

Covid-19 Disease Outbreak Outlook

Arizona State and Pima County

Updated June 12, 2020

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 recommendations should be considered in conjunction with other corroborating and conflicting data.

For the week ending Sunday, June 7th, 7286 new Covid-19 cases were reported in Arizona (Figure 1). However, this tally may undercount the actual number of new cases owing to reporting lag. For example, last week's update reported 4400 new cases for the week ending May 31st but that count has been upwardly revised to 4736 cases. This week's 8% "backfill" is smaller than last week's 28% indicating that reporting lag is improving.

While rapid expansion of testing previously made it difficult to draw meaningful conclusions about the underlying dynamics of viral transmission, that is no longer the case. Since the testing blitz ended the week of May 17, cases have increased 138% (3061 to 7286) while testing has increased by 17% (46206 to 54078). This provides compelling evidence that increasing case counts largely reflect increased community transmission.

At least 54708 individuals provided 66619 PCR samples this past week of which 11.1% were positive; 17147 individuals provided 25904 serology samples of which 4.1% were positive (Figure 2 following page). Since the week ending May 17th, the percent of PCR specimens that are positive has increased from 5.3% to 11.1% suggesting that testing capacity is not keeping pace with transmission. The percent of serology specimens that are positive has increased from 2.9% to 4.1% over the same time period indicating a growing, but still small, pool of recovered. Note: Testing results may vary slightly from the ADHS Dashboard owing to several data reporting challenges (e.g., because not all tests are electronically reported, some may be missing).

