COVID-19 Disease Outbreak Outlook
Arizona State and Pima County
Updated May 1, 2020

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As of May 1, 7962 COVID-19 cases and 330 deaths have been reported on the Arizona Department of Health Services (ADHS) website. To better account for reporting lag, this and future updates will only present data for the week ending Sunday. Weekly trends seem to be more reliable and informative than daily trends. When weekly case counts are aggregated by test collection date, the number of newly reported cases in Arizona continues to increase (Figure 1). However, the state average can mask potential differences within smaller geographic units.

The COVID ACT NOW group is now reporting the effective viral transmission value R_t by state and county (Figure 2). The R_t for Arizona is 1.12 indicating continued modest case growth with a peak daily case count projected at some future date.

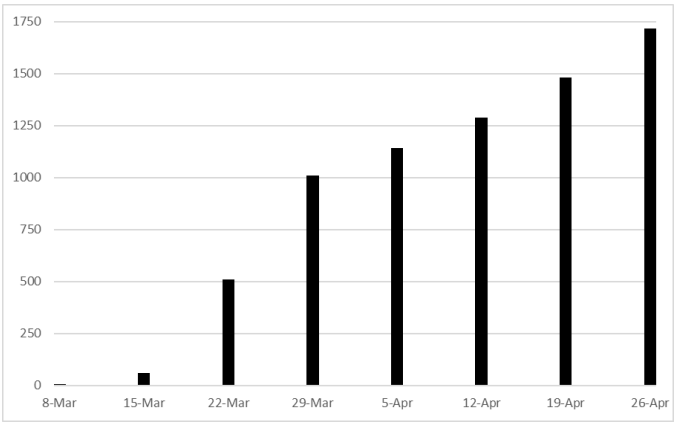


Figure 1. Weekly Arizona COVID-19 Cases through April 26 Presented by Test Collection Date.

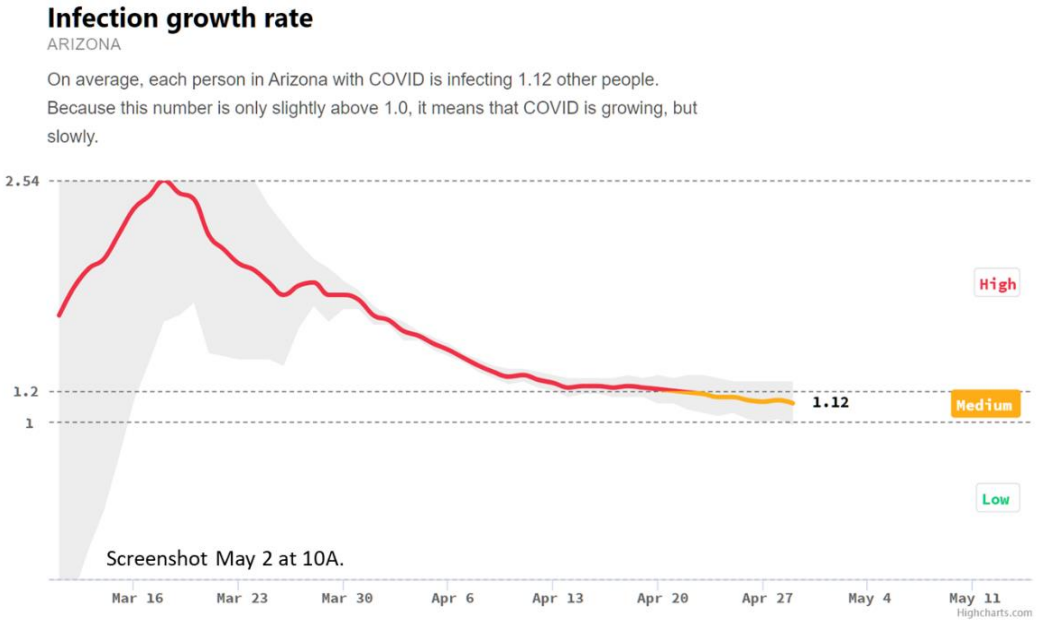
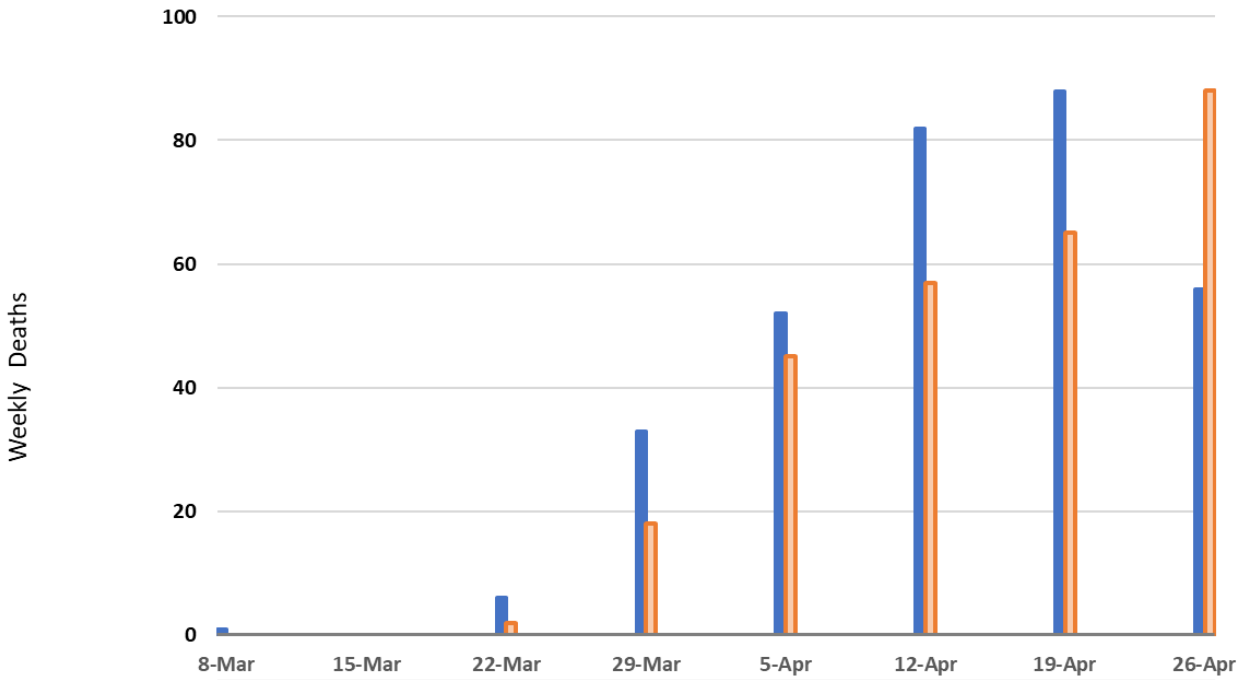


