January then increase into early-mid February.



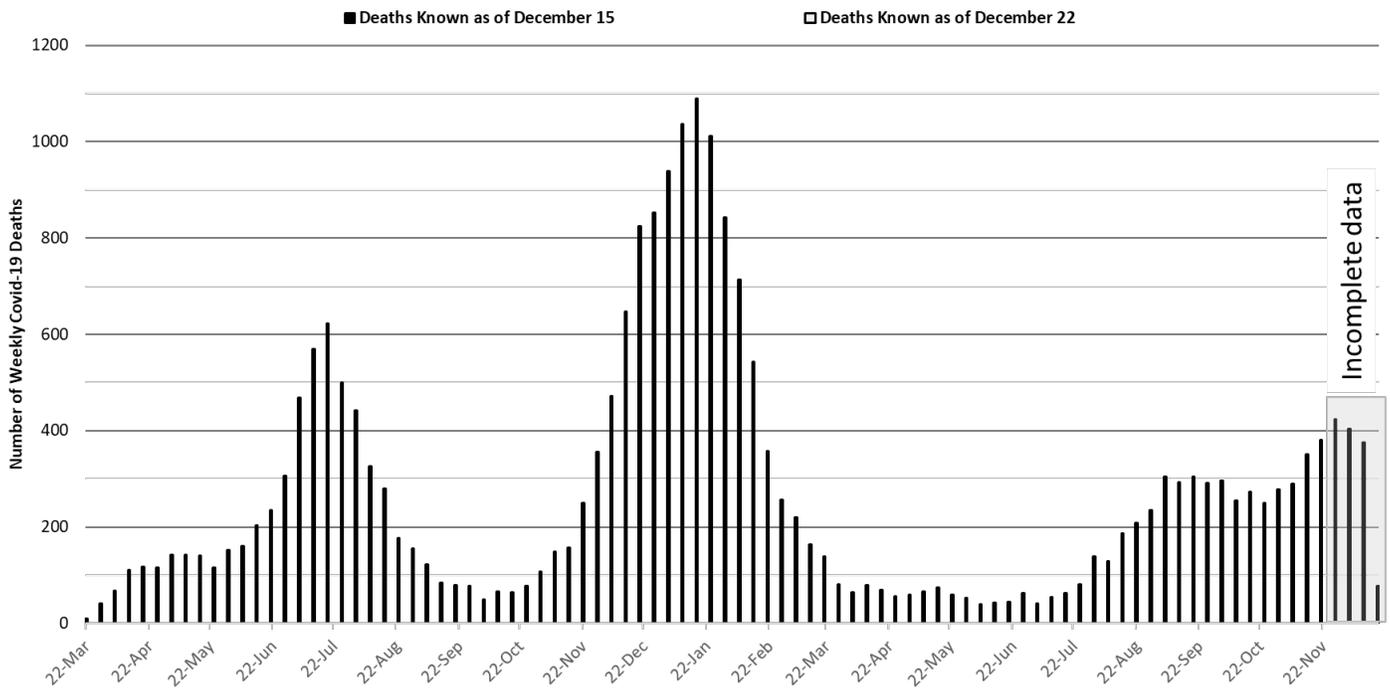
**Figure 5. COVID-19 Occupancy as a Percent of Listed General Ward (A, left) and ICU (B, right) Capacity in Arizona April 20, 2020 – December 23, 2021.**

Hospital occupancy remains far above seasonal levels. Safety margins, as measured by available beds, remain at or just above historical lows (Figure 6). Hospitals should prepare for >25% ward occupancy and >35% ICU occupancy for some time.



