

Research Article

Arizona Reopening Phase 3 and COVID-19: After 18 Months

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Abstract

There had been three Arizona COVID-19 Reopening Phases. On March 5, 2021, Arizona's Reopening Phase 3 began. The state is the sixth largest in size of the United States 50 states and about the same size as Italy. There were four case surges -- in the summer and fall 2021 with Delta variant, and the winter 2021-22 and summer 2022 with Omicron variants. This 18 months longitudinal study examined changes in the number of new COVID-19 cases, hospitalized cases, deaths, and vaccinations. There was an increase of more than 1.4 million cases during the study period. The data source used was from the Arizona Department of Health Services COVID-19 dashboard database. Even with the case surges, the new normal was low number of severe cases, manageable hospitalization numbers, and low number of deaths.

Keywords: COVID-19, Arizona returning to normal, Longitudinal study, Arizona and COVID-19

Introduction

The severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2) is also known as COVID-19 (coronavirus). It 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. Since the virus first appears in Wuhan, China in December 2019, there has been more than 600 million cases in the world. On September 7, 2022, Johns Hopkins University [1] reports that there are 606,889,445 total COVID-19 cases and 6,507,958 deaths associated with the virus in the world. The United States has the highest total cases (95,020,855) and deaths (1,048,989) in the world [1].

A three prong attack is used 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. The preventive health behaviors include, but not limited to, practicing physical and social distancing, washing hands frequently and thoroughly, and wearing face masks. Johns Hopkins reports that more than 12.18 billion vaccine doses have been administered in the world and the U.S. has administered more than 605 million vaccine doses (September 7, 2022) [1].

There has been three Arizona Reopening Phases. During Arizona's Reopening Phase 2 winter surge in 2020, ABC and NBC News report that the state has the highest new cases per capital in the world [2,3]. On September 7, Arizona is ranked 12th in total COVID-19 cases (2,258,040) and 11th in total deaths (31,162) of the 50 U.S. states [1]. Arizona is the sixth largest in size (113,990 square miles / 295,233 square kilometers) of the U.S. 50 states and is about the same size as

Italy (301,340 square kilometer) [4,5]. The state population estimate is 7,276,316 on July 1, 2021 [6].

A partnership between the U.S. federal government and each of the 50 states is required to address the COVID-19 pandemic [7,8]. 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 decide on what actions to take and when to carry out those actions; the state COVID-19 restrictions; when to carry out each reopening phase; and the state vaccination plan.

On March 5, 2021, 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 [9,10]. This eases more of the COVID-19 restrictions. 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 to normal.

The remainder of the paper examines Arizona Reopening Phase 3 (March 5, 2021 to September 7, 2022) looking at changes in the number of new COVID-19 cases, hospitalizations, and deaths.

Methods

This was an 18-months longitudinal study. The Arizona Department of Health Services (the state health department) COVID-19 dashboard database was the data source used. 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 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 positive home testing results.

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 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.

Results

A case could be *mild* (no symptoms), *moderate* (sick, but can recover at home), and *severe* (require hospitalization and/or result in death). There were four case surges during the Reopening Phase 3: 2 summers, 1 fall, and 1 winter. The 2022 cases (882,671) had already exceeded the 2021 total case numbers (838,836). Figure 1 shows the Arizona weekly COVID-19 cases during January 1, 2020 to September 10, 2022.

