

COVID-19 Disease Outbreak Outlook

Arizona State and Pima County

Updated May 8, 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.

As of May 8, 10526 COVID-19 cases have been reported on the Arizona Department of Health Services (ADHS) [website](#). For the week ending Sunday May 3, case counts aggregated by week and test collection date indicate the number of newly reported cases in Arizona continues to increase (Figure 1). Because of the lag between infection and detection, this increase is attributable to conditions before easing of social distancing restrictions.

[COVID ACT NOW](#) reports that the effective viral transmission value (R_t) in Arizona is 1.14 (Figure 2). Because R_t is >1 , the number of cases in Arizona is projected to grow with a peak at some future date. Of note, state-wide averages may mask differences across counties as is shown in the Appendix.

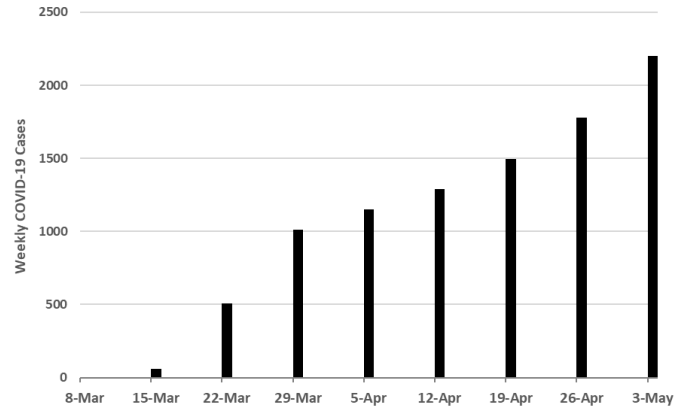
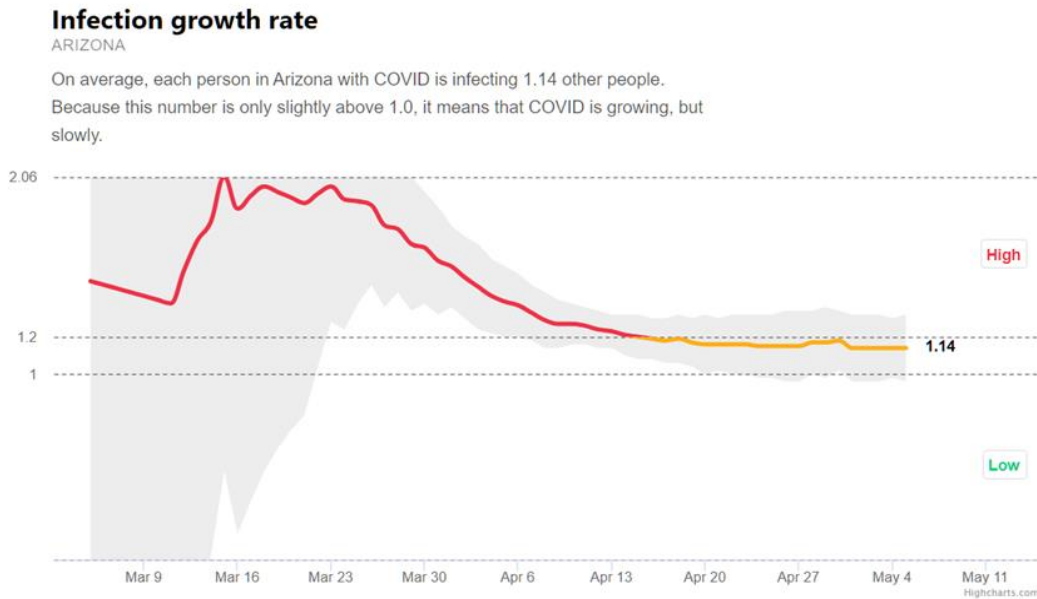


Figure 1. Weekly Arizona COVID-19 Cases through May 3 Presented by Test Collection Date



Screenshot May 9 at 9:30AM.

Figure 2. Infection Growth Rate in Arizona as Estimated by COVID ACT NOW

As of May 8, 517 deaths have been announced in Arizona; however, reporting lag makes it difficult to interpret these counts in real-time. For example, ADHS announced 87 new deaths during the week ending May 3, but only 59 of these deaths occurred during this period (Figure 3). Currently, most of these deaths are confirmed COVID-19 deaths, meaning occurring among patients who have tested positive. However, ADHS is [now using death certificate data](#) to more completely identify total deaths (see Washington Post [analysis](#)).