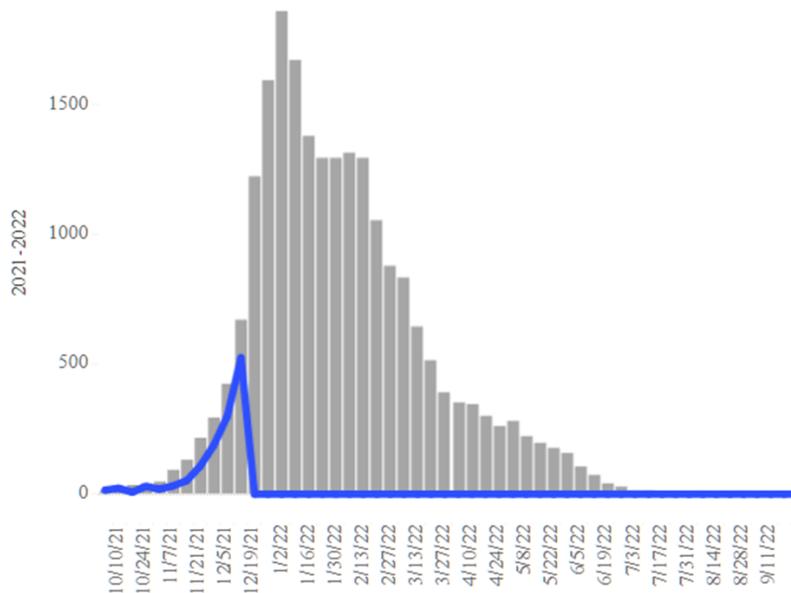
**Figure 6. Observed Excess Non-Surge General Ward and ICU Capacity in Arizona March 26, 2020 – Dec 17, 2021.**

The week ending November 28th has recorded 424 deaths and the week ending December 5<sup>th</sup> has recorded 404 deaths to date (Figure 7). At least 23913 Arizonans have lost their lives to COVID-19. However, as an [updated mortality report](#) from the Arizona Public Health Association indicates, excess deaths are considerably higher than the official COVID-19 death statistics. Therefore, considerably more Arizonans have lost their lives to COVID-19 than reflected by the ADHS Dashboard.



**Figure 7. Weekly Arizona COVID-19 Deaths March 16, 2020 – December 19, 2021.**

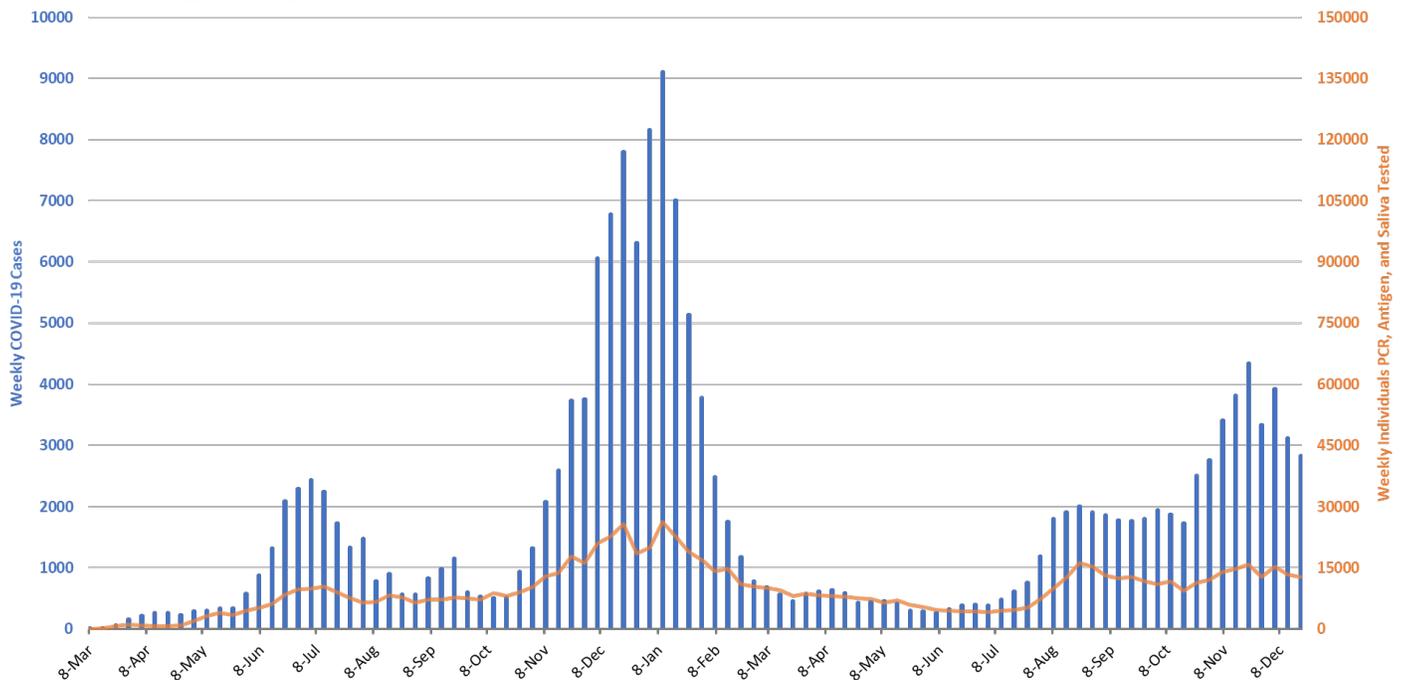
[Seasonal influenza cases in Arizona](#) (blue line) remain slightly below the 5-year historical average (grey bars, Figure 8) but even rates below historical averages could still cause a feared ‘twindemic’ in January given current levels of hospital crowding. This trend bears close observation over the next 4 – 6 weeks.



