

Arizona Reopening Phase 2: Rise and Fall of COVID-19 Cases

Howard J Eng

Associate Professor Emeritus, Mel and Enid Zuckerman College of Public Health, College of Pharmacy, The University of Arizona

***Corresponding author**

Howard J Eng, Associate Professor Emeritus, Mel and Enid Zuckerman College of Public Health, College of Pharmacy, The University of Arizona, Email: hjeng@email.arizona.edu

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Abstract

Of the United States 50 states, Arizona is the sixth largest in size. It is about the same size as Italy. After three months of Arizona Reopening Phase 2, the COVID-19 cases had surged. In early January 2021, ABC and NBC News reported that Arizona has the highest new cases per capital in the world. This longitudinal study examined the Arizona's Reopening Phase 2 surge in cases. The study examined the changes in the numbers of testing given, new COVID-19 cases, cases that required hospitalizations, deaths, and vaccines given. The data source used was from the Arizona Department of Health Services COVID-19 dashboard database. During the last third of seven-month study period, Arizona's case numbers declined as the number of those infected recovered and acquired immunity and the state residents became fully vaccinated increased.

Keywords: COVID-19, Arizona, Reopening Phase 2, Longitudinal Study, Arizona and COVID-19

Introduction

Coronavirus (COVID-19) appeared in 192 countries and regions [1]. COVID-19 is a respiratory disease (attacks primarily the lungs) that spreads by person to person through respiratory droplets (coughs, sneezes, and talks) and contaminated surfaces or objects. On March 6, 2021, Johns Hopkins University reported that there were 116,501,992 total confirmed cases and 2,587,934 deaths associated with the virus in the world. The United States (U.S.) had the highest total cases (28,952,137) and deaths (524,319) in the world [1].

Of the U.S. 50 states, Arizona is the sixth largest in size (113,990 square miles / 295,233 square kilometers) [2]. It is about the same size as Italy (301,340 square kilometer) [3]. Arizona population estimate is 7,294,587 on July 1, 2020 [4]. There are 15 counties in the state in which the two of the largest population counties are Maricopa and Pima.

On March 2, 2020, Arizona was one of many states that had the lowest number of COVID-19 cases -- 2 cases and no hospitalization [5]. On March 11, the World Health Organization had declared COVID-19 outbreak a pandemic [6]. Soon after, the United States declared the COVID-19 pandemic as a national emergency on March 13 [7]. Arizona Governor Ducey issued a Stay-at-Home Executive Order on March 30. The state began Reopening Phase 1 on May 16 and ended on June 29 due to the surge of cases. After the summer case surge, Arizona Reopening Phase 2 began on August 10. There was a winter case surge. On March 5, 2021, the

state Reopening Phase 3 started.

The United States required a partnership between the federal government and each of the 50 states to address the COVID-19 pandemic. The federal government provided the national guidance and needed logistical support (e.g., provide federal supplemental funding, needed medical personnel and resources, and other needed assistance), while the states decided on what actions to take and when to carry out those actions. Arizona's Governor Ducey issued Executive Orders to reopen the state:

- May 12 (484 new cases) – the Governor confirmed that his Stay-at-Home Executive Order would end on May 15 and began the state Reopening Phase 1 [8].
- August 10 (926 new cases) – the Governor continued the state reopening, laid out plans for Reopening Phase 2, and established reopening health benchmarks (e.g., for bars, gyms, and schools) [8].
- March 5, 2021 (805 new cases) – the Governor began Reopening Phase 3 that rescinded the COVID-19 business occupancy limits and expanded in person learning in schools.

For each of the three reopening phases, the state encouraged the practicing physical and social distancing by maintaining a distance of at least 6 feet and avoid large crowds of people, and the washing hands frequently with soap and water or using hand sanitizers. Potentially contaminated surfaces or objects needed to be cleaned and disinfected often. One needed to avoid contact with

individuals who have the virus.

