

Covid-19 Disease Outbreak Outlook

Arizona State and Pima County

Updated July 10, 2020

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For the week ending July 5th, 20123 new Covid-19 cases were reported in Arizona (Figure 1). However, this tally likely undercounts new cases owing to the reappearance of a large testing lag. For example, last week's tally of 22388 new cases has been revised to 27555 cases this week, a 23% upward revision. Even with this backfill, last week's count was "only" 32% higher than last week's count bringing an end to a 4-week streak of 60% week-over-week average increases. Uncertainty regarding this week's testing lag makes it difficult to reliably assess the pace of viral transmission and our efforts to slow it.

Given the reporting lag, it is unclear how PCR testing capacity changed this past week; however, the percent of patients testing positive continues to increase from a low of 4.9% in mid-May to a new high of 23.4% this past week (Figure 2 following page). Likewise, the number of patients undergoing serology testing this past week is uncertain but the percent of patients testing positive increased to 5.5%. Because serology testing is not capturing a representative sample of Arizonans, these test positive results are difficult to interpret except that there is a small, but growing pool of recovered individuals. In a worrisome development, [anecdotal reports](#) of reinfection following recovering are being reported raising questions about the viability of herd immunity.

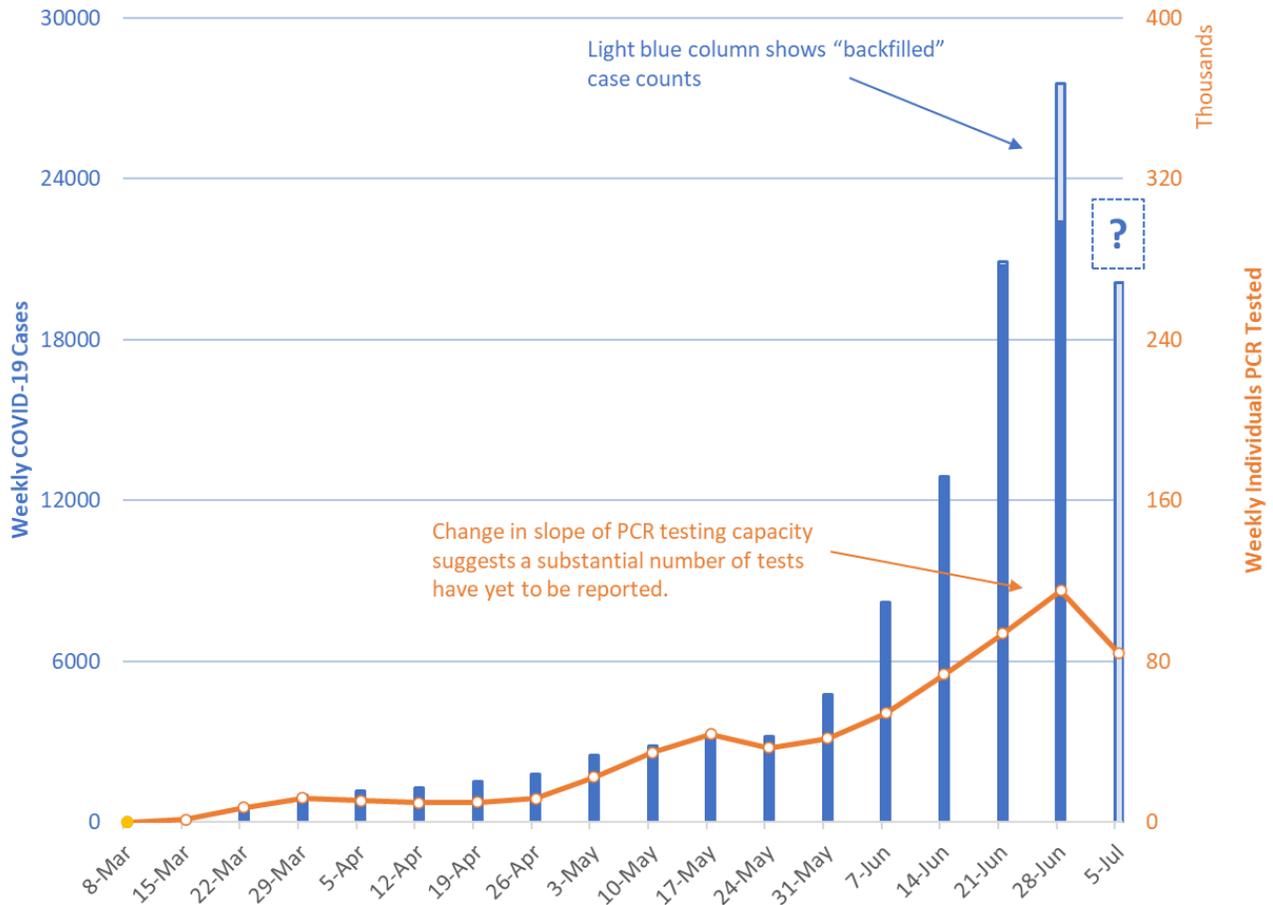


Figure 1. Newly Diagnosed Covid-19 Cases in Arizona and Number of Individuals Undergoing PCR Testing March 1 through July 5.

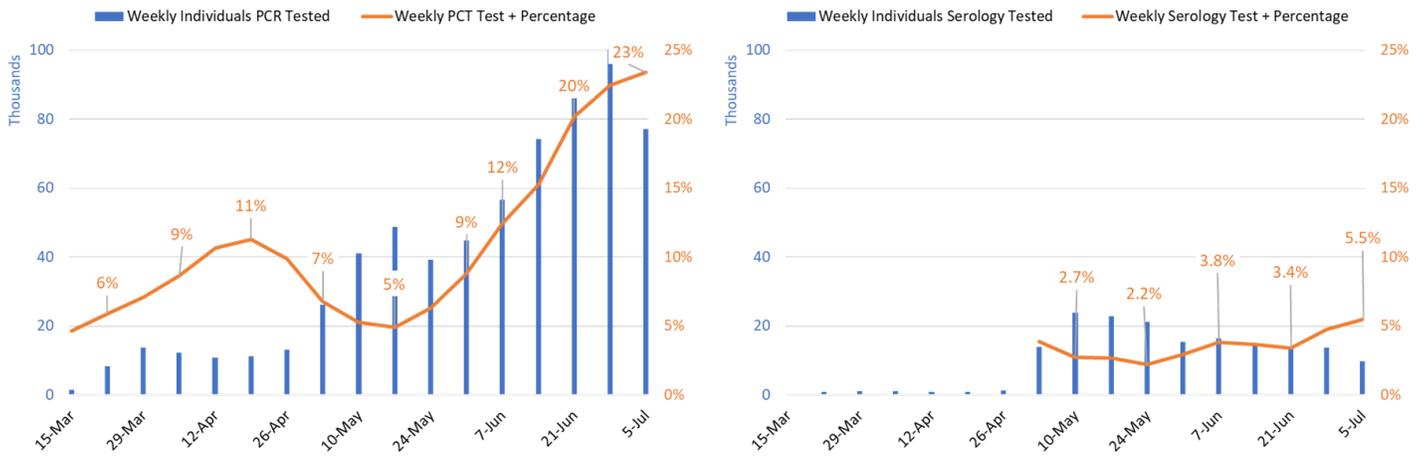


Figure 2. Weekly Number Patients Tested and Percent of Individuals with Positive Covid-19 PCR and Serology Results March 8 - July 5

The 7-day moving average of doubling time for cumulative Covid-19 cases shortened from a peak of 29 days on May 25th to a trough of 12 days on June 21st (Figure 3). As of June 28th, it was a bit longer at 14 days. Because testing lag artificially lengthens doubling time, I am not displaying new case data through July 5th as I normally would. The doubling time for cumulative deaths has shortened from a high-water mark of 42 days on June 5th to a trough of 34 days on June 16th. As of June 28th, it was a bit longer at 41 days. Despite the large amount of backfilled data this week, doubling time for new cases does still seem to be lengthening; however, the change is more modest than illustrated last week.

