

COVID-19 Disease Outbreak Forecast

Arizona State and Pima County

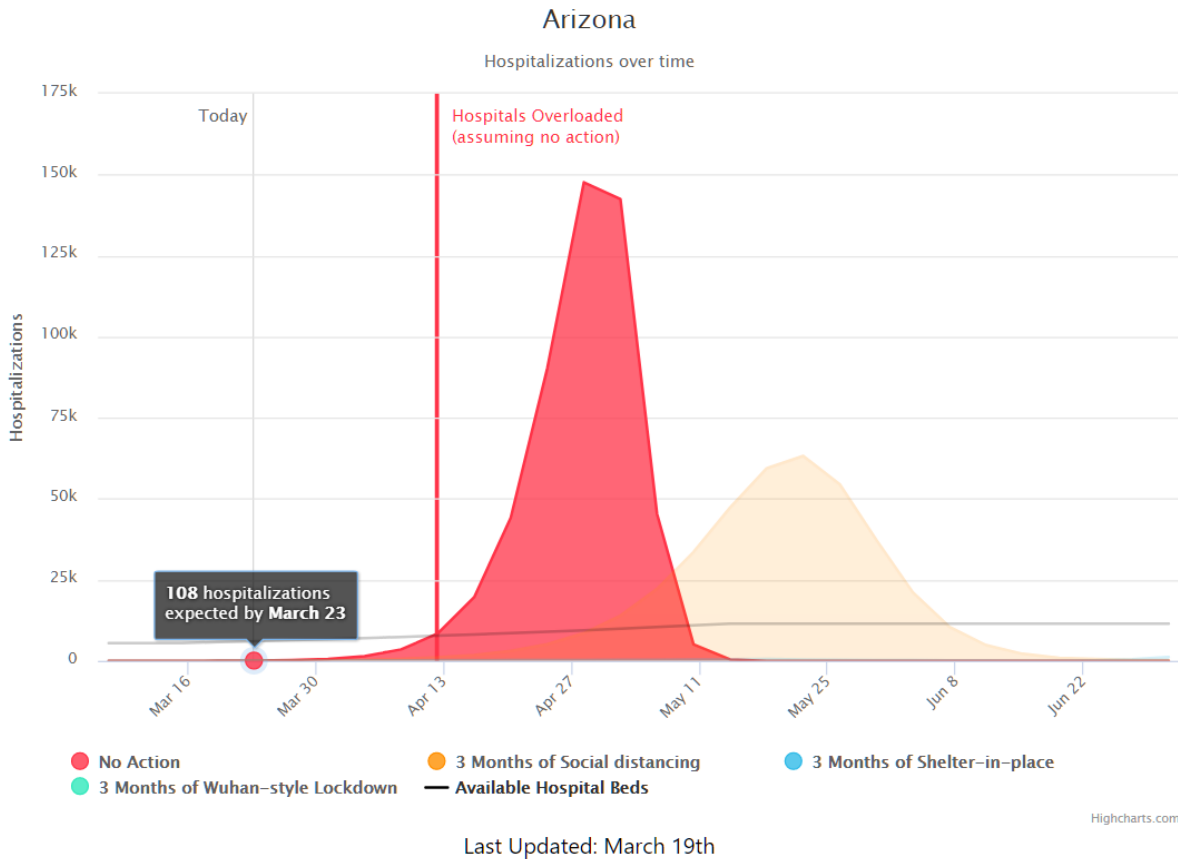
Updated March 22, 2020

Since the March 17 update, 132 new COVID-19 cases have been identified in Arizona, bringing the total number of confirmed cases to 152 (Table 1). Recent growth has occurred faster than I previously projected, 1.45X per day versus 1.20X per day. This difference is likely due to expanded access to diagnostic testing rather than faster viral spread. As testing expands, milder cases that would have otherwise remained undetected are diagnosed.

Table 1. Reported and Projected (from March 17th update) COVID-19 Cases in Arizona.