The state encouraged individuals with the highest risks (65-year-old or older who has more than one serious underlying medical conditions such as chronic lung disease, cardiovascular disease, cancer, and diabetes, has immunocompromised conditions, and/or takes immunosuppressive drugs) of getting a severe COVID-19 case to stay home until the coronavirus crisis is over – unless they need go out for essential services. Those under 65-year-old with more than one of the above medical conditions and who are sick were also encouraged to stay home.

In addition to the above preventive measures, several action steps were taken to address the spiking of the COVID-19 cases in Arizona [8]. Governor Ducey delayed the opening of businesses, limited the business occupancy numbers, prohibited large gathering, delayed the first day of school for in-person learning, and allowed counties to issue their own preventative measures (e.g., face covering requirement). Several counties implemented their own preventative measures such as Pima County required the wearing of face covering when social distancing cannot be maintained. The county implemented voluntary/mandatory curfews during Reopening Phase 2 surges of cases. Many retail businesses required face covering inside their stores.

The remainder of the paper examined Arizona Reopening Phase 2 rise and fall of COVID-19 cases (August 15, 2020 to March 6, 2021). August 15, 2020 was the first day of collecting Arizona Reopening Phase 2 data, and March 6, 2021 was the day after that Arizona Governor Ducey issued the Executive Order on March 5 that began the State Reopening Phase 3.

Methods

This was a longitudinal study. The data source for the study was from the Arizona Department of Health Services (the state health department) COVID-19 dashboard database. This study examined the changes in the numbers of testing given, new COVID-19 cases, case hospitalizations, deaths, and vaccines given. These variables were monitored for a seven-month period, except for vaccinations. The vaccines were not available in Arizona until late December.

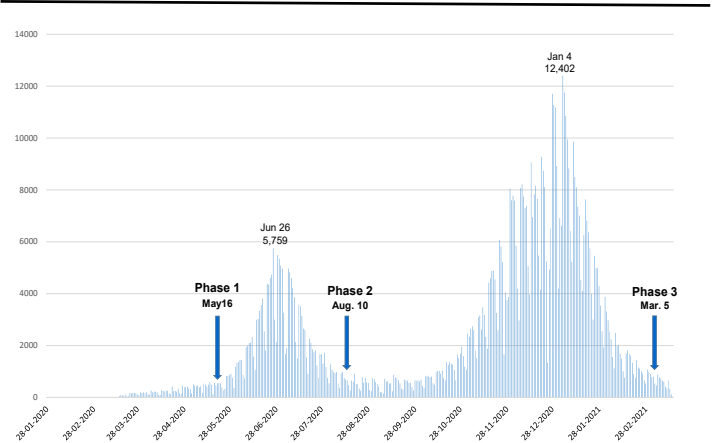
There were several data limitations. The COVID-19 case numbers represented the numbers of positive tests reported. The cases reported did not separate out those who had newly acquired the virus from those who no longer had active virus. More than one test may be given to the same person (e.g., during hospitalization and at work) – possible individual case duplications. There were

delays in the data submitted daily to the state health department that caused fluctuations in the number of tests given, cases, hospitalizations, deaths, and vaccinations reported. The state health department continued to adjust the reported numbers that may take more than a month to correct the numbers. The deaths associated with the coronavirus may be caused by more than one serious underlying medical conditions, and the virus may not be the primary cause of death.

Results

During the first two reopening phases, there were case surges. The Reopening Phase 1 - summer surge peaked on June 26, 2020 with 5,759 cases, and Reopening Phase 2 - the winter surge peaked on January 4, 2021 with 12,402 cases. The case surge in the winter was about two times larger and longer than in the summer surge. Figure 1 shows the Arizona daily COVID-19 cases during January 28, 2020 to March 18, 2021.

Figure 1: Arizona Daily COVID-19 Cases: January 28, 2020 to March 18, 2021



Source: Arizona Department of Health Services Dashboard Arizona Daily COVID-19 Cases on March 18, 2021.

