

## Arizona Reopening Phase 3 and COVID-19: Two-Year Experience

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**ABSTRACT**

*It had been two years since Arizona's COVID-19 Reopening Phase 3 began on March 5, 2021. The state is about the same size as Italy and the sixth largest in size of the United States 50 states. The two-year longitudinal study examined changes in the number of new COVID-19 cases, hospitalized cases, and deaths. There were increases of 1,619,025 COVID-19 cases, 76,303 case hospitalizations, and 16,779 deaths during the study period, but there were declines in the numbers of cases, hospitalizations, and deaths in the second year. There were five case surges. Even with the case surges, the new normal was low number of severe cases, manageable hospitalization numbers, and low number of deaths going into the third year of the reopening. Arizona was moving toward the endemic phase of COVID-19.*

**Keywords**

Arizona and COVID-19, Longitudinal Study, Endemic Phase.

**Introduction**

It has been four years since COVID-19 (coronavirus) first appears in Wuhan, China in December 2019. The virus is also known as the severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2). It is a respiratory disease (attacks primarily the lungs) that spreads from person to person through respiratory droplets (coughs, sneezes, and talks) and contaminated surfaces or objects. There have been more than 675 million cases in the world. On March 8, 2023, Johns Hopkins University reports that there are 676,387,775 total COVID-19 cases and 6,880,004 deaths associated with the virus in the world [1]. The United States has the highest total cases (103,755,425) and deaths (1,123,299) in the world [1].

Arizona is about the same size as Italy (301,340 square kilometer) and is the sixth largest in size (113,990 square miles / 295,233 square kilometers) of the U.S. 50 states [2,3]. The state population estimate is 7,359,197 on July 1, 2022 [4]. Arizona is ranked 13<sup>th</sup> in total COVID-19 cases (2,444,144) and 11<sup>th</sup> in total deaths (31,102) of the 50 U.S. states (March 8, 2023) [1]. The state has the highest death rate of all the 50 states reported by the Centers for Disease Control and Prevention (CDC) [5,6].

There have been three Arizona Reopening Phases. ABC and NBC News report that the state has the highest new cases per capital in the world during Arizona's Reopening Phase 2 winter surge in 2020 [7,8]. Arizona Governor Douglas Ducey begin Reopening Phase 3 (final reopening phase) after the state had administered more than two million vaccine doses and several weeks of declining cases on March 5, 2021 [9,10]. As more people become vaccinated and those infected recovered and have immunity against the virus; the numbers of cases, hospitalizations, and deaths will be low; COVID-19 will be manageable; and the state returns back to pre-pandemic normal.

Arizona uses a three prolong attack against the virus by encouraging the public to practice preventive health behaviors that reduces the risks of getting respiratory infections (e.g., coronavirus, flu, and cold), and using vaccines and therapeutics. Preventive health behaviors include, but are not limited to, practicing physical and social distancing, washing hands frequently and thoroughly, and wearing face masks. Arizona Department of Health Services reports that more than 13.8 million vaccine doses have been administered in the state and Arizona has 4,645,364 fully vaccinated individuals on March 8, 2023 [11].

A partnership between the U.S. federal government and each of the 50 states is required to address the COVID-19 pandemic [12,13]. The federal government provides the national guidance primarily through the Centers for Disease Control and Prevention (CDC) and needed logistical support (e.g., provide federal supplemental funding, needed medical personnel and resources, and other needed assistance). The states determine what actions to take and when to carry out those actions; the state COVID-19 restrictions; when to carry out each reopening phase; the state vaccination plan; and when the pandemic emergency is over. Governor Ducey ended the COVID-19 Emergency Declaration on March 30, 2022.

The remainder of the paper examines two years of the reopening (March 5, 2021 to March 8, 2023) looking at changes in the number of new COVID-19 cases, hospitalizations, and deaths.

## Methods

This was a two-year longitudinal study (March 5, 2021 to March 8, 2023). The source of data used was the Arizona Department of Health Services (the state health department) COVID-19 dashboard database. The study examined the changes in the numbers of new COVID-19 cases, hospitalized cases, deaths, and vaccines administered.

There were several data limitations. The COVID-19 case numbers represented the numbers of positive tests reported. When more than one test was given to the same person (e.g., during hospitalization, at work, and mandatory testing), there were individual case duplications. Aggressive testing resulted in increases in false positive and false negative testing results. The case numbers did not include the most positive home testing results. One could be infected by the virus more than once.