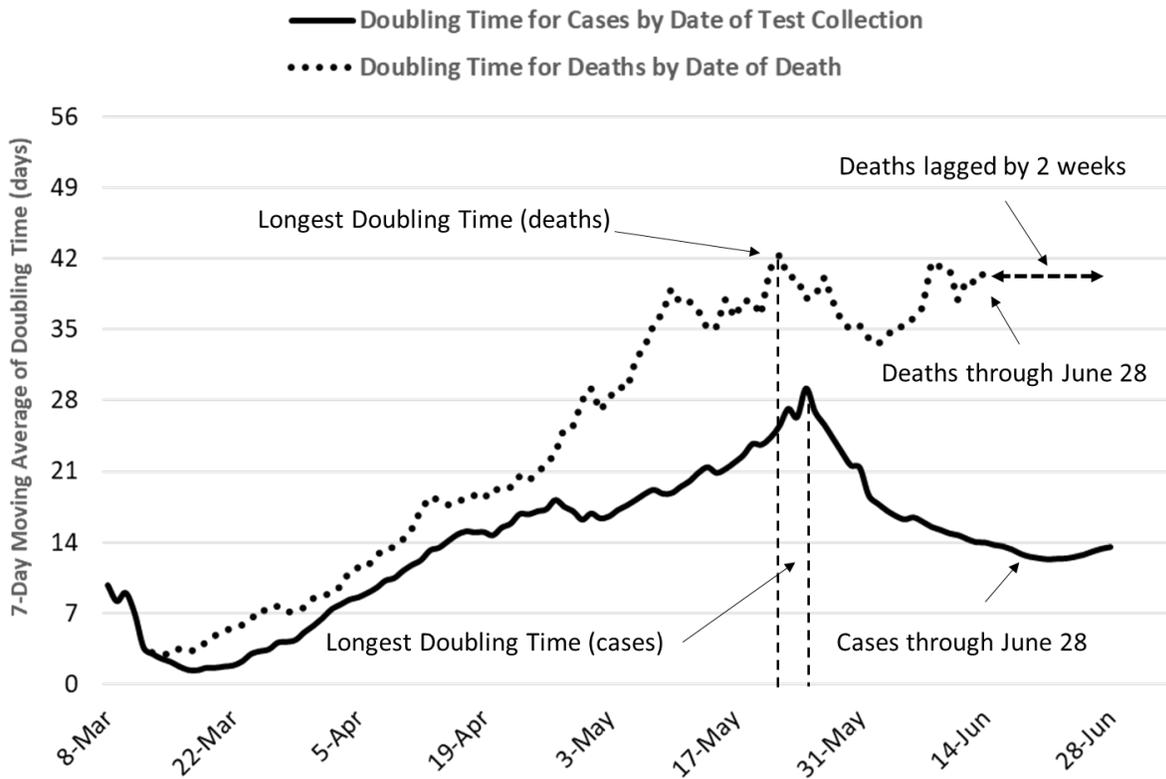


Figure 3. 7-Day Moving Average of Doubling Time of Cumulative Cases through June 28 Superimposed on Lagged (2-week) Doubling Time of Cumulative Deaths through June 28.

From a May 22 plateau, total Covid-19 hospitalization has increased 301% from 1093 to 4384 occupied beds (Figure 4). Increases in general ward occupancy have outpaced ICU occupancy, 345% versus 191%, respectively. Because of a decline in non-Covid hospitalizations, all-cause occupancy has only increased 20% from 7173 to 8581 occupied beds (not shown). Continued increases in new cases are expected to drive additional hospitalizations for the near future.