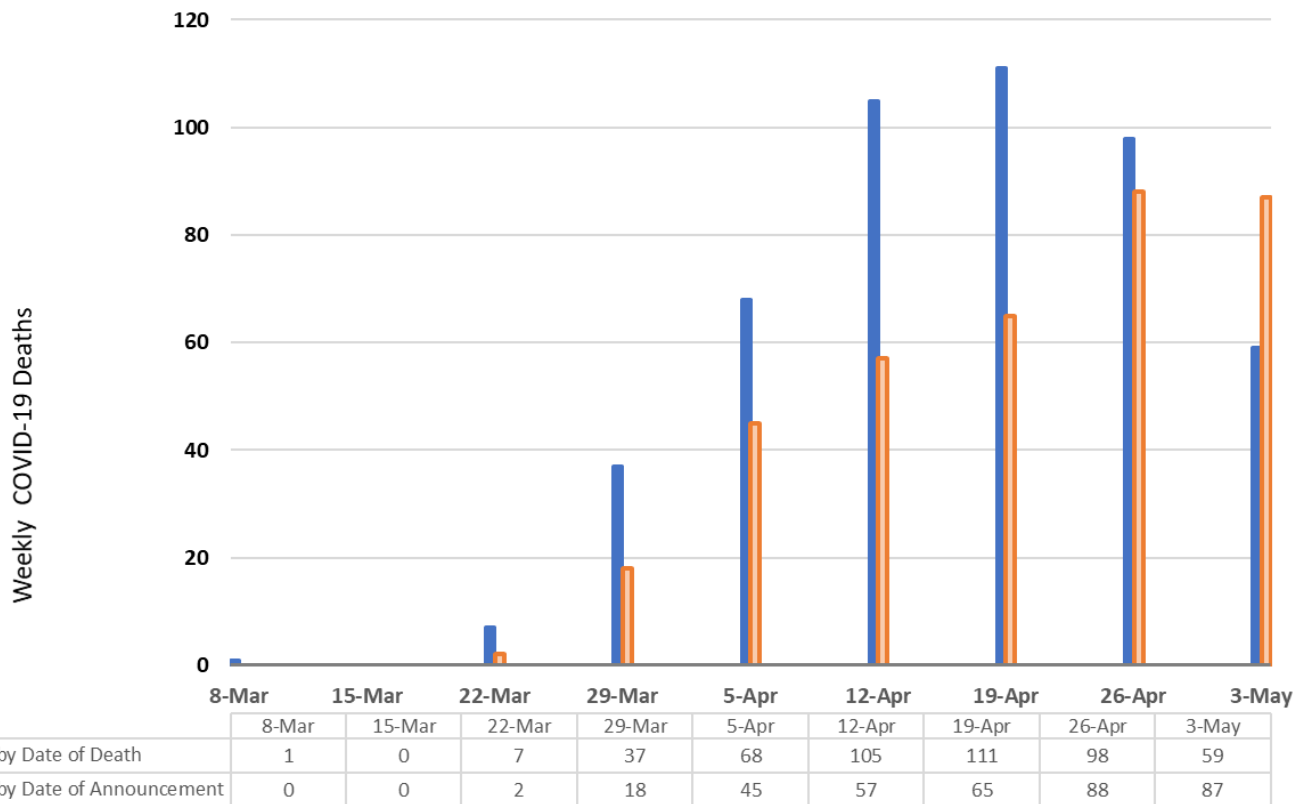


Figure 3. Weekly Arizona COVID-19 Deaths by Date of Announcement and Date of Death Mar 1 – May 3

Pima County Outlook

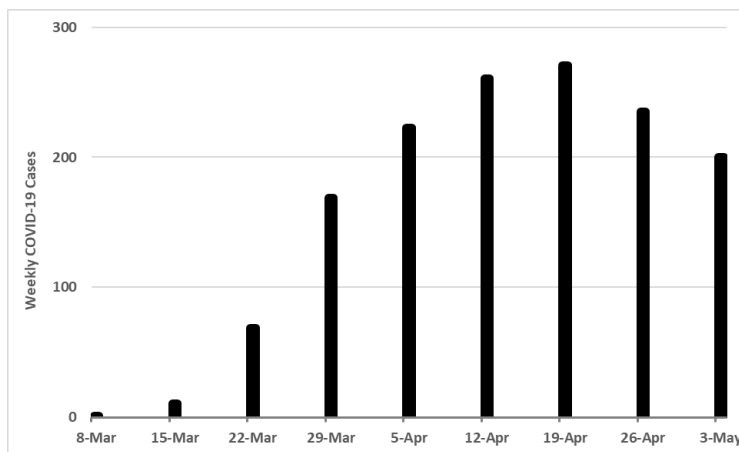


Figure 4. Weekly Pima County COVID-19 Cases through May 3 Presented by Test Collection Date.