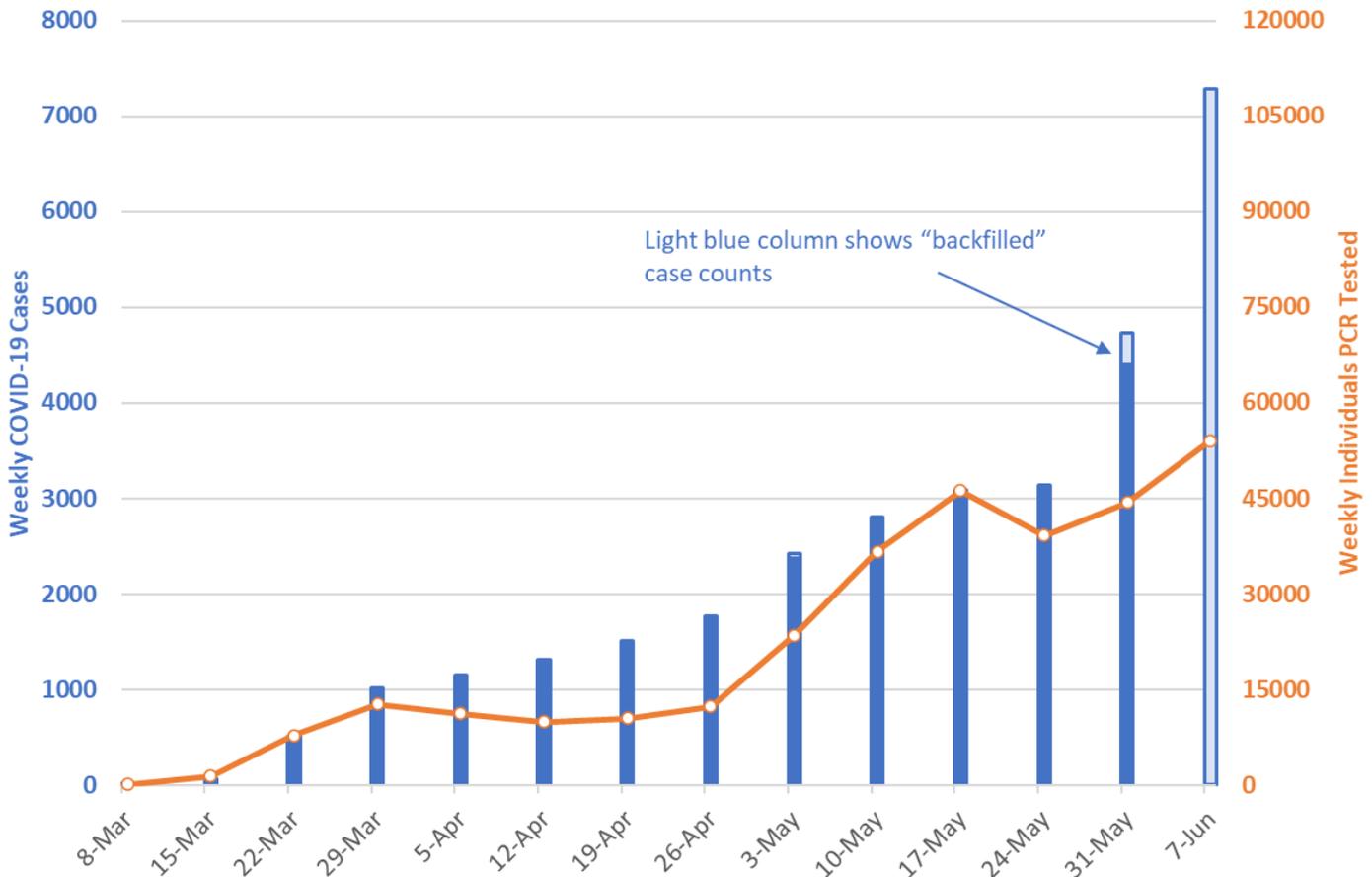


Figure 1. Newly Diagnosed Covid-19 Cases in Arizona and Number of Individuals Tested through June 7

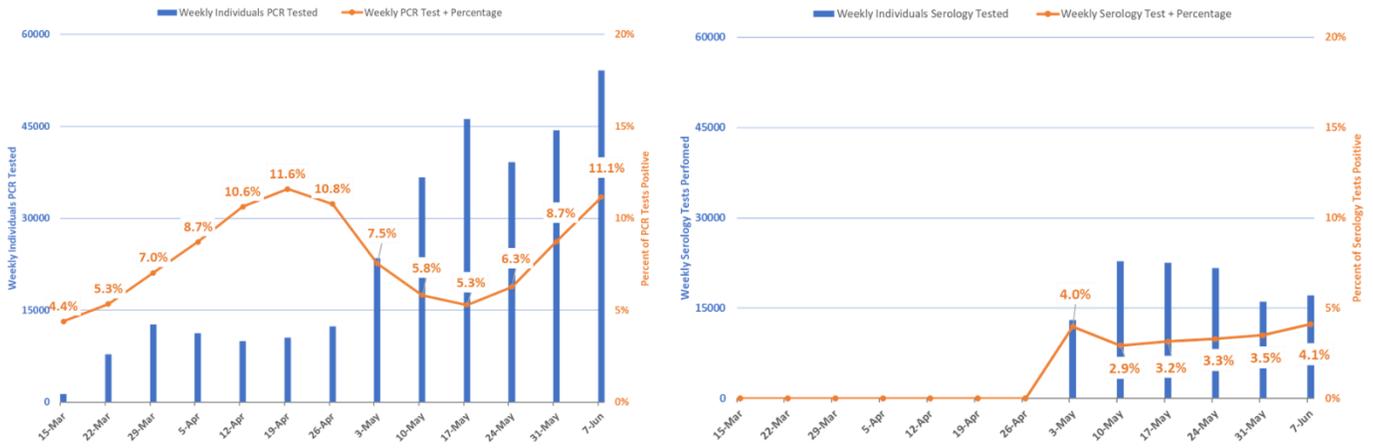


Figure 2. Patients Tested and Percent Specimens Positive for Covid-19 PCT and Serology Mar 15 - June 7.

The 7-day moving average of doubling time for cumulative Covid-19 cases has shortened from a peak of 29 days on May 25th to 18 days on June 7th (Figure 3). The 7-day moving average of doubling time for cumulative deaths has continued to lengthen reaching a high-water mark of 45 days on May 31st. A longer offset (e.g., May 31 vs. June 7) was chosen because of longer reporting delays for deaths. With a current 14-day interval between diagnosis and death, changes in mortality trends are not expected before the week ending June 12th.