Delays in the data submitted to the state health department affected the timeliness of data reported and caused fluctuations in the number of cases, hospitalizations, deaths, and vaccinations. The case, hospitalization, death, and vaccination statistics did not use the same reporting periods. 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 cause by more than one serious underlying medical conditions, and the virus may not be the primary cause of death.

The public reporting period changed during February 2022. It had changed from daily to weekly reporting. The periodic data adjustments made it more difficult to track trends.

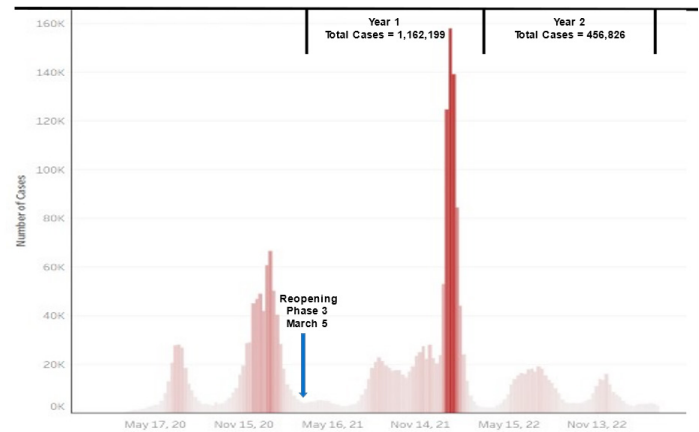
## Results

A COVID-19 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 were five case surges during the two years (Figure 1). In the first year, the dominant variant during the 2021 summer and fall surges was Delta, and Omicron was the dominant variant during the 2021-22 winter surge. Omicron

was the dominant variant in the second-year summer and winter surges, but the winter surge case numbers were significantly lower compared to the previous winter.

At the end of the Year 2 of Arizona Reopening Phase 3, there were 1,619,025 COVID-19 cases, 76,303 case hospitalizations, and 16,779 deaths associated with the virus in Arizona (see Table 1). There were lower numbers of cases, hospitalizations, and deaths in the second year than the first year.

**Figure 1:** Arizona Weekly COVID -19 Cases: January 1, 2020 to March 12, 2023.



Source: Arizona Department of Health Services Arizona COVID-19 Weekly Cases Graph

Table 2 tracks the weekly total and weekly numbers of COVID-19 cases, hospitalized cases, and deaths during the past 6 months (September 7, 2022 through March 8, 2023). The largest weekly numbers of cases (15,983) occurred on December 7, 2022 while hospitalizations (1,682) occurred on December 21, 2022. The largest weekly number of deaths were on December 28, 2022 and January 25, 2023 (144).

Figures 2-4 compare the numbers of COVID-19 cases, hospitalized cases, and deaths by age groups for the two years. A case could be *mild*, *moderate*, and *severe*. Most people recovered and did not require hospitalization. There was an increase of 1,619,025 cases during the two years.

The 20-44 years age group had the largest number of cases and the largest decrease in cases in Year 2 (Figure 2). There were more females (56.2%) than males (43.8%) who got the virus on March 8, 2023. The two largest state race/ethnicity groups diagnosed with COVID-19 were White, non-Hispanics (40%) and Hispanics (28%).

The percentages of total hospitalized cases (severe cases) decreased from 7 percent on March 6, 2021 to 6 percent on March 8, 2023. The case hospitalizations had increased by 76,303 during the study period. Seniors had the highest percent of the total hospitalizations (45.3% on March 8) and those under 20 years of age had the lowest percent (5.1%). Nineteen percent (18.5%) of seniors diagnosed

**Table 1:** Arizona Reopening Phase 3 Total Numbers of COVID-19 Cases, Hospitalizations, and Deaths: March 7, 2021 to March 8, 2023.

Time Period	Cases	Hospitalizations	Deaths
March 7, 2021 to September 4, 2021	202,240	14,859 (7.35%)	2,674 (1.32%)
September 5, 2021 to March 9, 2022	959,959	35,035 (3.65%)	9,093 (0.95%)
March 7, 2021 to March 9, 2022	1,162,199	49,894 (4.29%)	11,767 (1.01%)
March 10, 2022 to September 7, 2022	270,722	9,197 (3.40%)	3,072 (1.13%)
September 8, 2022 to March 8, 2023	186,014	17,212 (9.25%)	1,940 (1.04%)
March 10, 2022 to March 8, 2023	456,826	26,409 (5.78%)	5,012 (1.10%)
March 7, 2021 to March 8, 2023	1,619,025	76,303	16,779

Source: Arizona Department of Health Services COVID-19 Dashboard.  
Arizona 2022 population estimate is 7,359,197, July 1, 2022 – U.S. Census.