As of May 8, 1520 COVID-19 cases have been reported in Pima County. When counts are aggregated weekly and by test collection date, the number of newly reported cases in Pima County peaked the week ending April 19 (Figure 4). With two consecutive weeks of declining counts, this conclusion is less likely to be explained by unrecognized testing lag, changes in testing availability, or reporting error. The divergence between Pima County and Arizona is corroborated by COVID ACT NOW estimates of viral transmission: $R_t = 1.14$ for Arizona versus $R_t = 1.02$ for Pima County. While values $R_t > 1$ indicate continued growth, the confidence band for the Pima County estimate includes values < 1.0 which would be consistent with declining case counts.

The signal that Pima County and Arizona could be diverging is still supported by projections of deaths from the [UT Modeling Consortium](#). The UT groups estimates there is an 82% probability that Tucson has already reached peak COVID-19 deaths, down from a 93% probability last week. However, there is only a 19% probability that Arizona has reached its peak, down from a 67% probability last week. Given that deaths lag new cases, these projections are consistent with declining viral transmission in Pima County but not Arizona as a whole.

I previously endorsed projections from the [Institute of Health Metrics and Evaluation](#) (IHME) model; however, readers may have noticed their absence in the past two updates. As noted by others ([here](#), [here](#), and [here](#)) the IHME model struggle to accurately predict future events.

As I previously discussed (April 3 Update), modelers either rely on a epidemiological based on viral characteristics and individual interactions or a mathematical model based on fitting data to a pre-specified curve. Currently, epidemiological models are outperforming mathematical models like the IHME. While the mathematical models are struggling with time lags and reporting variability inherent in the publicly available data, they also rely on a strong assumption that case counts will fall quickly once a peak is reached. However, counts have not fallen. Instead, they have plateaued or continued to rise slowly. While the mathematical models may eventually [adjust](#), epidemiological models like the one crafted by Arizona State University modelers are providing superior results. Several weeks ago, Dr. Tim Lant and his team correctly projected that confirmed cases wouldn't peak in Arizona until late May at the earliest (Figure 5 Scenario 3, previously shown in April 23 Update).