There were increases in the numbers of cases – 632,465, hospitalizations – 37,068, and deaths – 11,831 during the study period. The week of January 3 to 9 had the largest number of cases (68,195), and the largest case hospitalizations week occurred during December 27 to January 2 (4,102). The largest numbers of deaths occurred in the week of January 10 to 16 (1,212). Table 1 tracks bi-weekly total and weekly numbers of COVID-19 cases, case hospitalizations, and deaths during the seven-month study.

Table 1: Arizona Reopening Phase 2 Bi-Weekly State Total and Weekly Numbers of COVID-19 Cases, Hospitalizations, and Deaths: August 16 -22, 2020 to February 28 - March 6, 2021

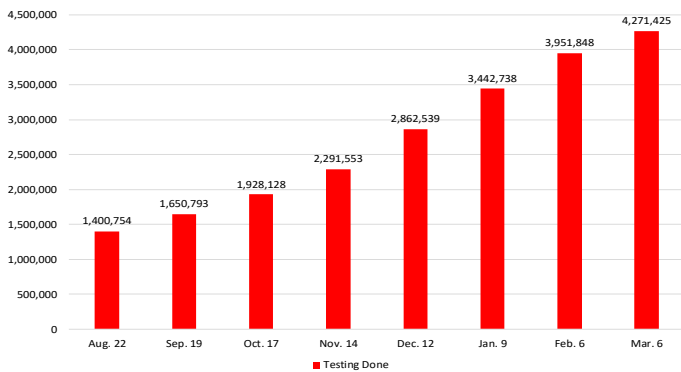
Week	Total Cases	Wk. Case	Total Hospital	Wk. Hospital	Total Deaths	Wk. Deaths
08-16 to 08-22	197,895	5,241	21,271	476	4,756	264
08-30 to 09-05	205,516	4,229	21,520	87	5,207	200
09-13 to 09-19	213,551*	5,423	21,882	109	5,467	152
09-27 to 10-03	220,399	3,573	22,258	253	5,705	83
10-11 to 10-17	230,407	5,429	20,618	389	5,824	65

10-25 to 10-31	245,946	9,174	21,492	449	5,979	110
11-08 to 11-14	273,053	15,669	22,937	767	6,300	153
11-22 to 11-28	322,774	27,440	25,348	1,167	6,624	167
12-06 to 12-12	402,589	43,689	30,687	2,681	7,322	397
12-20 to 12-26	493,041	44,810	35,337	2,661	8,424	487
01-03 to 01-09	607,345	68,195	43,095	3,656	10,036	975
01-17 to 01-23	715,357	48,456	49,963	3,315	12,170	922
01-31 to 02-06	779,093	25,714	54,507	2,501	14,011	913
02-14 to 02-20	806,163	10,840	56,872	1,313	15,480	532
02-28 to 03-06	825,119	9,412	57,863	355	16,323	356

Source: Arizona Department of Health Services Coronavirus Database. Wk. = Weekly
 *Correction – adjustment to previous number.
 Arizona 2020 population estimates is 7,294,587.

The number of COVID-19 tests done in Arizona had increased by 2,945,647 from August 15, 2020 to March 6, 2021 (Figure 2). On March 6, there were 4,271,425 total tests done and 14.0% were tested positive.

Figure 2: Arizona Reopening Phase 2 COVID-19 Testing Numbers: August 22, 2020 to March 6, 2021

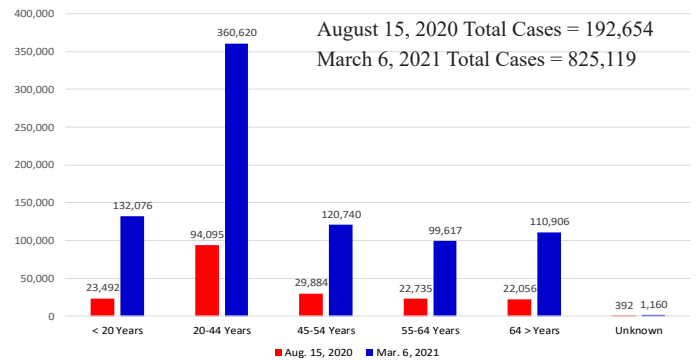


Source: Arizona Department of Health Services COVID-19 Testing Statistics. Dates at 5 weeks intervals. August 15, 2020 – total tests = 1,375,788 with 12.2% tested positive. March 6, 2021 – total tests = 4,271,425 with 14.0% tested positive.