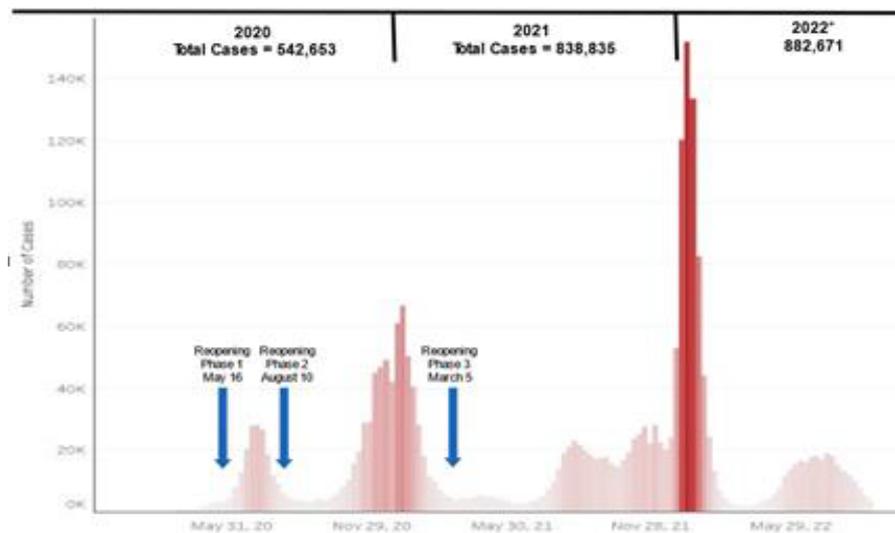
At the end of the 18 months of Arizona Reopening Phase (began March, 5, 2021), there were 1,432,921 COVID-19 cases, 59,091 case hospitalizations, and 14,839 deaths associated with the virus in Arizona (Table 1). There were higher percentages of hospitalizations, and deaths in the first 6 months of the first year than the following two 6-month periods.

Table 2 tracks the weekly total and weekly numbers of COVID-19 cases, hospitalized cases, and deaths during the past 6 months (March 9 through September 7, 2022). The largest weekly numbers of cases (20,198) occurred on July 6, while hospitalizations (1,955) occurred on March 9. The largest weekly number of deaths was on March 16 (457).

Figures 2-4 compare the numbers of COVID-19 cases, hospitalized cases, and deaths by age groups for the three 6-month periods. A case could be *mild*, *moderate*, and *severe*. Most people recovered and did not require hospitalization. There was an increase of 1,432,921 cases during the 18 months. The 20-44 years age group had the largest number of cases (Figure 2). There were more females (52.8%) than males (47.2%) who got the virus on September 7, 2022.

The percentages of total hospitalized cases (severe cases) decreased from 7 percent on March 6, 2021 to 5 percent on September 7, 2022. The case hospitalizations had increased by 59,091 during the study period. Seniors had the highest percent of the total hospitalizations (43.7% on September 7) and those under 20 years of age had the lowest percent (4.5%). Eighteen percent (18.1%) of seniors diagnosed with

Figure 1: Arizona Weekly COVID-19 Cases: January 1, 2020 to September 10, 2022.



Source: Arizona Department of Health Services Arizona COVID-19 weekly Cases Graph
*2022 cases as of September 14.

Table 1: Arizona Reopening Phase 3 Total Numbers of COVID-19 Cases, Hospitalizations, and Deaths: March 7, 2021 to September 7, 2022.

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 10, 2022 to September 7, 2022	270,722	9,197 (3.40%)	3,072 (1.13%)
March 7, 2021 to September 7, 2022	1,432,921	59,091	14,839

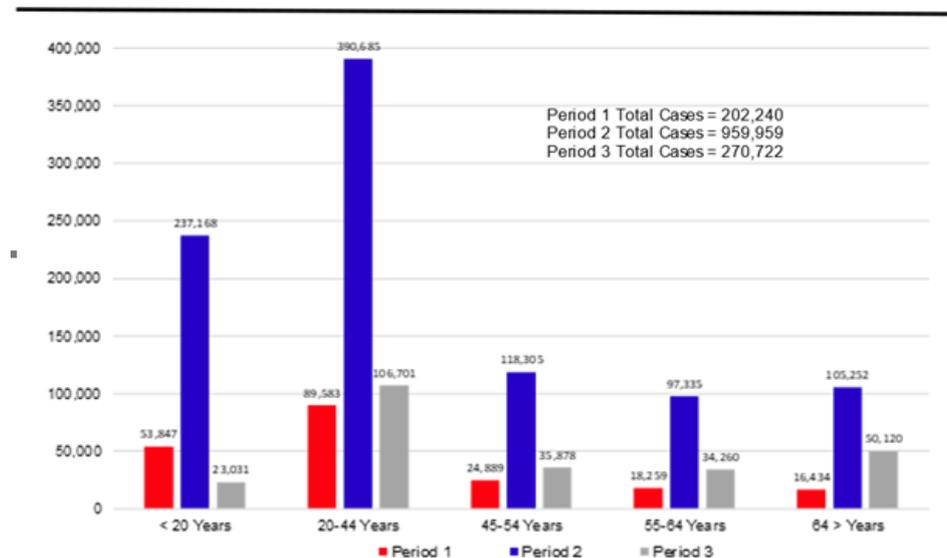
Source: Arizona Department of Health Services COVID-19 Dashboard.
Arizona 2021 population estimate is 7,276,316, July 1, 2021 – U.S. Census.