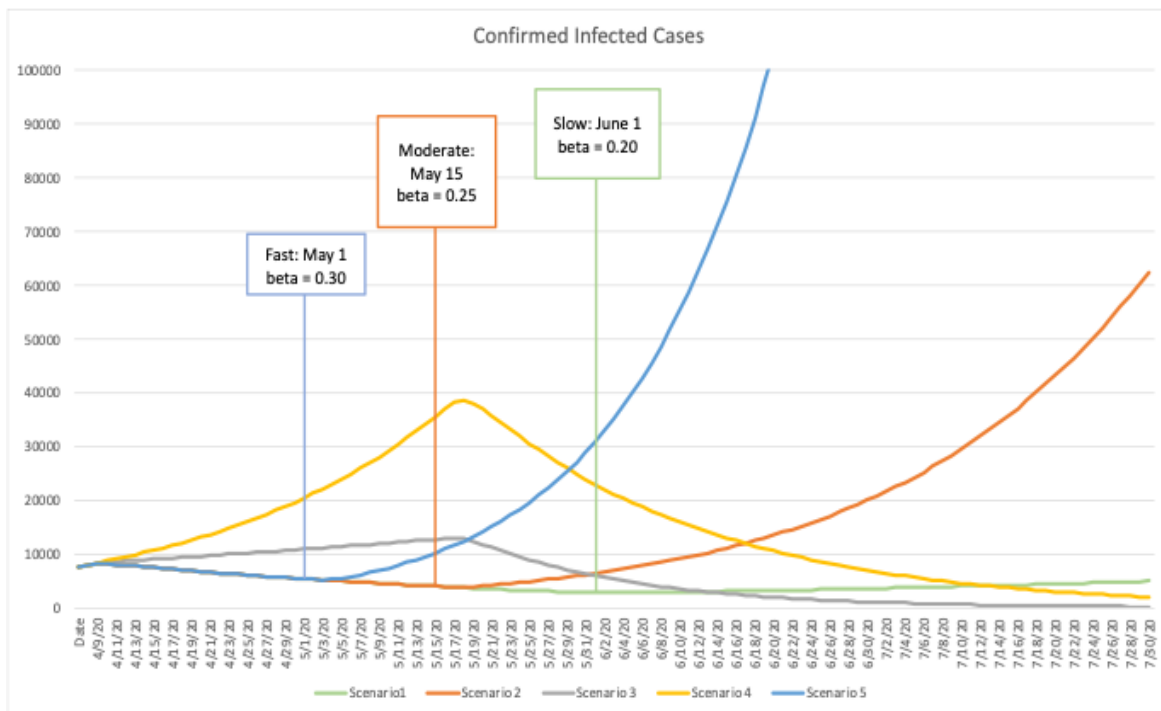


Figure 5. Simulated Scenarios of COVID-19 Infection in Response to Social Distancing Policy. ADHS COVID-19 Modeling Working Group 1, Arizona State University: Tim Lant, PhD, MAS (tim.lant@asu.edu); Megan Jehn, PhD; Esmá Gel, PhD; Anna Muldoon, MPH; Heather Ross PhD, DNP, ANP-BC. April 20, 2020.

For now, I am relying less heavily on IHME [projections](#) because their continued insistence on an early peak followed by a relatively quick decline in new cases and deaths (Figure 6, following page). Data shown in this update indicate that state-wide cases have not yet peaked and are unlikely to do so until later in May at the earliest. Readers should be aware that the [UT Modeling Consortium](#) also uses a curve-fitting approach such that deaths tend to quickly, perhaps too quickly, decline from an estimated peak. Despite these models limitations, their short-term projections are reasonably consistent with epidemiological models as noted by side-by-side comparisons made by [FiveThirtyEight](#). So far, both approaches have correctly predicted that Arizona hospitals would not be overwhelmed by severely ill cases.