**Table 2:** Arizona Total and Weekly Numbers of COVID-19 Cases, Hospitalizations, and Deaths.

Date	Total Cases	Weekly Case	Tot. Hospital	Wk. Hospital	Tot. Deaths	Wk. Deaths
09-07-2022	2,258,040	3,666	116,954	492	31,162	48
09-14-2022	2,264,159	6,119	117,341	387	31,244	82
09-21-2022	2,268,158	3,999	117,625	284	31,326	82
09-28-2022	2,271,560	3,402	117,859	234	31,370	44
10-05-2022	2,275,235	3,675	118,099	240	31,406	36
10-12-2022	2,277,635	2,400	118,321	222	31,455	49
10-19-2022	2,283,073	5,438	118,606	285	31,514	59
10-26-2022	2,287,886	4,813	118,960	354	31,548	34
11-02-2022	2,293,015	5,129	119,326	366	31,573	25
11-09-2022	2,300,375	7,360	119,789	463	31,613	40
11-16-2022	2,311,150	10,775	120,214	425	31,647	34
11-23-2022	2,324,560	13,410	120,907	693	31,709	62
11-30-2022	2,337,547	12,987	121,942	1,035	31,751	42
12-07-2022	2,353,530	15,983	123,237	1,295	31,822	71
12-14-2022	2,365,080	11,550	124,797	1,560	31,929	107
12-21-2022	2,373,361	8,281	126,479	1,682	32,038	109
12-28-2022	2,378,334	4,973	127,887	1,408	32,182	144
01-04-2023	2,384,521	6,187	128,965	1,078	32,311	129
01-11-2023	2,391,895	7,374	129,905	940	32,503	192
01-18-2023	2,394,646	2,751	130,821	916	32,631	128
01-25-2023	2,398,200	3,554	131,487	666	32,775	144
02-01-2023	2,401,287	3,087	132,058	571	32,882	107
02-08-2023	2,404,386	3,099	132,538	480	32,936	54
02-15-2023	2,407,765	3,379	132,921	383	33,003	67
02-22-2023	2,434,631	26,866*	133,307	386	33,042	39
03-01-2023	2,440,294	5,663	133,698	391	33,076	34
03-08-2023	2,444,144	3,850	134,166	468	33,102	26

Arizona 2022 population estimate is 7,359,197, July 1, 2022 – U.S. Census.

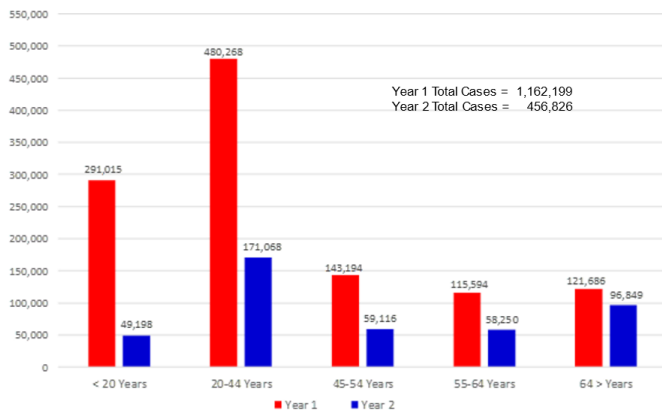
\*Adjustment – adding uncounted 2022 cases to the total.

with COVID-19 hospitalized, while 1.4 percent of those under 20 years of age were hospitalized. Only the 20-44 years age group had increased in number of hospitalizations in Year 2. There were more males (51.7%) than females (48.3%) hospitalized. Figure 3 shows the hospitalization numbers for each age group with the virus for the two-year period.