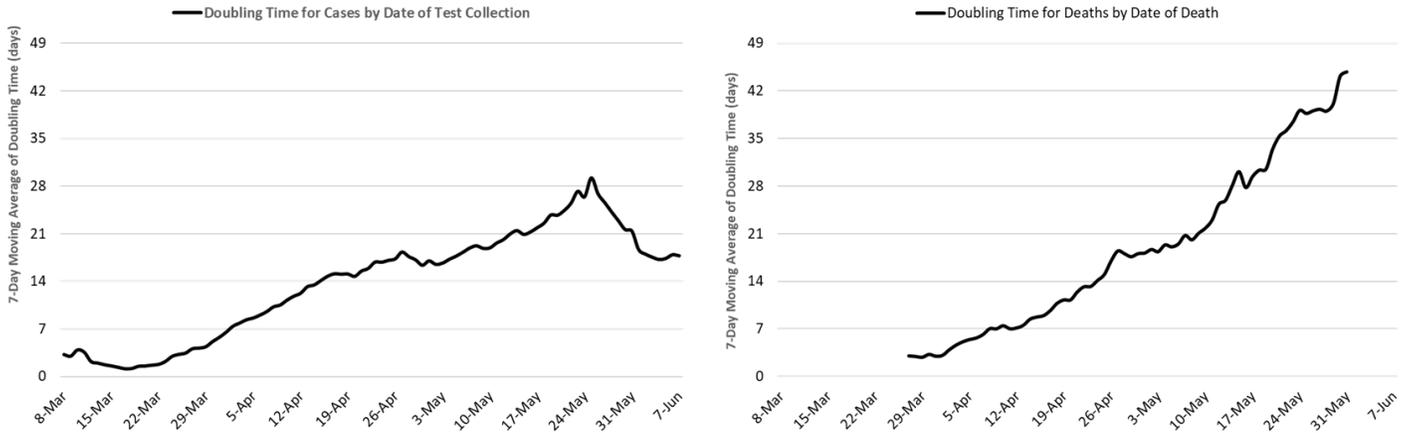


Figure 3. 7-Day Moving Average of Doubling Time of Cumulative Cases and Deaths through June 12.

From a May 22 (plateau) to present (June 12), Covid-19 total hospitalization has increased 70% from 1093 to 1859 occupied beds (Figure 4). Increases in Covid-19 general ward occupancy were greater than increases in ICU occupancy, 80% and 45%, respectively. Because of a decline in non-Covid hospitalizations, the all-cause hospital census has only increased 9% from 7173 to 7785 occupied beds (not shown). Continued increases in case counts is expected to drive additional hospitalizations for the foreseeable future. We will there be enough capacity to meet this demand?

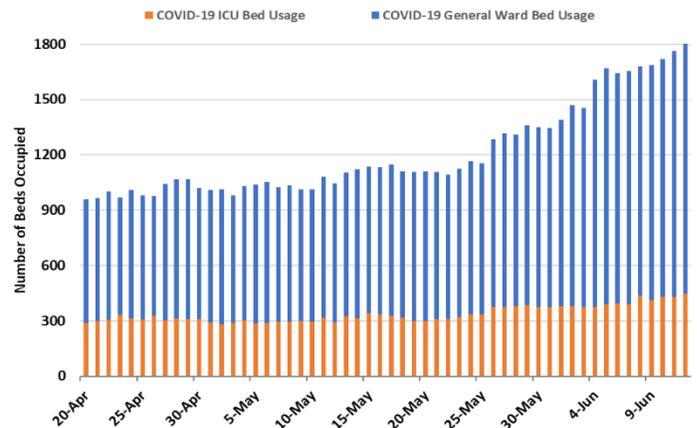


Figure 4. Arizona Daily Covid-19 General Ward and ICU Census April 20 – June 12.

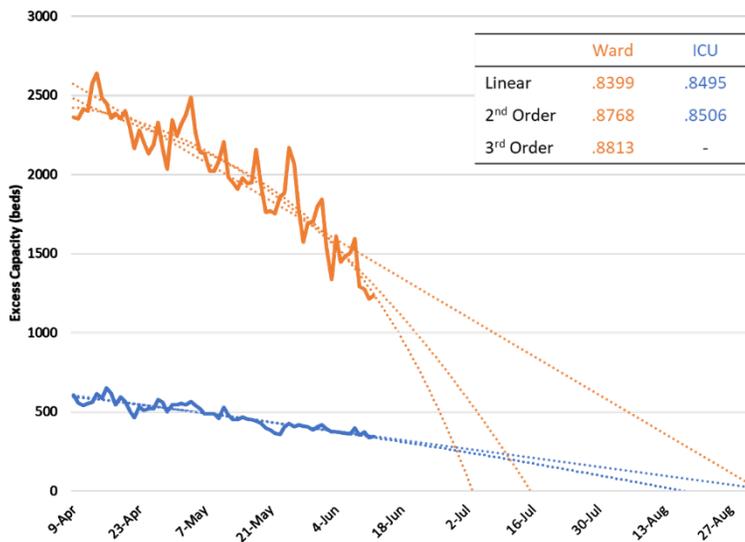


Figure 5. Observed and Projected Excess Non-Surge General Ward and ICU Capacity April 20 – August 31.