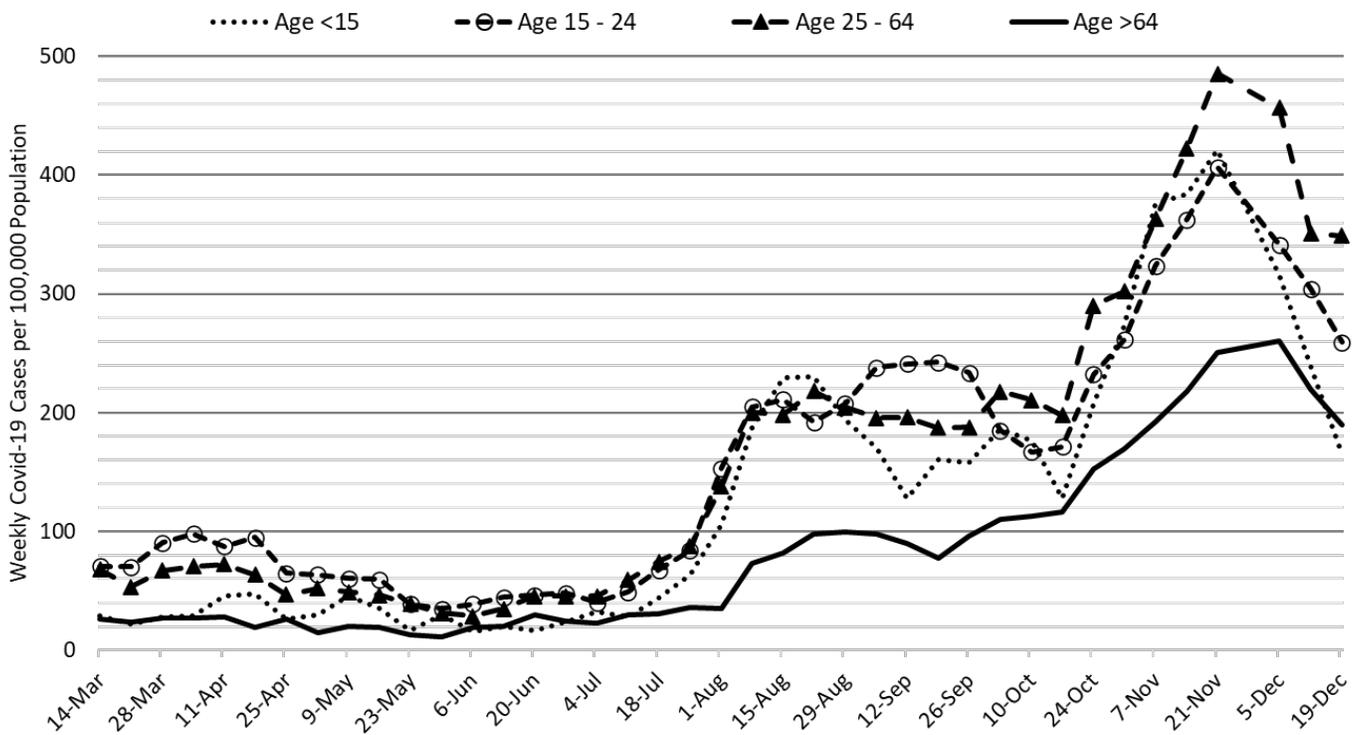
**Figure 8. Arizona Influenza Cases in 2021 (blue) versus 5-Year Historical Average (grey)**

## Pima County 2841

For the week ending December 19th, 2841 Pima County residents were diagnosed with COVID-19, a 5% decrease from the initial tally of 3002 cases last week (Figure 9). Trends across the various age groups in Figure 10 below show generally lower transmission locally.