As of July 10, 3485 (44%) of Arizona's 7971 general ward beds were occupied by patients with suspected or confirmed Covid-19 infection, a 16% increase from last week. An additional 946 (12%) beds remain available which is lower than last week's 1122 beds. About 300 general ward beds were added to Arizona's total capacity on July 6th.

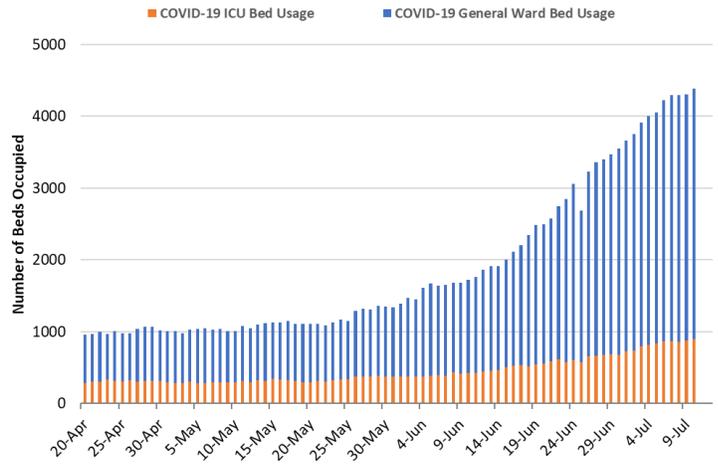


Figure 4. Arizona Daily Covid-19 General Ward and ICU Census April 20 – July 10.

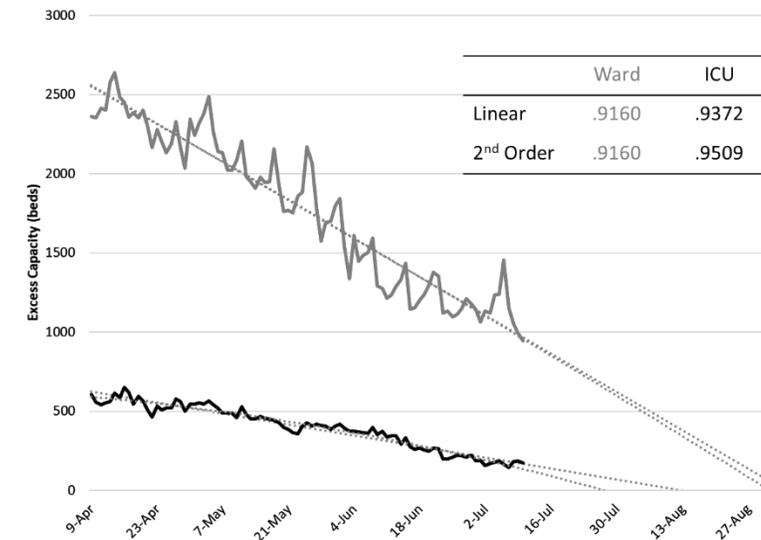


Figure 5. Observed and Projected Excess Non-Surge General Ward and ICU Capacity April 20 – August 31.

Hospital capacity is difficult to project because it can change in response to clinical efforts to conserve capacity. For example, patients can be discharged from the ED or hospital with greater severity of illness or elective procedures could be postponed or shifted to outpatient facilities. On June 29th, [ADHS allowed hospitals to implement](#) crisis standards of care making these changes a bit easier to implement.

Of concern, June represents the low-water mark for hospitalizations in Arizona (Figure 6). In large measure, Arizona has been able to withstand the most recent surge in cases because it coincided with this annual reduction. However, this trend is now expected to reverse with a greater number of non-Covid hospitalizations expected through January.

Similarly, 899 (52%) of Arizona's 1730 ICU beds were occupied for Covid-19 care, a 13% increase from last week. An additional 174 (10%) beds remain available which is about the same as the 171 beds available last week. About 50 ICU beds were added to Arizona's total capacity on July 10th.