As of June 12, 1412 (18.3%) of Arizona’s 7705 general ward beds were occupied by patients with suspected or confirmed Covid-19 infection, a 10% increase from last week. An additional 1237 (16.1%) beds remain available. This is lower than the 1,447 available last week. Bear in mind, the current doubling time of cases is a bit longer than 2 weeks. If past correlations between cases and severe illness hold, general ward hospitalization could double within the next 3 weeks threatening non-surge capacity.

Similarly, 447 (26.9%) of Arizona’s 1664 ICU beds were occupied for Covid-19 care, a 14% increase from last week. An additional 347 (20.9%) beds remain available which is slightly lower than the 369 available last week.

Note: ADHS announced an [error in general ward and ICU bed reporting](#) where surge beds

were incorrectly reported. Surge capacity is no longer reflected on the ADHS Dashboard metrics. Overall, this error did not fundamentally change interpretation of hospital capacity.

A simplistic projection of non-surge general ward and ICU capacity suggests Arizona could reach general ward capacity sometime between in July or August assuming no mitigation efforts are instituted, and past trends continue uninterrupted (Figure 5). While ICU capacity seems more abundant, trends in general ward occupancy may not have spilled over into ICU occupancy yet. Because mitigation takes 2 – 3 weeks to work, preventing a mid-July general ward overflow (assuming these trends are accurate) requires action as early as late June.

The possibility that Arizona might exceed its ICU capacity is supported by [CovidActNow](#) which shows markedly rising ICU utilization through June (Figure 6). A similar, but less dire projection is made by the [Institute of Health Metrics and Evaluation](#) (IHME, Figure 7 following page).

As mentioned in the June 5 Update, local health systems including Banner Health have already [sounded an alarm regarding capacity](#). I can also anecdotally note that ICU occupancy in Tucson has reached or exceeded the maximum levels during the outbreak’s first phase. When comparing ADHS and hospital reports, the latter’s warnings should take precedence.

Furthermore, focusing on “hard” capacity (e.g, ICU beds and ventilators) overlooks equally important “soft” factors that are harder to measure. Once “normal” operating capacity is exceeded, patients will be admitted to jury-rigged settings, treated with second-line agents owing to shortages of critical resources, and cared for by nurses and physicians recruited from non-critical specialties. This is not to disparage the heroic measures these facilities and caregivers will make to ensure quality care but rather to caution against an overly idealistic view of the equivalence of surge care. Such conditions are also likely to exact a significant psychological toll on patients and caregivers.

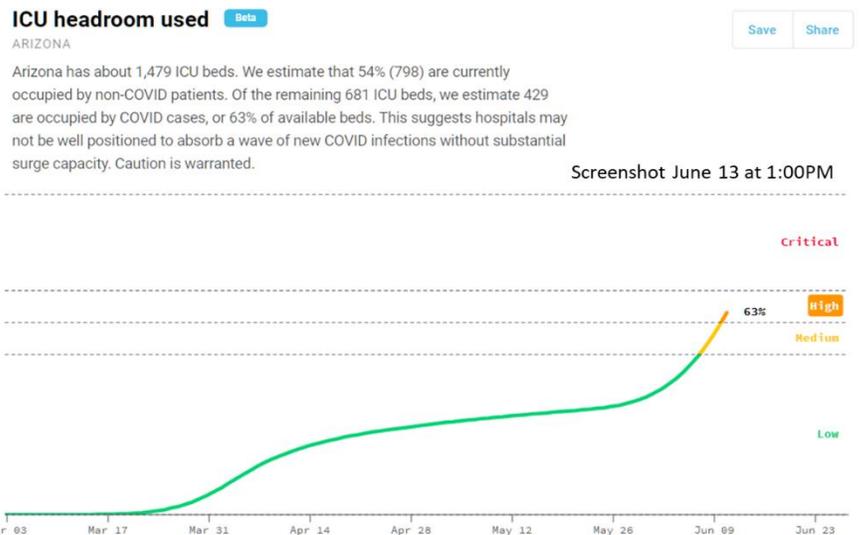


Figure 6. Projected ICU Utilization through June 30 by CovidActNow.