**Figure 9. Weekly COVID-19 Cases in Pima County and Number of Individuals Undergoing COVID-19 Diagnostic Testing March 1, 2020 – December 19, 2021.**

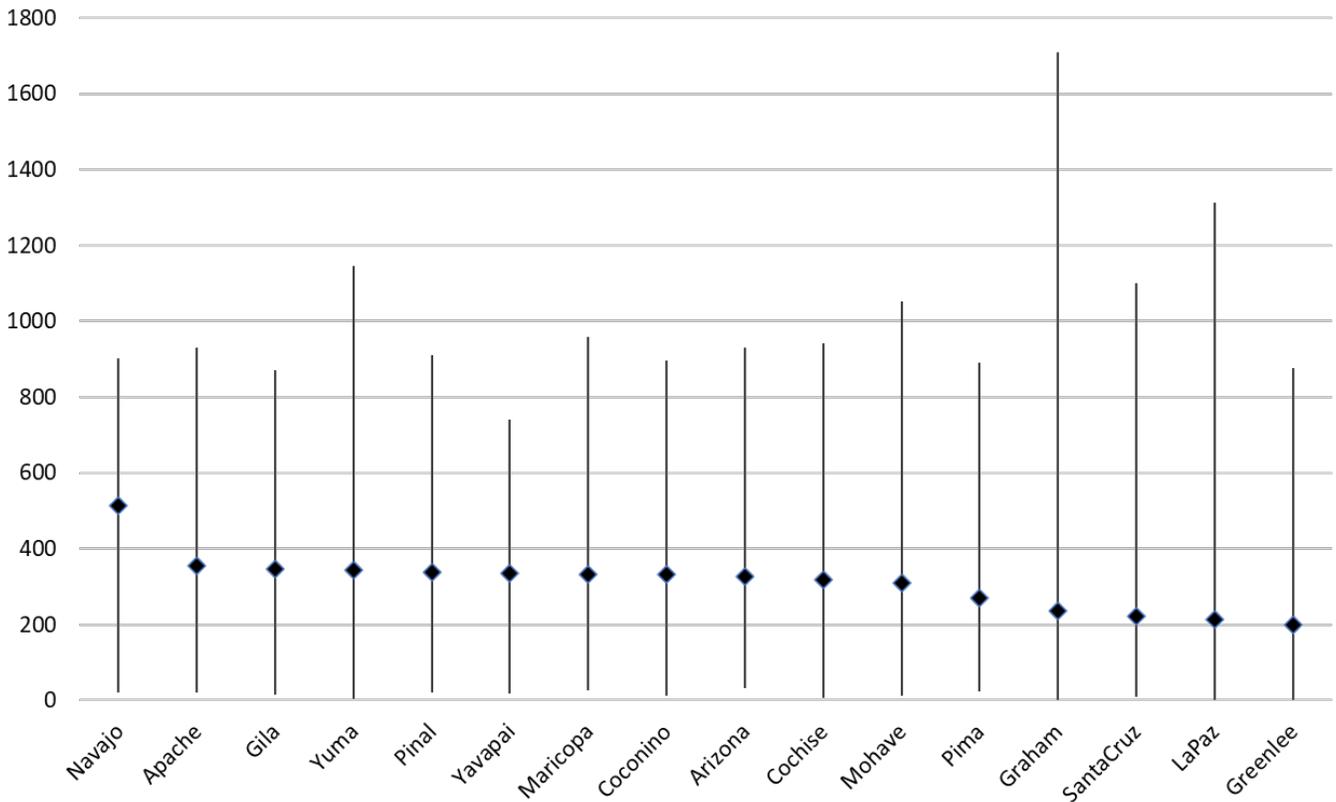


**Figure 10. COVID-19 Cases in Pima County by Age Group March 7, 2020 – December 19, 2021. (Data from week ending November 28 are suppressed).**