Figure 4 shows the numbers of deaths for each age group with the

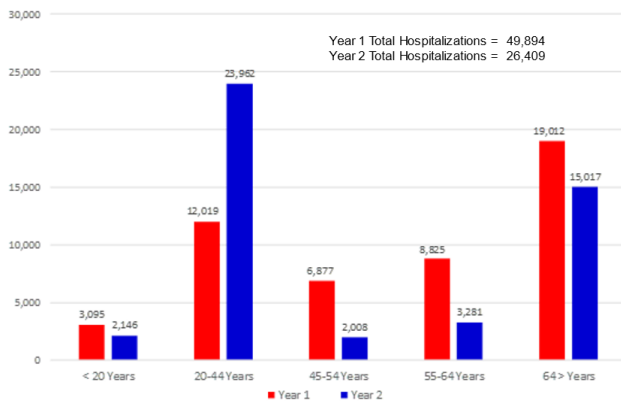
virus for the two-year period. The numbers of deaths had increased by 16,779 during the two years. The rates of fatalities per 100,000 population increased 227.05 to 454.40. As expected, seniors had the highest percent of total deaths (72.2% on March 8) and those under 20 years of age had the lowest percent (0.2). Seven percent (7.3%) of the seniors diagnosed with COVID-19 died, while 0.02 percent of those under 20 years of age died. There were more males (58%) than females (42%) who died.

**Figure 2:** Arizona Reopening Phase 3 COVID-19 Cases by Age Group for the Two Years.



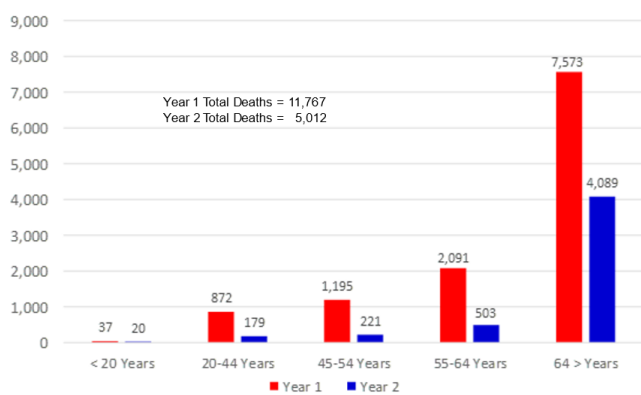
Source: Arizona Department of Health Services COVID-19 Cases by Age Groups Statistics

**Figure 3:** Arizona Reopening Phase 3 Hospitalized COVID-19 Cases by Age Group for the Two Years.



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

**Figure 4:** Arizona Reopening Phase 3 COVID-19 Deaths by Age Group for the Two Years.



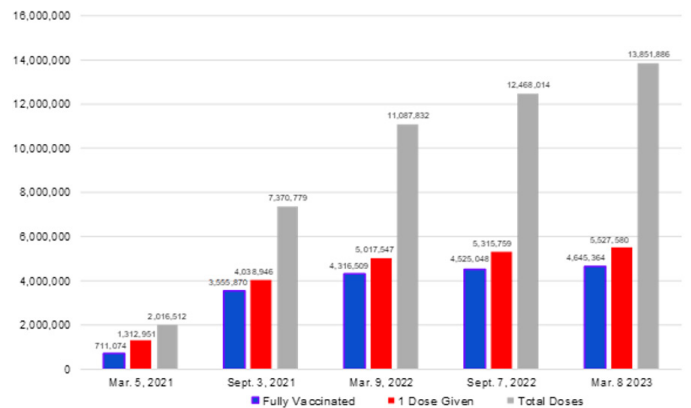
Source: Arizona Department of Health Services COVID-19 Deaths by Age Groups Statistics

The first U.S. COVID-19 vaccine, Pfizer/BioNTech Comirnaty, approved for emergency use authorization by the Food and Drug

Administration (FDA) on December 11, 2020. Arizona began to administer vaccines in late December. There were three vaccines (Pfizer/BioNTech Comirnaty, Moderna Spikevax, and Johnson & Johnson Jcovden) available in the first year. The fourth vaccine, Novavax Nuvaxivud, approved in July 2022. The vaccines provided different levels of protection against COVID-19 and its variants.

During Reopening Phase 3 (March 6, 2021 to March 8, 2023), there were 11,835,374 vaccine doses administered, and 3,934,290 fully vaccinated against the virus. Figure 5 shows the numbers of COVID-19 vaccines given in Arizona (persons fully vaccinated, persons receiving at least one dose, and total doses given) during the two years.

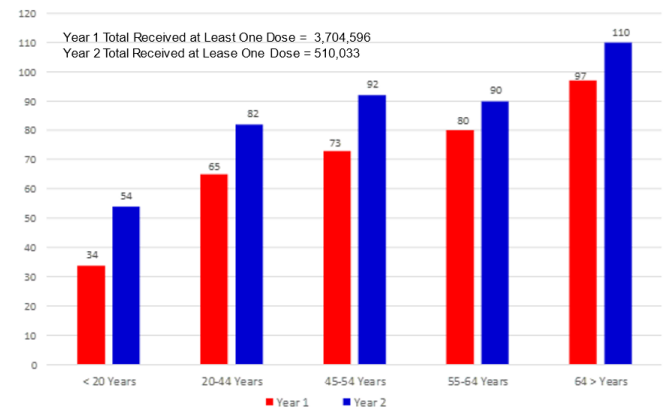
**Figure 5:** Arizona Reopening Phase 3 COVID-19 Vaccination Numbers: March 5, 2021 to March 8, 2023.