Figure 2. Infection Growth Rate in Arizona as Estimated by COVID ACT NOW.

As of May 1, 330 deaths have been announced in Arizona; however, reporting lag makes it difficult to interpret these data in real-time. It also poses challenges for modelers attempting to predict future trends. For example, ADHS announced 88 new deaths during the week ending April 26, but only 56 of these deaths occurred during this period (Figure 3). The remainder occurred in the more distant past. This is a well-known challenge that all jurisdictions face and it is difficult to overcome. It is also important to recognize that reported deaths are confirmed COVID-19 deaths, meaning deaths in patients known to have tested positive. Therefore, these deaths may under-represent the total number of deaths as reported in a Washington Post analysis.



	8-Mar	15-Mar	22-Mar	29-Mar	5-Apr	12-Apr	19-Apr	26-Apr
Deaths by Date of Death	1	0	6	33	52	82	88	56
Deaths by Date of Announcement	0	0	2	18	45	57	65	88

Figure 3. Weekly Arizona COVID-19 Deaths by Date of Announcement and Date of Death Mar 1 – Apr 26.

Pima County Outlook

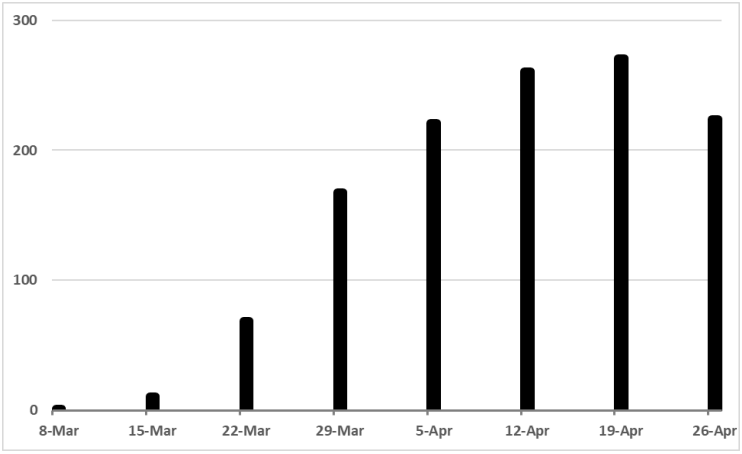


Figure 4. Weekly Pima County COVID-19 Cases through April 26 Presented by Test Collection Date.