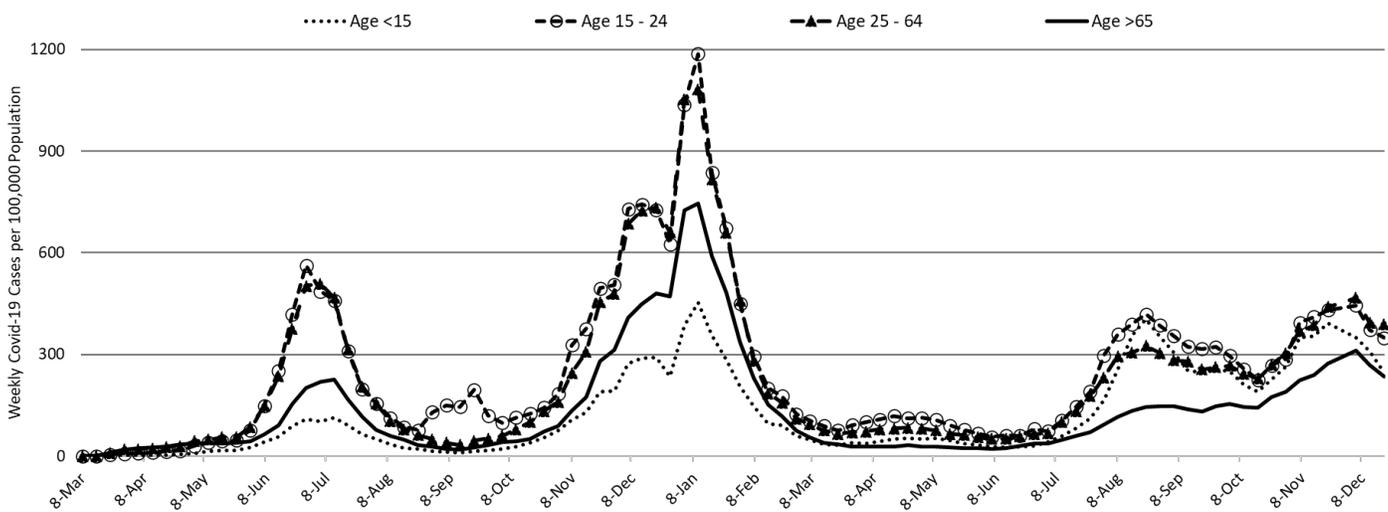
## Summary:

- Arizona continues to experience high levels of community transmission attributable to the newly dominant *Omicron* variant and to a lesser extent the *Delta* variant. Test positivity remains high reminding us that test capacity, accessibility, and/or uptake is inadequate. Given how quickly the *Omicron* variant impacted the United Kingdom and the US Northeast, Arizona is poised to experience another large wave of infections in January with increased hospitalizations lagging 10 – 14 days behind.
  - **As of December 19th, new cases were being diagnosed at a rate of 326 cases per 100K residents per week.** Increasing viral transmission among those 20 – 39 years indicates that the *Omicron* wave is imminent.
  - **Mask mandates are urgently needed at municipal and county levels to reduce transmission, blunt the worst of the *Omicron* wave, and relieve overwhelmed hospitals.** Regardless of public action, individuals should mask in indoor settings using a KN-95 or better.
- Waning vaccine immunity makes it imperative that all adults who were previously vaccinated obtain a booster, particularly those 50+ years of age.
  - **Risk factors for breakthrough hospitalization and death were recently elucidated in the *British Medical Journal*:** Down's syndrome, kidney transplantation, sickle cell disease, nursing home residents, chemotherapy, recent bone marrow or solid organ transplantation (ever), HIV/AIDS, dementia, Parkinson's disease, neurological conditions, and liver cirrhosis. <https://www.bmj.com/content/374/bmj.n2244>
  - **ADHS and county health departments should re-open mass vaccination pods for boosters given low uptake among high-risk groups.** Unfortunately, the narrow window of opportunity to mitigate/blunt the coming *Omicron* wave at the population level is rapidly closing or already passed. Nevertheless, there is time for some individuals to protect themselves and their families by obtaining third shot boosters.
- The United Kingdom continues to publish excellent weekly summaries of *Omicron*'s impact (Dec 23): [https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment\\_data/file/1043807/technical-briefing-33.pdf](https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/1043807/technical-briefing-33.pdf)
  - For those wanting to track variant data, here are links to genomic state data (<https://pathogen.tgen.org/covidseq-tracker/>) and national data (<https://covid.cdc.gov/covid-data-tracker/#variant-proportions>). S-gene Target Failure (SGTF) from PCR testing is available from the ASU Biodesign Institute: <https://biodesign.asu.edu/research/clinical-testing/critical-covid-19-trends>.
- **COVID-19 hospital occupancy is at least temporarily declining but will continue to exceed 25% of all beds in the general ward and 35% of beds in the ICU for the remainder of the year.** Access to care will continue to be restricted in the face of staff shortages in inpatient and outpatient settings.
  - January is poised to be a very difficult months for Arizona hospitals as 3 events will collide: (1) the tail of the *Delta* wave, (2), below average but still meaningful seasonal influenza, and (3) the *Omicron* wave.
- **Weekly COVID-19 deaths have now reached 400 per week and should remain near this level while cases exceed 20 – 25K per week.** So far, 23913 Arizonans have lost their lives to COVID-19.
  - As an [updated mortality report](#) from the Arizona Public Health Association indicates excess deaths are considerably higher than the official COVID-19 statistics. Considerably more Arizonans have lost their lives to COVID-19 than reflected by the ADHS Dashboard.