Simplistic projections of non-surge general ward and ICU capacity suggest Arizona could reach listed ward capacity by late August (Figure 5). This projection is about two weeks later than estimated last week and was impacted by recently added capacity.

While the safety margin in ward beds is being better preserved, ICU capacity is now under greater strain. If current trends persist, excess ICU capacity could be exhausted by late July or early August.

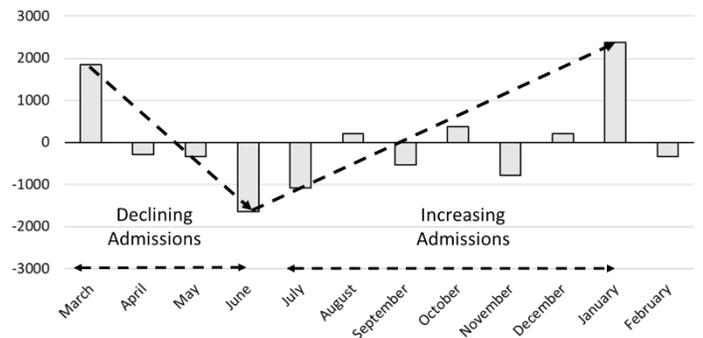


Figure 6. Number of Monthly Hospital Admissions Above or Below the Annual Average 2014 - 2019.

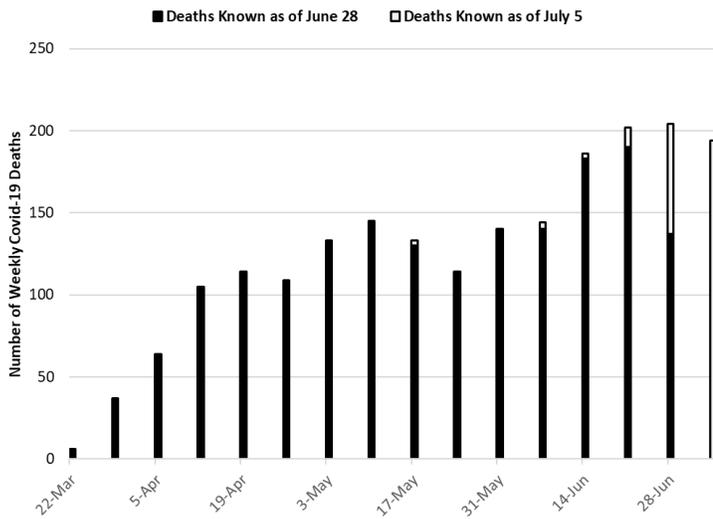


Figure 7. Weekly Arizona Covid-19 Deaths March 1 – July 5 by Date of Death

With 204 deaths reported to date, the week ending June 28th is now the week with the largest number of Covid-19 deaths eclipsing the 202 deaths the week ending June 21st (Figure 7). This increase is consistent with the recent increases in new cases. Given that case counts are still increasing, a larger number of deaths in the coming weeks is expected.

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. These models also predict that cumulative deaths will continue to increase at roughly the same trajectory for the next 3 weeks.

Pima County Outlook

For the week ending July 5, there were 1732 newly diagnosed Pima County residents. Like state-wide figures, this count likely underestimates the number of diagnosed cases owing to the reemergence of a sizable testing lag. For example, last week's count of 1799 cases was revised to 2262 cases this week, a 26% upwards revision (Figure 8). For this reason, it is difficult at this time to draw reliable conclusions about the current pace of viral transmission or our efforts to slow it.

Nevertheless, the week-over-week increase from June 21 to June 28 was only 8% (2086 to 2262). This is much smaller than the 65% week-over-week increases for the 4-weeks immediately following reopening. This provides hopeful evidence that the pace of new case counts is slowing. Given that Pima County and Tucson instituted face mask ordinances quickly after being permitted to on June 17th, it supports their important role in our public health response.