As of May 1, 1267 COVID-19 cases have been reported on the ADHS website for Pima County. When weekly case counts are aggregated by test collection date, the number of newly reported cases counts appear to have peaked in Pima County during the week ending April 19 (Figure 4). However, this conclusion is highly speculative and could be explained by other factors such as unrecognized testing lag, changes in testing availability, and or reporting error. Furthermore, the divergence between Pima County and Arizona is not corroborated in the COVID ACT NOW estimates of viral transmission with an R_t of 1.12 for Arizona versus a similar R_t of 1.06 for Pima County. R_t values >1 indicate continued growth in daily case counts and a future peak in new case counts.

The potential signal that Pima County and Arizona could be diverging is also suggested by the UT Modeling Consortium. The UT groups estimates there is a 93% probability that the Tucson MSA has reached its peak in COVID-19 deaths (Figure 4) whereas there is only a 67% probability that Arizona has (Figure 5). Given that deaths lag new cases, this would be consistent with earlier slowing of viral transmission in Pima County than Arizona as a whole. Again, this is highly speculative as these projections regarding the timing of the peak have been notoriously unreliable. Given the numerous challenges predicting COVID-related cases and deaths, I have low confidence in this conclusion until more data become available.

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

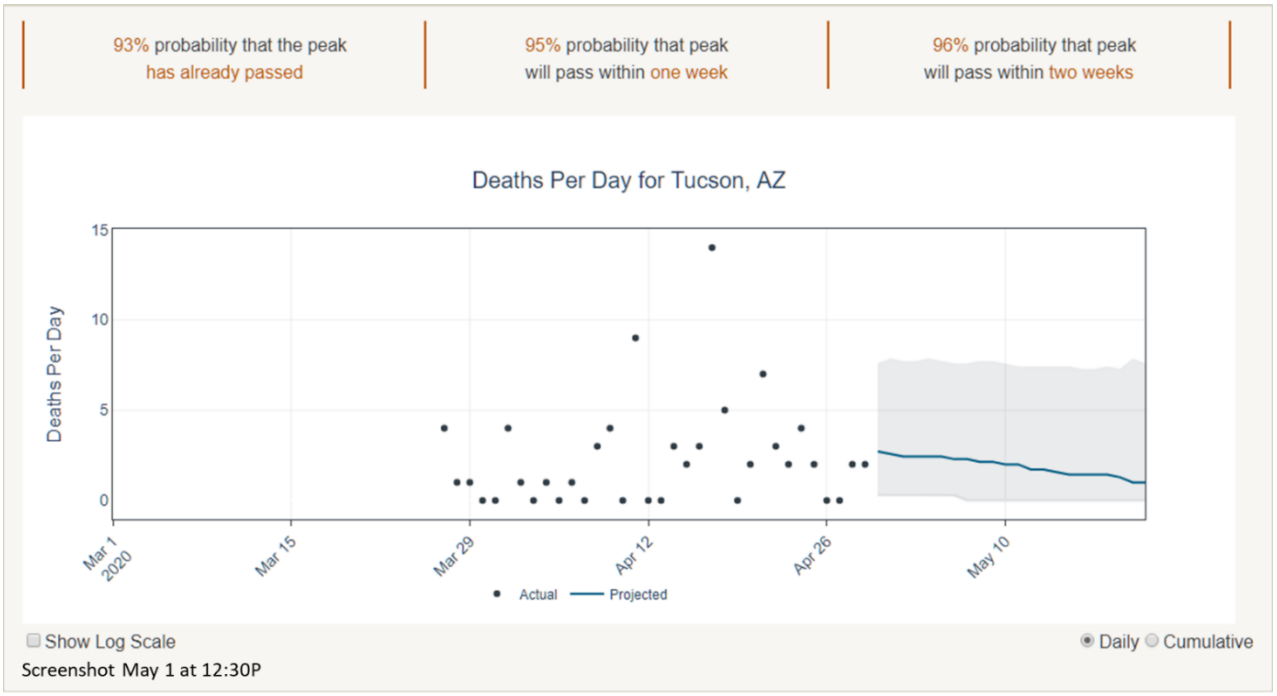


Figure 4. Projected Tucson MSA COVID-19 Deaths from the University of Texas COVID-19 Modeling Consortium