## Appendix



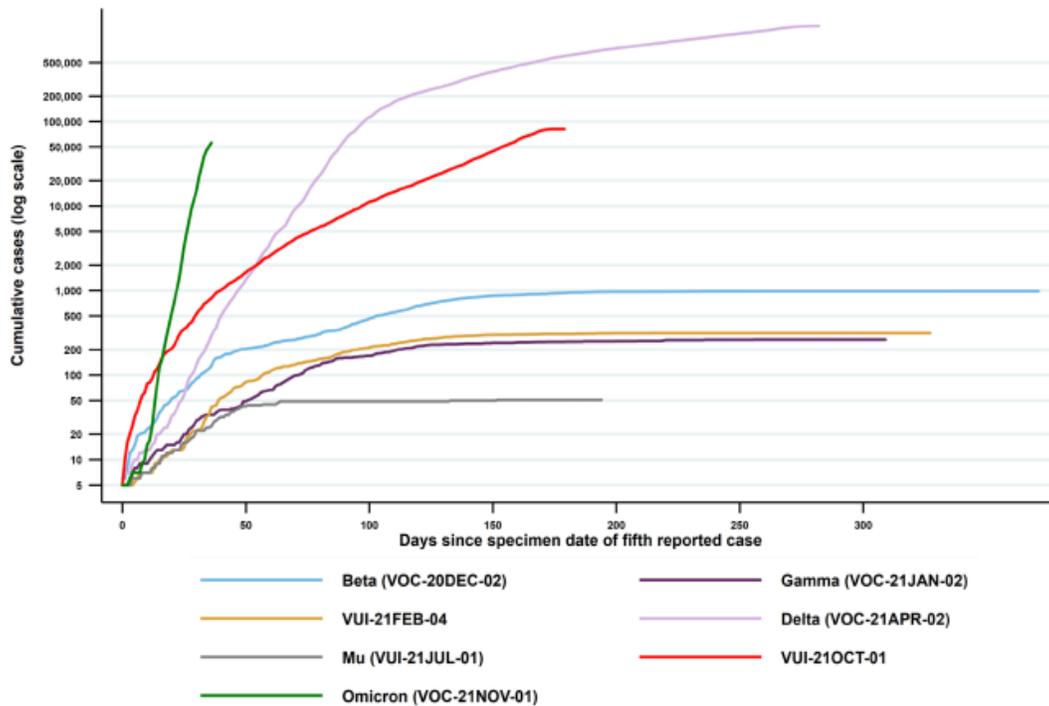
**Figure 1A. Minimum, Maximum and Current COVID-19 Cases Rates by County April 1, 2020 – December 19, 2021.**