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
03-09-2022	1,987,318	6,549	107,757	1,955	28,090	382
03-16-2022	1,992,471	5,153	108,057	300	28,547	457
03-23-2022	1,997,037	4,566	108,259	202	28,883	336
03-30-2022	2,007,180	10,143	108,768	509	29,268	385
04-06-2022	2,014,020	6,840	108,953	185	29,681	413
04-13-2022	2,016,797	2,777	109,050	97	29,823	142
04-20-2022	2,019,174	2,377	109,262	212	29,852	29
04-27-2022	2,021,524	2,350	109,443	181	29,951	99
05-04-2022	2,025,435	3,911	109,539	96	30,189	238
05-11-2022	2,030,925	5,490	109,656	117	30,230	41
05-18-2022	2,038,129	7,204	109,820	164	30,259	29
05-25-2022	2,049,627	11,498	110,029	209	30,299	40
06-01-2022	2,062,669	13,042	110,202	173	30,332	33
06-08-2022	2,077,346	14,677	110,587	385	30,372	40
06-15-2022	2,093,680	16,334	110,871	284	30,400	28
06-22-2022	2,109,053	15,373	111,410	539	30,452	52
06-29-2022	2,125,567	16,514	111,903	493	30,515	63
07-06-2022	2,145,765	20,198	112,375	472	30,572	57
07-13-2022	2,161,045	15,280	112,759	384	30,632	60
07-20-2022	2,179,180	18,135	113,066	307	30,698	66
07-27-2022	2,196,429	17,249	113,414	348	30,768	70
08-03-2022	2,211,463	15,034	113,863	449	30,842	74
08-10-2022	2,224,964	13,501	114,277	414	30,901	59
08-17-2022	2,237,208	12,244	114,553	276	30,982	81
08-24-2022	2,245,713	8,505	115,907	1,354	31,047	65
08-31-2022	2,254,374	8,661	116,462	555	31,114	67
09-07-2022	2,258,040	3,666	116,954	492	31,162	48

Source: Arizona Department of Health Services COVID-19 Dashboard.
 Arizona 2021 population estimate is 7,285,370, July 1, 2021 – Arizona OEO.

Figure 2: Arizona Reopening Phase 3 COVID-19 Cases by Age Groups for Three 6-Month Periods.



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

COVID-19 hospitalized, while 1.1 percent of those under 20 years of age hospitalized. There were more males (52.2%) than females (47.8%) hospitalized. Figure 3 shows the hospitalization numbers for each age group with the virus for the three 6-month periods.