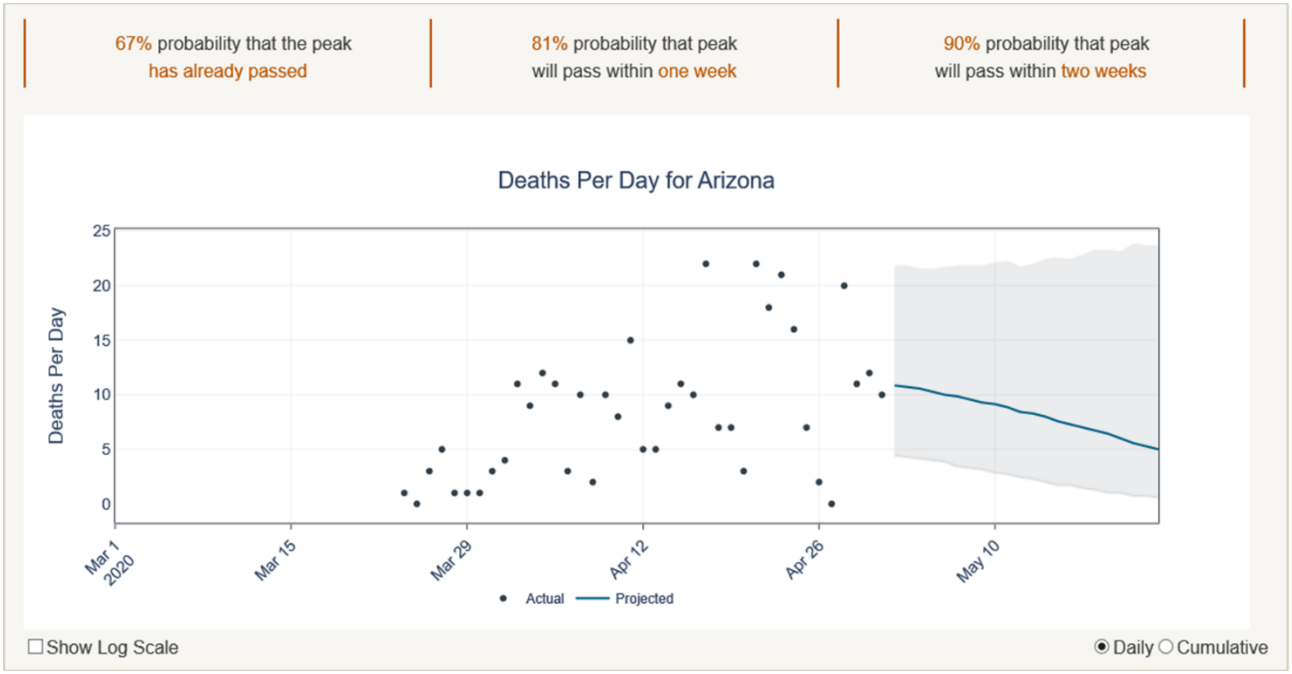


Figure 5. Projected Arizona COVID-19 Deaths from the University of Texas COVID-19 Modeling Consortium

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It is interesting to hypothesize about what might cause Pima and Arizona to diverge (again a highly speculative assumption). Given that Maricopa County's large population tends to drive state-wide trends, comparisons to it seem reasonable. Trends between the two seem comparable until the week ending April 26 with Maricopa County reporting a somewhat larger weekly tally of new cases and Pima County reporting a somewhat lower tally (Figure 6).

Case counts are subject to viral transmission, reporting practices, and testing capacity. The number of daily tests performed in Pima and Maricopa Counties are offset in magnitude, with about 5 times as many tests being performed in Maricopa County, but the trend between the two has remained relatively consistent (Figure 7, Panel A). Similarly, the percent of tests with positive results has been generally higher in Pima County than Maricopa County (Figure 7, Panel B). However, this "gap" noticeably narrowed the week ending April 26. The test positive rate is about 10% in both counties suggesting that testing capacity is not adequate to meet clinical and public health demands in either.