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

All the ages groups had increased their vaccination percentages between Years 1 and 2 (see Figure 6). Those 65 years and older had the highest vaccination percentage, while those under 20 years of age had the lowest.

**Figure 6:** Arizona COVID-19 Vaccination Percentage (at least one dose) by Age Group of Years 1 and 2.



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

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The number of vaccinations increased with the availability of several COVID-19 vaccine boosters. The first booster was Comirnaty approved in September 2021. Soon after, Spikevax booster became available. The latest booster approved was Nuvaxivud (October 2022). In August 2022, the FDA approved the new Pfizer/BioNTech and Moderna bivalent COVID-19 vaccines that include both the original virus and the Omicron BA.4 and BA.5. The bivalents used as another vaccine boosters.

## Discussion

After two years of the Reopening Phase 3, the virus had not disappeared, but was still active in Arizona. The state had moved to a new normal of low numbers of severe cases and deaths, and manageable hospitalization numbers. There were periodic case surges. The coronavirus case numbers decreased between the first and second years.

The three-pronged attack used against the virus included: (1) encourage preventive health behaviors, (2) increase vaccination numbers, and (3) use therapeutics. The highest priority in receiving the vaccines given to those who have the highest risks of getting the virus. As more people vaccinated and those infected recovered and have immunity against the virus; the numbers of severe cases, hospitalizations, and deaths would be low; COVID-19 would be manageable; and the state would be able to return to pre-pandemic normal [10].

On March 5, 2021, the Arizona Governor began Reopening Phase 3 (final phase) after the state had administered more than two million vaccine doses and several weeks of declining cases [9,10]. The state continued its efforts to vaccinate its population, and the vaccination numbers continued to rise. During the two years, the highest numbers of fully vaccinated persons occurred in the week of April 17 to 23, 2021 (249,755) [14]. Soon after, the pace of vaccination had slowdown.

The early vaccines became less effective against the later Delta and Omicron variants comparing to the original Alpha. There were breakthrough infections and vaccines waned over time. For those whose vaccine protection were waning, they received booster vaccines to extend their immunity protection. Even though the vaccines and boosters reduced the risks in getting a severe case, one could still get the virus. Some therapeutics became less effective against the new variants (e.g., the older monoclonal antibodies).

The public experienced COVID-19 fatigue (e.g., significant numbers did not wear masks during the 2022 summer and winter case surges and paid little attention to the daily/weekly number of case increases) [15]. Many felt the pandemic was over. There was more vaccine hesitancy in the second year than the first. There were 3,605,435 new fully vaccinated persons in first year, while only 328,855 in the second year in the state.

Many of the Arizona population had chronic anxiety/depression/stress associated with the virus [15]. There are many causes for the

mental anguish: the uncertainty of the virus, constant emergent of new variants, vaccine limitations, the lack control of the situation, and no end to the virus. There were people who had not adapted to the new normal and continued to limit their interactions with people.

Several characteristics are seen in the Arizona COVID-19 population. Those who had highest risk of acquiring COVID-19 were those immune compromised, who had severe medical conditions, adult 65 and older, and those who were obese. Those adults 20-44 years were the age group that had the highest number of cases. As expected, those who are under 20 years of age had the lowest numbers of case hospitalizations and deaths, while those 65 and older had the highest numbers of case hospitalizations and deaths. Women had a higher percentage of cases than men, but men had higher percentage of hospitalizations and deaths than women.

There were 1,619,025 COVID-19 cases, 76,303 case hospitalizations, and 16,779 deaths associated with the virus in Arizona at the end of the second year.

## Conclusions

The virus continues to mutate, multiply, spread, and infect the population. New variants emerge and resist vaccines and therapeutics in the state. During the two years, the numbers of cases, hospitalizations, and deaths have decreased. There have been cyclic case surges, and the normal is not zero cases. Going into the third year, the new normal has low numbers of severe cases and deaths, and manageable hospitalization numbers. The virus is moving toward the endemic phase.

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