Hospital resource use ⓘ

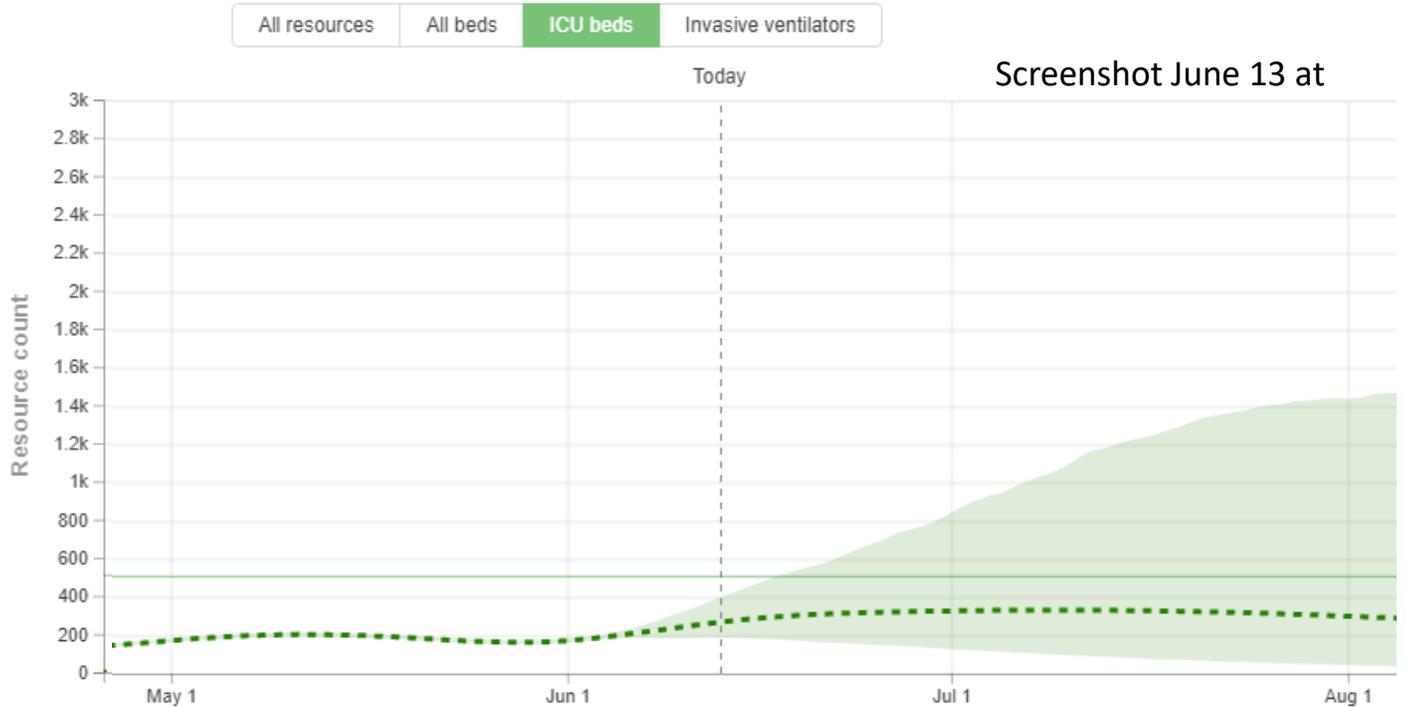


Figure 7. Projected ICU Utilization through August 1 by the Institute of Health Metrics and Evaluation.