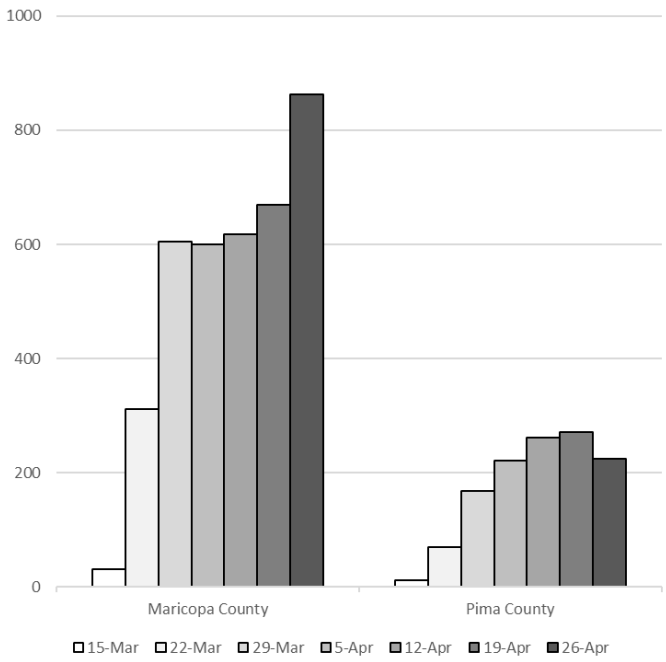

Figure 6. Weekly COVID-19 Case Counts Aggregated by Test Collection Date Ending March April 26.

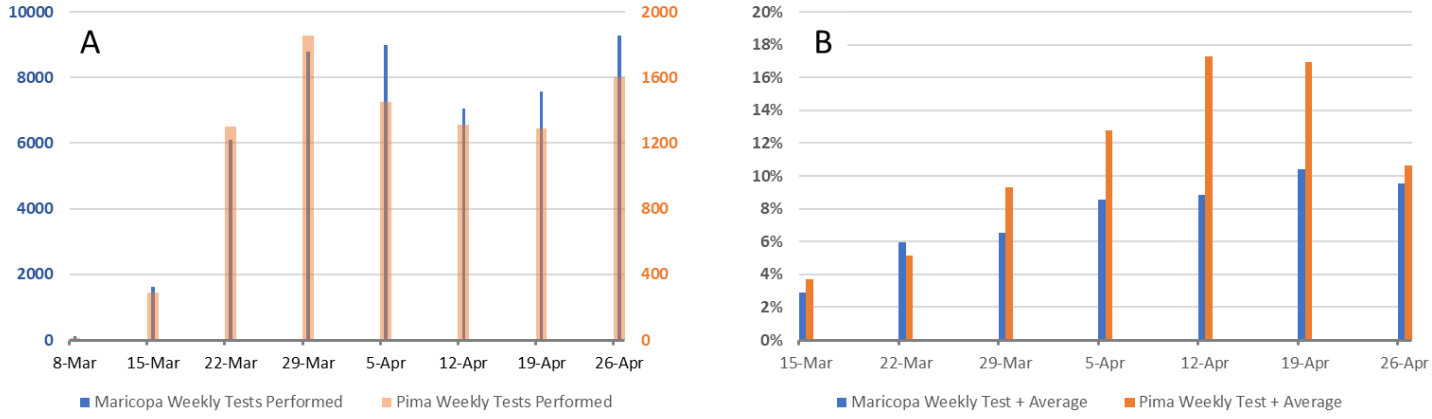

Figure 7. Comparison of Weekly Tests Performed (Panel A) and Percent of Tests Positive (Panel B) in Maricopa and Pima County Arizona.

For a divergence to be "real," an underlying explanation such as differences in policy, policy implementation, or population characteristic between the two regions is needed. Unacast provides an unvalidated Social Distancing Scoreboard that grades county performance on social distancing including distance traveled, non-essential visits, and encounter density (Figure 8). Trends are similar across counties with both seeing a decline in all metrics. However, average encounter density in Maricopa County is higher than in Pima County which is consistent with its higher population density, 308 versus 109 residents per square mile, respectively (Statistical Atlas). While social density has been suggested as an explanation why New York City experienced higher case counts, this metric is relatively static making it an unlikely explanation for a recent change within Arizona.