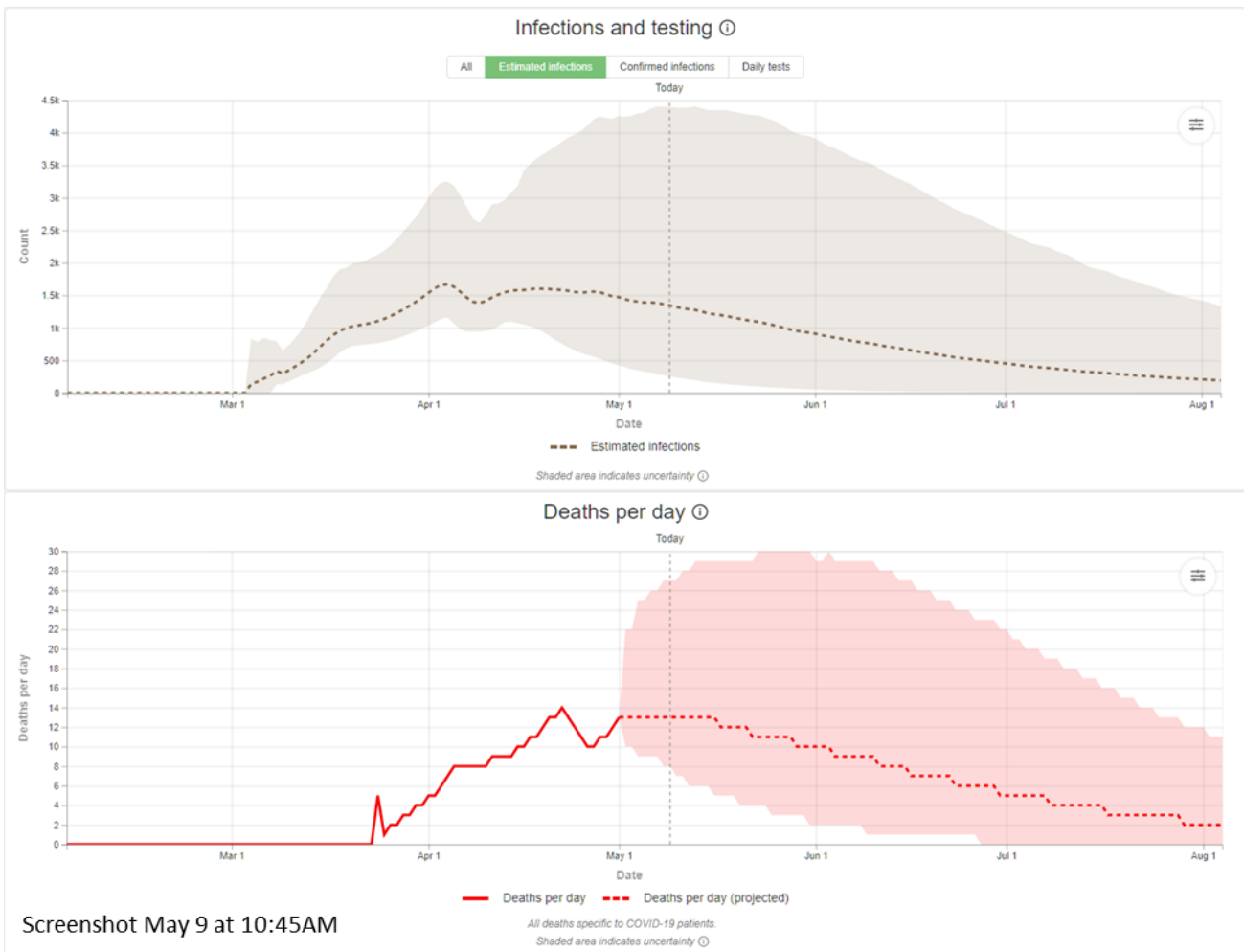


Figure 6. Projected Peak Daily Infections and Deaths in Arizona from the Institute of Health Metrics and Evaluation (IHME)

Arizona’s Testing Capacity

Arizona announced a “testing blitz” starting May 4; however, a substantial increase in PCR testing was already noticeable beginning April 27 (Figure 7). Testing has increased from about 2000 to 4000 tests daily. The percent of positive tests has fallen from a peak of 12.1% to 7.4%. Test positive rates $\leq 3\%$ suggest adequate testing for clinical and surveillance demands. While welcomed, the testing blitz will make it more difficult to understand the trajectory of viral transmission (e.g., new case counts) for the next several weeks as greater testing will detect more cases, but the additional cases may not necessarily mean more transmission.

COVID-19 serology testing also increased dramatically beginning April 27 (Figure 8). During the week ending May 3, over 1700 tests were performed with 3.9% of them being positive.

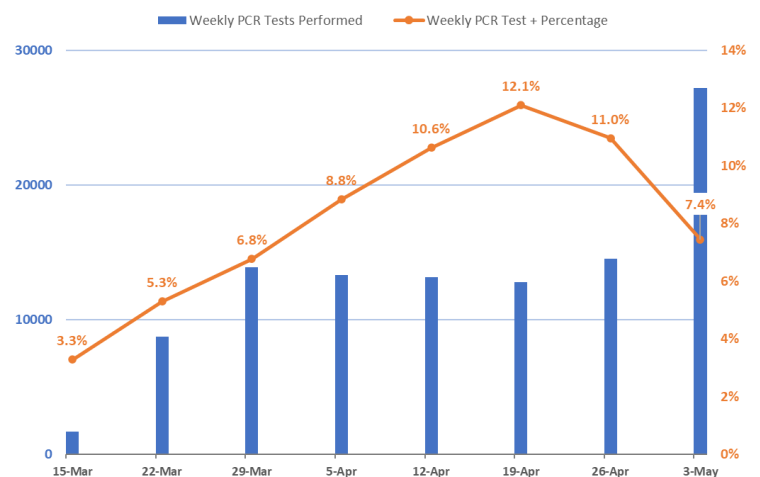


Figure 7. Weekly Number of COVID-19 PCR Tests Conducted and Test Positive Percent Mar 8 – May 3