	Mar 15	Mar 16	Mar 17	Mar 18	Mar 19	Mar 20	Mar 21
Total Reported Cases	18	20	27	44	63	104	152
Newly Reported Cases	6	2	7	17	19	41	48
Projected Total Cases	18	21	26	31	37	44	53

Arizona’s first COVID-19 death occurred on March 20th and its second on March 21st, both in Maricopa County. Given a median incubation period of 5 days (IQR 4, 7) and median time between symptom onset and death of 18.5 days (IQR 15, 22), the initial infections that resulted in these deaths likely occurred during the last week of February. Using various reported case fatality rates and estimated doubling times, there are at least 400 – 800 COVID-19 cases in Arizona today; the number could be as high as 1600 – 2400. More precise estimates are not possible until more testing or more deaths occur. Now that more sophisticated models are available, I am substituting [them](#) for my own (Figure 1).



Point of no-return for intervention to prevent hospital overload:

Mar 29 to Apr 3

Figure 1. Arizona Projected COVID-19 Hospitalizations and Hospital Capacity (<https://covidactnow.org/state/AZ>)

COVID ACT NOW projects there have been 103 COVID-19 hospitalizations in Arizona which represents only 2% of the available beds needed to care for them. However, without more restrictive social distancing interventions, the number of COVID-19 hospitalizations could exceed available bed capacity as early as April 12th. However, instituting more restrictive Wuhan style Lockdown or Shelter-in-Place restrictions before April 3rd could avoid such a scenario. It's not too late to act!

Pima County

Since the previous update, 13 new COVID-19 cases have been identified in Pima County bringing the total number of confirmed cases to 17 (Table 2). Recent growth has occurred faster than previously projected, 1.29X per day versus 1.20X (Figure 2). Again, this is likely attributable to expanded testing capacity. No deaths have yet been reported in Pima County.

Table 2. Reported and Projected (from March 17th update) COVID-19 Cases in Pima County.

	Mar 15	Mar 16	Mar 17	Mar 18	Mar 19	Mar 20	Mar 21
Total Reported Cases	4	4	5	7	8	12	17
Newly Reported Cases	1	0	1	2	1	4	5
Projected Total Cases	4	4	5	6	7	9	11

Recommendations

- To ensure we do not exceed our capacity to care for critically ill COVID-19 patients, more restrictive social distancing interventions must be instituted before April 3rd including at least “shelter-in-place” advisories:
 - *“Voluntary/VolunTold “shelter-in-place” community-wide home quarantine (especially firm for high-risk groups), shutdown of non-essential businesses, close schools, ban on events over 10 people, passive monitoring, public advocacy around social distancing and enhanced hygiene. Possibly closed borders or restricted travel. Public aid relief bill. Roll-out of free population-wide testing and quarantine, so that quarantines can be relaxed for those who are not infected.”*
- To facilitate forecasting/monitoring the impact of such measures, the Arizona Department of Health Services should report the daily number of hospitalized patients including those in critical care settings (e.g., ICU) and those receiving mechanical ventilation. These reports should be archived by date rather than as updated daily totals.
 - Case counts, by themselves, are no longer adequate measures of viral burden and/or spread owing to limited testing capacity, changing testing requirements, and uncertainty surrounding the number of undiagnosed cases, the proportion needing hospital-level care, etc.
- The Governor should appoint a state-level Testing “Czar” and supporting advisory panel consisting of industry representatives, public health professionals, and epidemiologists to coordinate public and private COVID-19 testing. The Governor should also consider taking control over specific aspects of public, private, and research laboratories to substantially expand COVID-19 testing and standardized testing practices. Current testing capacity is inadequate and uncoordinated. Because of the consequences and probability of nosocomial transmission, testing priority should be given to the following groups:
 - Hospitalized patients with COVID-19 symptoms, then
 - Health care professionals (e.g., hospital personnel and first responders), then
 - Patients with COVID-19 symptoms who present to outpatient facilities, then
 - Public health surveillance efforts including repeated testing of randomly sampled populations to determine population prevalence as the outbreak progresses, then others as warranted.
- Economic relief to individuals and small businesses most affected by social distancing measures including enhanced unemployment benefits, Medicaid eligibility, food assistance, postponement of business and home foreclosures, and more restrictive eviction criteria is urgently needed.

The next update is scheduled for March 27th.