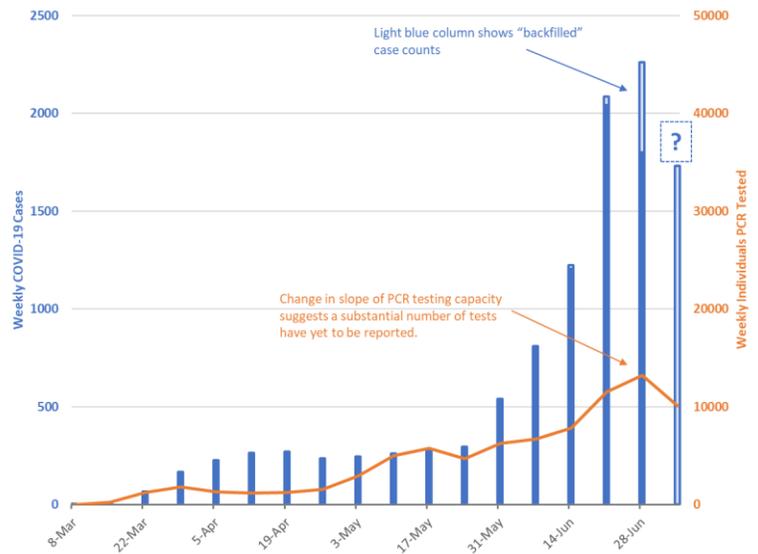


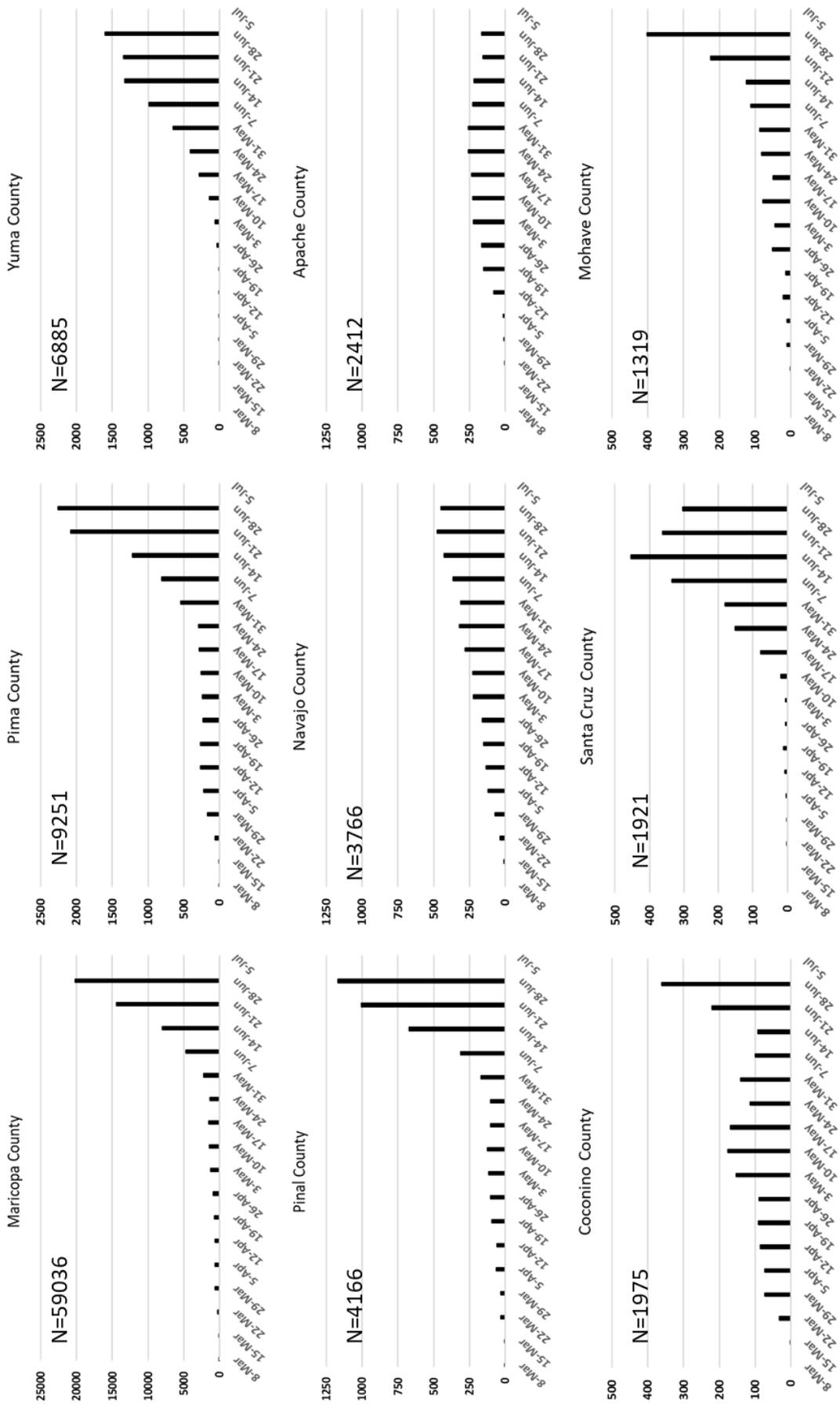
Figure 8. Newly Diagnosed Covid-19 Cases in Pima County and Individuals PCR Tested through July 5.