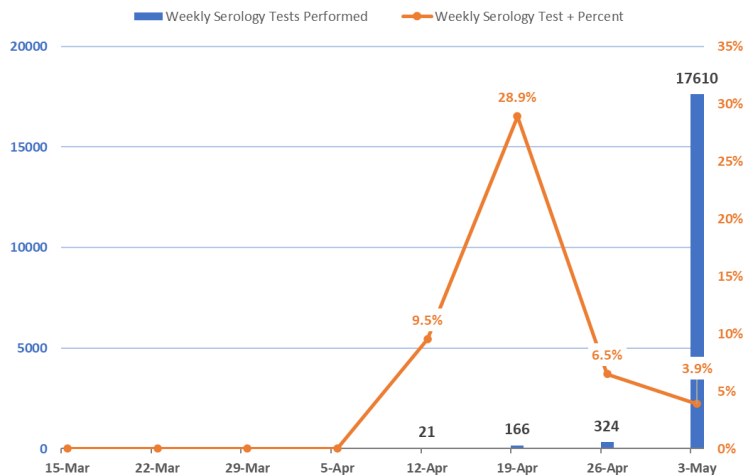


Figure 8. Weekly Number of COVID-19 Serology Tests Conducted and Test Positive Percent Mar 8 – May 3

Revisiting the Goals of Social Distancing and Deciding When to Lift Them

Last week, Governor Ducey extended his “Stay at Home” order to May 15th. However, this week he announced a faster pace for lifting restrictions. Social distancing has become a key control measure because our public health response has been hampered by a lack of testing and because this coronavirus is more difficult to control than typical influenza (see [COVID-19: The CIDRAP Viewpoint](#)).

By reducing human interactions social distancing creates fewer opportunities for viral transmission to occur. Social distancing by itself will not necessarily reduce the total number of infections. Instead, it postpones them into the future when better treatment (e.g., more hospital

capacity or anti-virals) or possible prevention (e.g., new vaccine) may be available. While nothing is certain, social distancing buys time for these advances to occur. Lifting restrictions while viral transmission is not well-controlled is likely to accelerate the pace of new infections and potentially increase preventable mortality.

Restrictions can be most safely lifted when case counts are low, trends are improving, and adequate contact tracing resources are available. To date, Arizona has yet to meet these conditions. Testing remains constrained, active infections are high, and new infections continue to increase.

Why then are these restrictions being lifted now? The most obvious reason is the substantial economic consequences imposed on governments, businesses, and households. A severe recession, perhaps a formal depression, is looming owing to reduced economic activity. Government tax receipts falling drastically while demands on government programs is rapidly increasing. Large and small businesses are facing the threat of bankruptcy. Record-level unemployment has stripped many families of their savings, health insurance, and homes. Lacking income, many face unprecedented food insecurity and must go hungry.

While the economic toll of social distancing cannot be prevented, its worst consequence could be mitigated. Unfortunately, the federal response has been too slow and too anemic to provide many with adequate protection. Unlike the federal government, state governments cannot borrow sufficient funds to support businesses and households. Therefore, they cannot fill-in for the absence of an effective federal response. Instead, they are forced to make difficult trade-offs between protecting the public’s health or their economic well-being. Because individual households cannot rely on the federal or state government for assistance, they will eventually be forced to decide between staying home or returning to work. Nevertheless, as of April 24, a [majority of Americans](#) say that they could social distancing for at least an additional 4-weeks.

As a public health professional, I am becoming increasingly torn. If governments are willing to effectively mitigate the hardships imposed by social distancing, then public health response is clear. Social distancing restrictions should be maintained, or more likely, increased. Investments to strengthen our public health response (e.g., expanded testing and contact tracing capacity) and identify new treatments and vaccines should be made. However, if governments are unwilling to effectively mitigate these consequences, social distancing becomes more difficult to justify. As this crisis unfolds, it is becoming increasingly clear that the conditions necessary to mount an effective response are lacking. While crude, the term “half-assing it” seems to best fit. While our window of opportunity is slowly closing, there is still time and enough resources to mount an effective response.

Summary:

- Current social distancing restrictions have slowed viral transmission, but not sufficiently to prevent newly reported cases, hospitalizations, and ICU utilization from increasing.
 - Absolute levels of community-driven viral transmission remain high as evidenced by substantial numbers of newly reported cases.
 - For many locales, additional social distancing restrictions are likely needed to prevent newly reported cases, hospitalizations, and ICU utilization from increasing and ultimately exceeding local health system capacity.
 - For all locales, lifting social distancing restrictions would likely accelerate the pace of viral transmission leading to increasing case counts and hospital utilization.
 - While adequate hospital capacity exists to care for some increase in severely ill patients, a higher case count will narrow our safety margin.
 - Growing evidence suggests that Pima County has slowed viral transmission such that newly reported cases are declining and a peak has been reached.
- COVID-19 testing capacity (PCR and serology) has meaningfully increased over the past week. However, the PCR test positive rate remains above 3% indicating capacity is not adequate to meet clinical and public health demands.