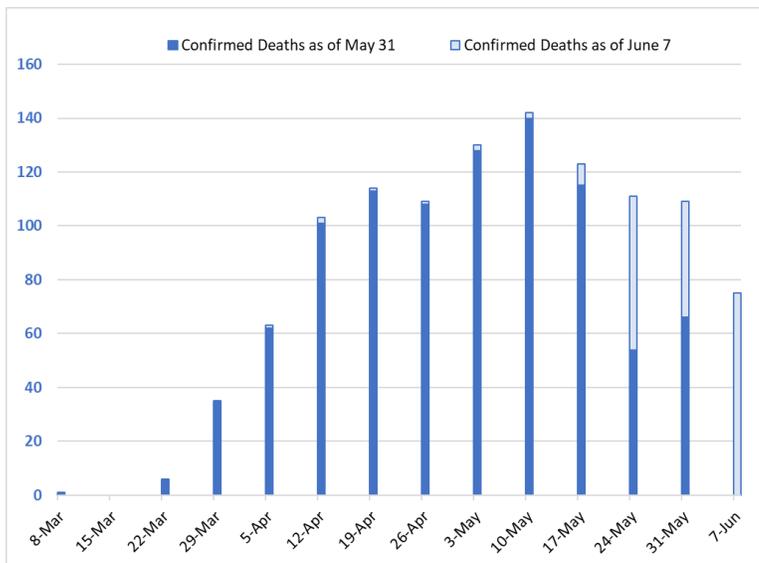


Figure 8. Weekly Arizona Covid-19 Deaths March 1 – May June 7 by Date of Death

The week ending May 10th continues to be the week with the largest number of reported deaths at 142 deaths (Figure 8). To date, the doubling time for cumulative deaths, as measured by the date of death, continues to lengthen as illustrated previously in Figure 3 (page 2). When reporting lag and the expected 14-day interval between diagnosis and death is accounted for, the recent increases in case counts would not be expected to impact mortality trends for another week or more.

The Centers for Disease Control and Prevention (CDC) [aggregates various models](#) to provide a consensus view of the trajectory of new Covid-19 deaths nationally and in Arizona (Figure 9). These models predict cumulative deaths will continue to increase at roughly the same trajectory for the next 3 weeks with a possible increase in late June.

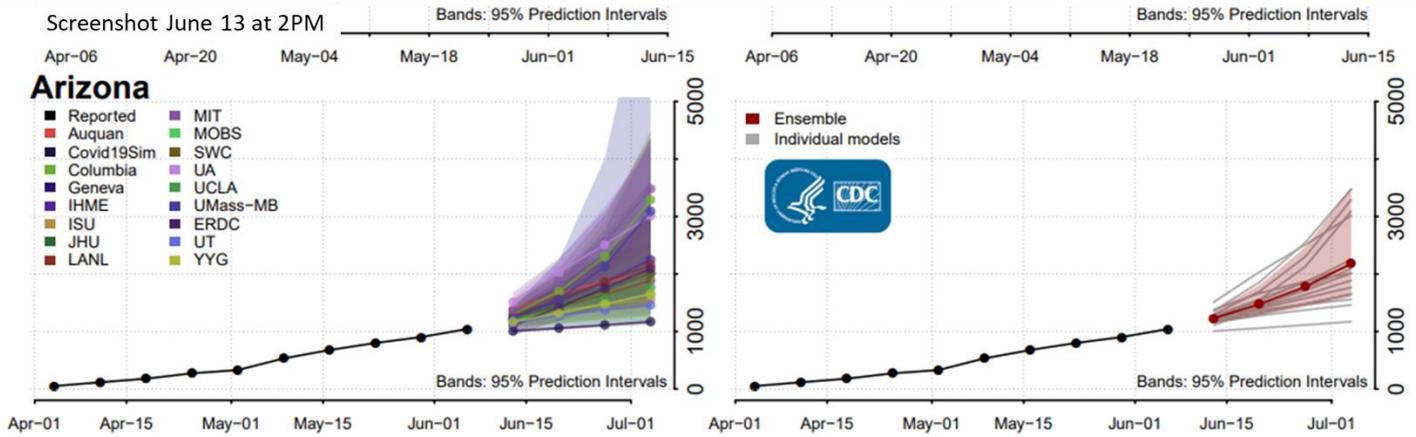


Figure 9. Centers for Disease Control and Prevention (CDC) Ensemble Forecast of Covid-19 Deaths in Arizona through June 22