Figures 3-5 compare the numbers of COVID-19 cases, case hospitalizations, and deaths by age groups on August 15, 2020 and March 6, 2021. A case could be mild (no symptoms), moderate (sick, but can recover at home), and severe (require hospitalization and/or result in death). Most people recovered and did not require

hospitalization. There was an increase of 632,465 cases during the study period. The 20-44 years' age group had the largest number of cases and had an increase of 266,525 (Figure 3).

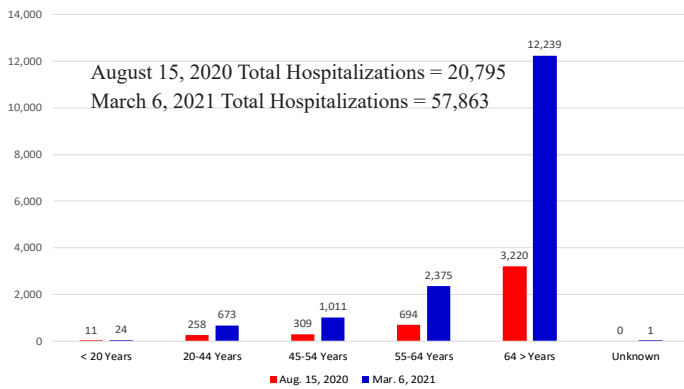
Figure 3: Arizona Reopening Phase 2 COVID-19 Cases by Age Groups on August 15, 2020 and March 6, 2021



Source: Arizona Department of Health Services COVID-19 Cases by Age Groups Statistics

The percent of total cases that were hospitalized (severe cases) on August 15, 2020 was 11% and on March 6, 2021 was 7%. The case hospitalizations had increased from 20,795 to 57,863. As expected, seniors had the highest numbers of the hospitalizations (46.3% of total hospitalizations on March 6) and those under 20 years of age had the lowest numbers (2.8% of total hospitalizations). Figure 4 shows the hospitalization numbers for each age group with the virus on August 15 and March 6.

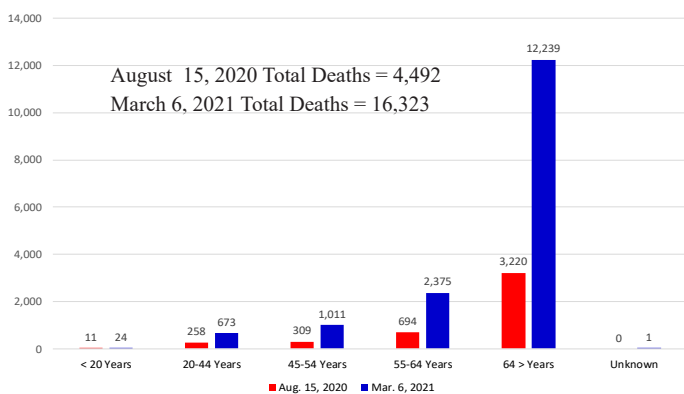
Figure 4: Arizona Reopening Phase 2 Hospitalized COVID-19 Cases by Age Groups on August 15, 2020 and March 6, 2021



Source: Arizona Department of Health Services Hospitalized COVID-19 Cases by Age Groups Statistics

The numbers of deaths had increased from 4,492 on August 15, 2020 to 16,323 on March 6, 2021. The rates of fatalities per 100,000 population increased from 62.48 to 227.05. As expected, seniors had the highest numbers of deaths (75% of total deaths on March 6) and those under 20 years of age had the lowest numbers -- 0.15% of total deaths (Figure 5).