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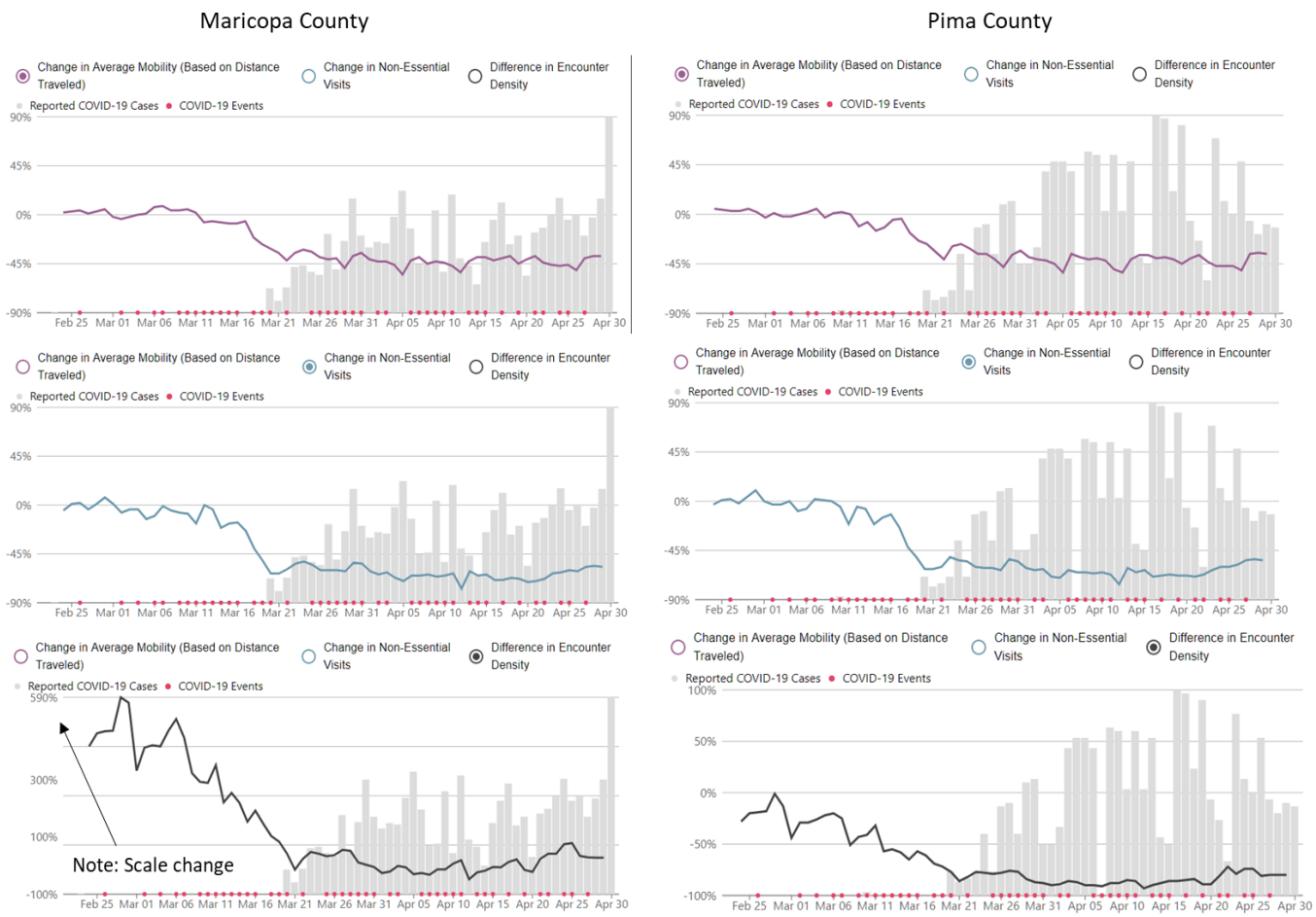

Figure 8. Metrics of Social Distancing (Distance Traveled, Non-Essential Visits, and Encounter Density) Maricopa County and Pima County, Arizona

Returning to the possibility that the Pima and Maricopa County experience with COVID-19 may be diverging, there has been no clear divergence in testing capacity, no divergence in social distancing policies, or differential adherence to them. The divergence is also very recent and relatively abrupt and could be explained simply by an unexpected lag in test reporting. For these reasons, there is insufficient quantity and quality of evidence to make a claim one way or the other until more data become available.

Summary:

- Social distancing has slowed / continues to slow viral transmission; however, reported cases, hospitalizations, or ICU utilizations have yet to clearly peak.
    - Community-driven viral transmission remains high as evidenced by substantial numbers of newly reported cases. Accordingly, maintaining or increasing social distancing should remain our highest priority or we risk a resurgence fueled by these active cases.
    - While current social distancing restrictions may be sufficient to prevent exponential growth, they may not be enough to extinguish viral transmission.
- COVID-19 testing remains constrained with inadequate testing for clinical and public health demands. Until this is overcome lifting social distancing restrictions risks a resurgence in active cases.

Next update scheduled for May 8.

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