See Appendix below for weekly COVID-19 case counts by county.

Next update scheduled for May 15.

Appendix

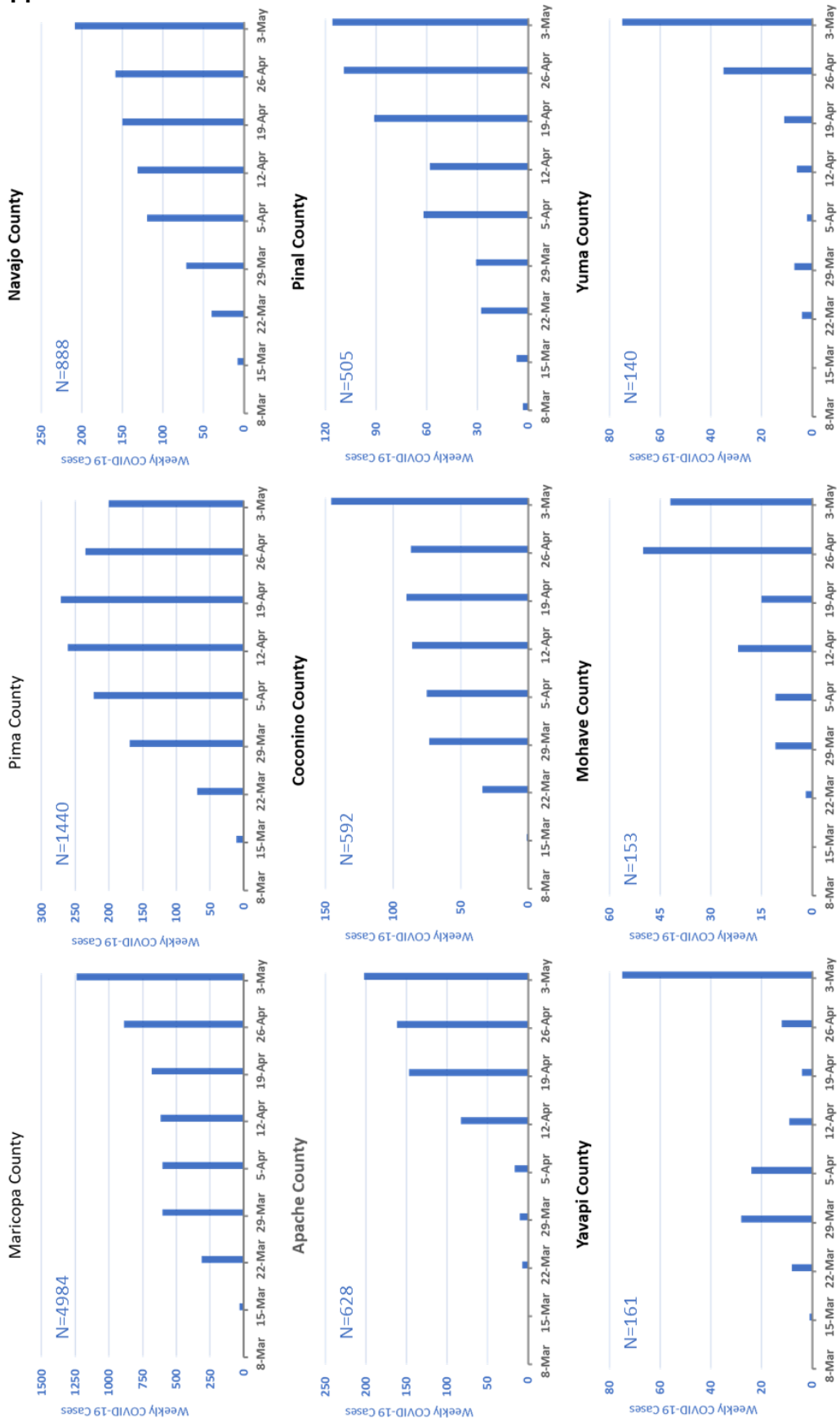


Figure 9. Weekly COVID-19 Cases in Arizona Counties with >100 Confirmed Cases

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