Summary:

- While reported cases, hospitalizations, and deaths continue to increase, the pace of community transmission is slowing. This means that these metrics will continue to increase, but not as quickly as before. While these trends differ by geographic region, Covid-19 remains widespread in Arizona.
 - Reporting lag for PCR results has markedly increased over the past 2-weeks making it difficult to interpret changes in the pace of viral transmission this week. Case data is only complete through June 28th.
 - Absolute levels of community-driven viral transmission have never been higher as evidenced by record numbers of daily and weekly Covid-19 cases.
 - For most locales, government-mandated social distancing restrictions and/or mask-wearing will be needed for the foreseeable future. Additional restrictions may be necessary to relieve pressure on overcrowded hospitals and secure additional capacity in anticipation of seasonal, non-Covid viral respiratory infections (e.g., influenza).
- Covid-related hospital utilization continues to increase while excess capacity is declining. Adequate physical capacity currently exists but could be depleted by mid-to-late August. Widespread personnel shortages are already being reported in critical care settings.
 - The shift towards younger, working-age adults has abated; therefore, future case increases will be more directly tied to hospital utilization and deaths.
 - June typically marks the nadir of Arizona hospital admission Arizona. From now until January, non-Covid hospitalizations are expected to increase putting additional strain on hospital capacity.
 - Most ICUs are at or over their capacity limits with regard to an adequate supply of health care workers; some hospitals are near or at capacity for ICU beds. Local conditions will provide a better indicator of critical capacity than state-wide trends.
 - Stated bed capacity may over-estimate actual capacity for structural reasons; therefore, surge beds or additional health care providers may be needed sooner than expected.
- The number of Covid-19 tests is not keeping pace with rising case counts as evidenced by increasing PCR test positive rates, currently at a record high of 23%. Positivity rates >3% indicate testing capacity is inadequate to meet clinical and public health demands. Test reporting lags have lengthened considerably once again threatening public health efforts to respond to this outbreak.

County-by-county trends in weekly Covid-19 diagnoses appear on the following page (Appendix Figure 1)

Next update scheduled for July 17.



Appendix Figure 1. Weekly Covid-19 Cases by County March 1 – June 28 (Note: Typically, data would be displayed through the week ending July 5; however, the reemergence of a sizable reporting lag makes data from the most recent week unreliable).