**Figure 2A. COVID-19 Cases in Arizona by Age Group March 1, 2020 – December 19, 2021.**

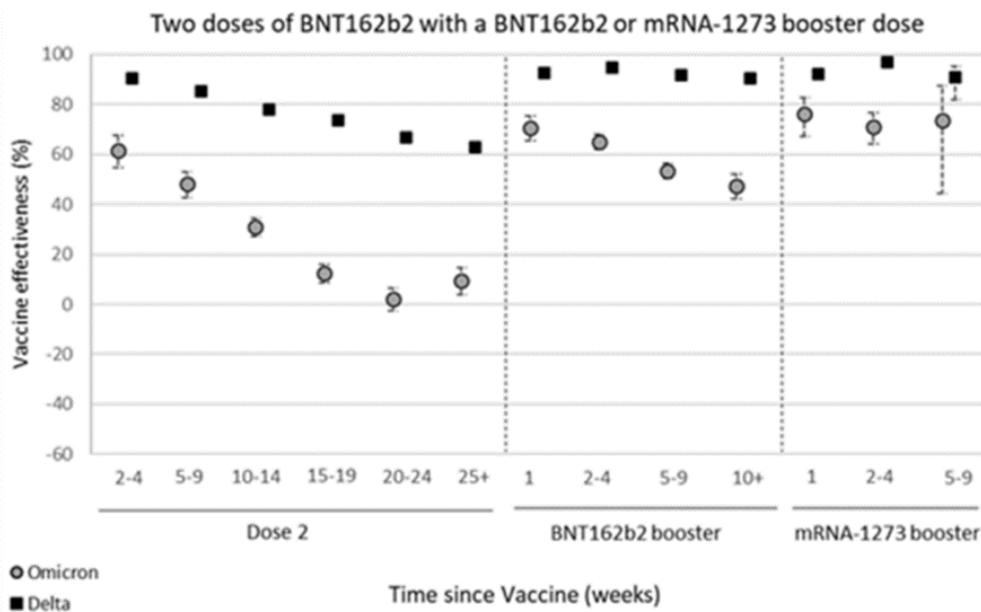
## Key Findings from UK Technical Report No. 33 (December 23, 2021).

The Omicron wave (green) is notable for its rapid acceleration, outpacing all other variants at a similar stage of existence. Expect a sharp, but time-limited, increase in cases over the coming weeks.



**Figure 3A. Cumulative Cases in England of Variants Indexed by Days Since Fifth Reported Case** (See Figure 1 UK [Technical Briefing No. 33](#), December 23, 2021).

**Pfizer** Vaccine effectiveness (2-dose sequence) provides little-to-no protection from symptomatic breakthrough infection after 30-days. Boosting with a 3<sup>rd</sup> dose, increase protection to 75% but this protection wanes quickly. Effectiveness against severe illness is expected to be more robust.



**Figure 4A. Vaccine Effectiveness against Symptomatic Disease by Period after Dose 2 and Booster** (See Figure 10 UK [Technical Briefing No. 33](#), December 23, 2021).

Created by Joe K. Gerald, MD, PhD (Associate Professor, Zuckerman College of Public Health, [geraldj@email.arizona.edu](mailto:geraldj@email.arizona.edu)) with assistance from Patrick Wightman, PhD from the UA Center for Population Health Sciences.

Compared to *Delta*, *Omicron* infection is more likely to lead to secondary transmission among close contacts within and outside of index household. Early identification and isolation of COVID-positive cases is even more important now than in the past. However, the speed of forward transmission and the lack of testing will further hamper control efforts.

**Table 6. Odds ratio of a close contact becoming a case for contacts of Omicron VOC-21NOV-01 (B.1.1.529) compared to Delta index cases, crude and adjusted**

(Case test dates 15 November to 14 December 2021, exposure dates 15 November to 11 December 2021, variant data as of 20 December 2021 and contact tracing data as of 21 December 2021)

Setting	OR (crude)	OR (adjusted*)
Household	1.40 (1.34-1.46, p<0.001)	1.42 (1.36-1.49, p<0.001)
Non-household	2.81 (2.62-3.02, p<0.001)	2.63 (2.43-2.84, p<0.001)

\* Adjusted for the age and sex of exposing case and close contact and home region of exposing case.

**Figure 5A. Vaccine Effectiveness against Symptomatic Disease by Period after Dose 2 and Booster** (See Table 6 UK [Technical Briefing No. 33](#), December 23, 2021).