Pima County Outlook

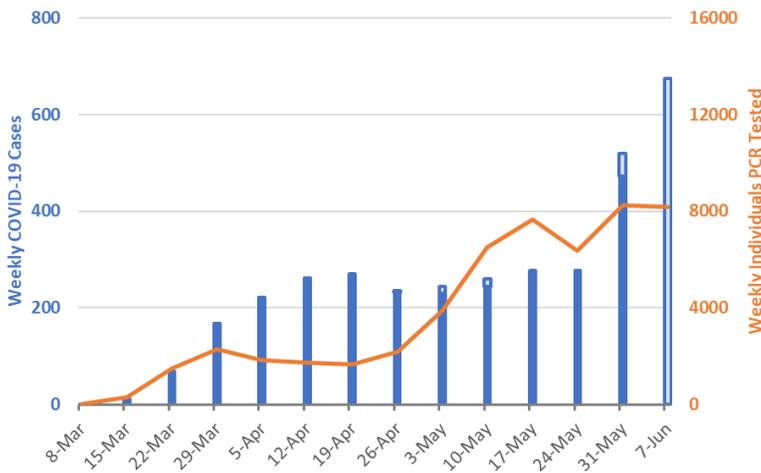


Figure 10. Newly Diagnosed COVID-19 Cases in Pima County and Individuals Tested through June 7

For the week ending Sunday, June 7, weekly case counts again increased in Pima County, from 520 the prior week to 674 cases this week, a 30% increase (Figure 10). Because testing capacity has not changed for the past 3 weeks, these data suggest that the pace of viral spread is increasing after a period of decline or plateauing in mid-to-late April.

Summary:

- Reported cases and hospitalizations but not deaths, have markedly diverged from previous trends. There is now compelling evidence (modelling and empiric) of rapidly increasing community transmission. While these trends differ by geographic region, Covid-19 is widespread (see Appendix for county data).
 - Absolute levels of community-driven viral transmission remain high as evidenced by substantial numbers of newly reported cases.
 - For most locales, additional government-mandated social distancing restrictions and/or mask-wearing are urgently needed to reduce the pace of community transmission.

- Covid-related hospital utilization continues to increase with excess non-surge capacity declining. While adequate capacity now exists, current trends suggest excess capacity could be depleted by early-to-mid July.
 - Some hospitals have already warned that they are already nearing capacity including ICU care; therefore, local conditions will provide a better indicated of capacity than state-wide trends.
- The number of Covid-19 tests performed is not keeping pace with rising case counts as evidenced by increasing PCR test positive rates. Positivity rates remain >3% indicating capacity is likely inadequate to meet clinical and public health demands. Test reporting lags appear to be improving.

Governor Ducey's June 11 Covid-19 Press Briefing

On June 11, Governor Ducey [laid out his arguments](#) against additional government-mandated Covid-19 mitigation efforts including social distancing and mask wearing. He argued that increasing case counts are attributable to increased testing not community transmission. He substantiated this view with data showing declining syndromic surveillance reports of Covid-like illnesses in our emergency departments and hospitals and relatively stable trends in overall general ward and ICU occupancy.

He also argues that additional surge capacity is available should Covid-related hospitalization increase; and, that this additional surge capacity will be equivalent to that currently available. Specifically, he said, "Arizona hospitals are prepared.... [There is] a lot of misinformation out there.... Get the facts straight...[we want to] assure the public of available bed capacity...to continue to serve people of Arizona.... [Hospitals are] well-prepared to manage an increase in volume."

These view sharply contrast with those detailed here and in the media (see Arizona 360 [Episode 322](#)). Our disagreement boils down to the underlying causes of the recent increase in Covid-19 diagnoses and whether these newly diagnosed cases threaten future hospital capacity. The Governor mostly attributes these changes to increased testing and believes sufficient capacity is available. Conversely, I argue that increases are attributable to faster community transmission and that enough of these cases will be severe enough to strain existing capacity.

Furthermore, he argues that surge care will be equivalent to current care which I also disagree with to a degree. Even if it were true, it ignores the "awfulness" of allowing the unmitigated spread of a highly contagious, potentially lethal virus. I disagree with Dr. Cara Crist's assertion that, "We are not going to be able to stop the spread and so we cannot stop living as well." The State's current approach demonstrates a callous and unreasoned indifference to Arizonans' well-being. The Governor's plan, "to continue our gradual and phased-in re-opening...[balancing] public health with public safety," is anything but balanced.

We can and should be doing more. At minimum, mask-wearing in public spaces should be mandatory. While the evidence is largely observational, the cost and inconvenience of mask wearing are outweighed by its potential benefits. Not requiring mask wearing in public risks the safety of our friends, acquaintances, neighbors, co-workers, and customers. Mask-wearing alone might be sufficient to achieve most of our public health goals. However, if this current surge is not quickly addressed, additional short-term government social distancing restrictions may be needed to mitigate its worst consequences.