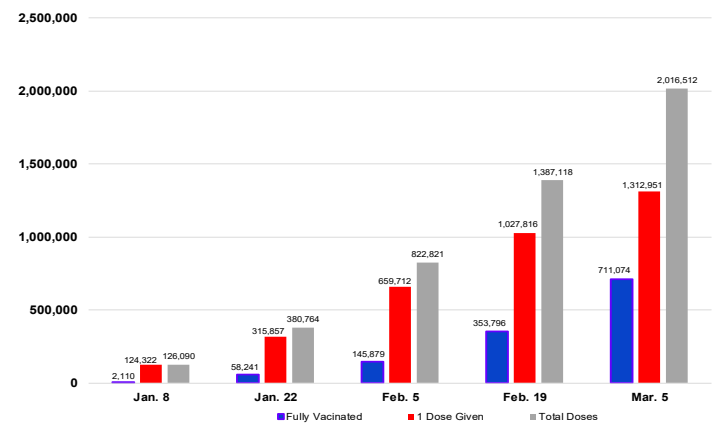
Figure 5: Arizona Reopening Phase 2 COVID-19 Death by Age Groups on August 15, 2020 and March 6, 2021



Source: Arizona Department of Health Services COVID-19 Deaths by Age Groups Statistics

On December 11, 2020, the first U.S. COVID-19 vaccine, Pfizer/BioNTech, was approved for use. In late December, Arizona began to administer vaccines. There were two vaccines available in Arizona (Pfizer/BioNTech and Moderna). On March 5, there were 2,016,512 vaccine doses were administered, and 711,074 in Arizona who were fully vaccinated against the virus. Figure 6 shows the numbers of COVID-19 vaccines that were given in Arizona (total doses given, persons receiving at least 1 dose, and persons fully vaccinated) during the last third of the Reopening Phase 2.

Figure 6: Arizona Reopening Phase 2 COVID-19 Vaccination Bi-Weekly Total Numbers



Source: Arizona Department of Health Services Arizona COVID-19 Vaccination Statistics

Discussion

During the seven-month study, there was a large surge of cases during the winter months. The Arizona Reopening Phase 2 began on August 10, 2020 with 926 new cases. As expected, there was a case surge associated with the reopening, but what was unexpected was the how large and long the surge was. On January 4, 2021, the winter surge peaked at 12,422 new cases. ABC and NBC News reported that Arizona has the highest new cases per capital in the world [9, 10]. Soon after, the cases began to decline. The Reopening Phase 2 ended on March 5 at 805 new cases.

Many factors had contributed to the increase cases and winter surge. These were the results of the state's Reopening Phase 2 that ease restrictions, aggressive COVID-19 testing and increase retesting of the same individuals (e.g., university students and assistance living residents), and individuals who did not adhered to social distancing and other preventative measures (e.g., not wearing face covering or attending events with large crowds). The influx of new people into the state who have or expose to the virus (e.g., visitors from other states, and snowbirds (winter visitors)). During Thanksgiving, Christmas, and New Year, individuals and families had social gathering and/or left the state for the holidays. The cold winter weather kept many people indoors.

When the Reopening Phase 2 case surge began, the state did not issue any new COVID-19 restrictions, but stopped the easing of existing restrictions. A few counties issued their own new restrictions (e.g., Pima County implemented 10:00 p.m. to 5:00 a.m. voluntary/mandatory curfews). Most of the state residents adhered to the recommended public health preventive behaviors and measures and to the voluntary stay-at-home recommendation, unless go out for essential services. At the end of December 2020, Arizona began to administer the COVID-19 vaccines. On March 5, 2021, the Arizona Governor began Reopening Phase 3 after the state had administered more than two million vaccine doses and

several weeks of declining cases.

Several factors could reverse the declining case trends. The vaccines may not be effective against the new variants that appear in the state. A large percentage of the state population may decide not to be vaccinated. The vaccines are not 100% effective in preventing one from getting COVID-19; those who are vaccinated could get the virus. A large influx of infected people may move into the state. A significant number of the state population may not adhere to preventive recommendations before the state reaches herd immunity.

Conclusion

As those who were infected recover and acquire immunity against the virus and more people acquire the vaccine immunity protection, Arizona's immunity level (herd immunity) rises, and the cases decline. This is seen in the last third of the study period.

Acknowledgements

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