In time, the correct approach will be revealed. I hope I will be proven wrong. Nevertheless, the pace of change means it is now is time for Arizonans to decide before it is too late to act. I have laid out the data and the arguments to help you make an informed decision. If you agree, call your local, state and federal representatives and make your voice known.

Next update scheduled for Jun 19.

County data on following page.

Arizona Counties Outlook

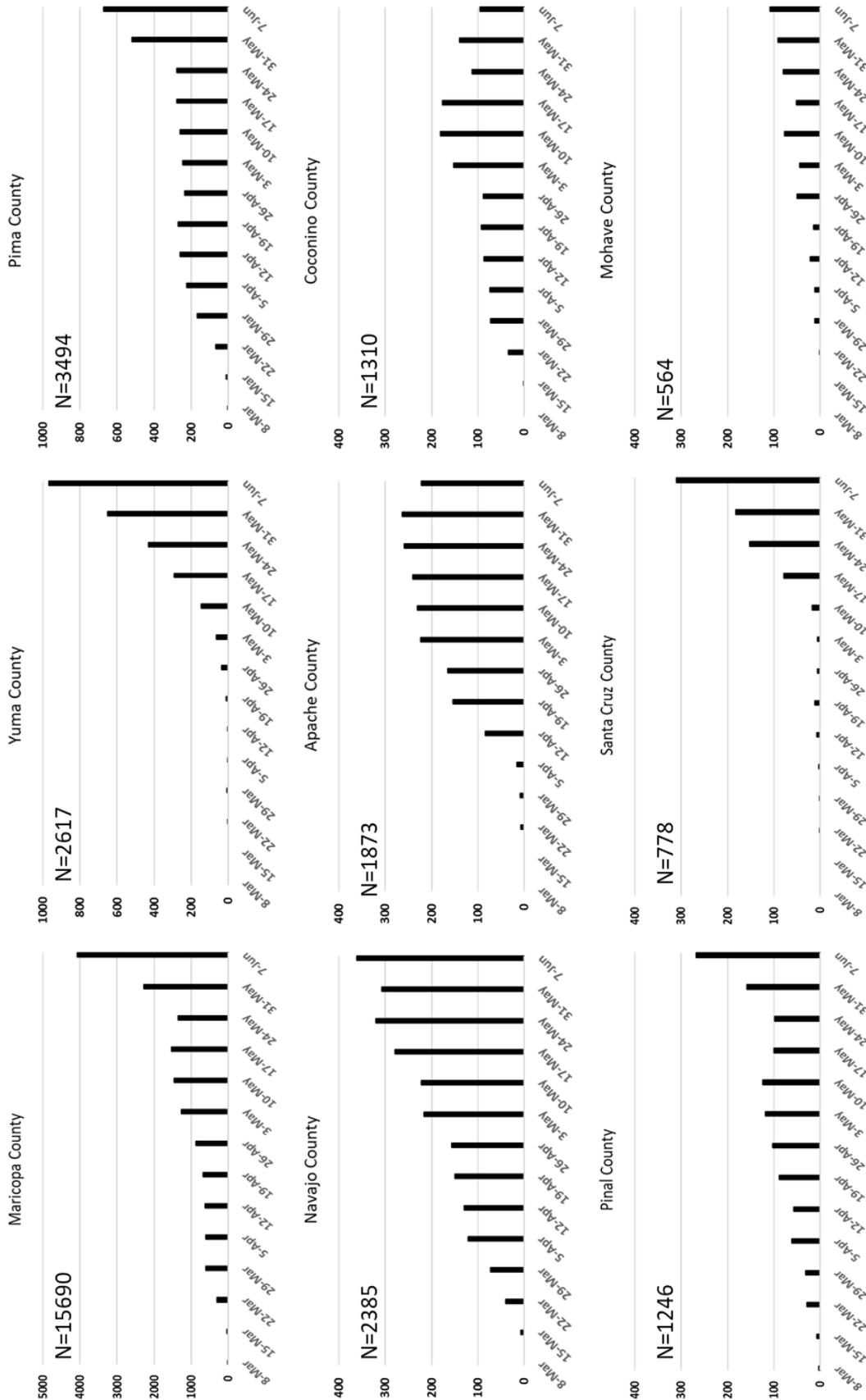


Figure 10. Weekly Covid-19 Case Counts across Arizona Counties with more than 360 Cases

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