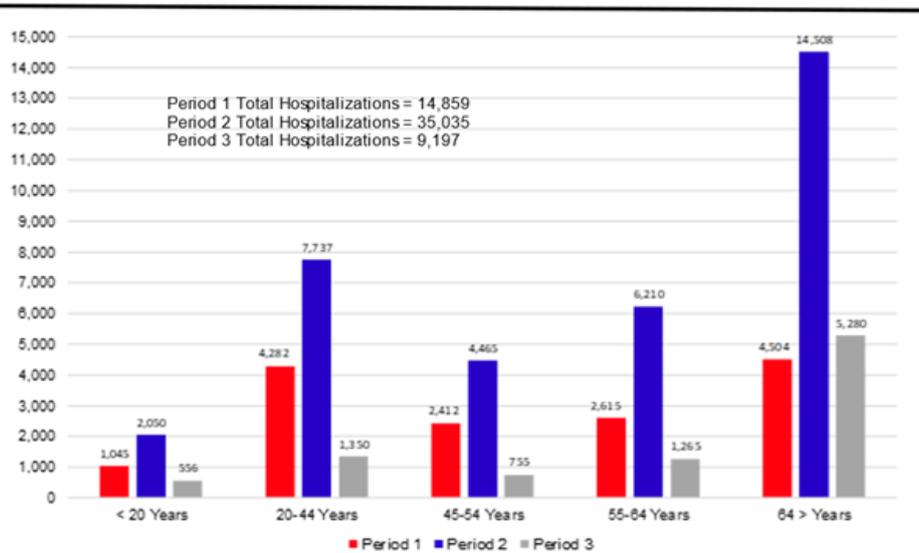
The numbers of deaths had increased by 14,839 during the 18 months. The rates of fatalities per 100,000 population increased 227.05 to 433.50. As expected, seniors had the highest percent of total deaths (71.3% on September 7) and those under 20 years of age had the lowest percent (0.2) Eight percent (7.9%) of the seniors diagnosed with COVID-19 died, while 0.01 percent of those under 20 years of age died. There were more males (59%) than females (41%) who died. Figure 4 shows the numbers of deaths for each age group with the virus for the three 6-month periods.

The first U.S. COVID-19 vaccine, Pfizer/BioNTech Comirnaty,

approved for emergency use authorization on December 11, 2020. In late December, Arizona began to administer vaccines. During Reopening Phase 3 (March 5, 2021 to September 7, 2022), there were 10,451,502 vaccine doses administered, and 3,813,974 fully vaccinated against the virus. Figure 5 shows the numbers of COVID-19 vaccines that were given in Arizona (persons fully vaccinated, persons receiving at least one dose, and total doses given) during the 18 months.

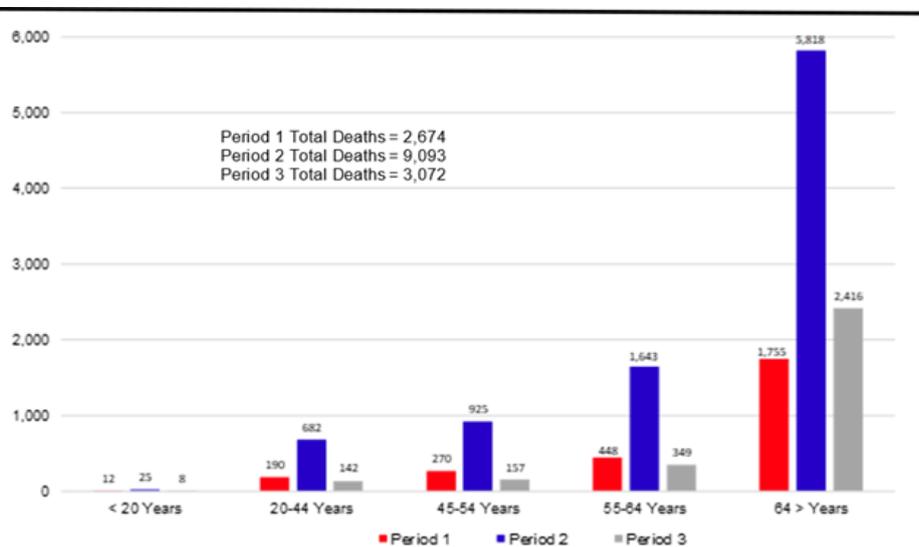
Initially, there were three vaccines available (Pfizer/BioNTech Comirnaty, Moderna Spikevax, and Johnson&Johnson Jcovden). Novavax Nuvaxivud became the fourth vaccine available in July 2022. The vaccines provided different levels of protection against COVID-19 and its variants. Those 65 years and older had the highest vaccination percentage, while those under 20 years of age had the lowest (Figure 6). It was expected the vaccination rates for this age group will increase with the approval of younger children vaccines use.

Figure 3: Arizona Reopening Phase 3 Hospitalized COVID-19 Cases by Age Groups for Three 6-Month Periods.



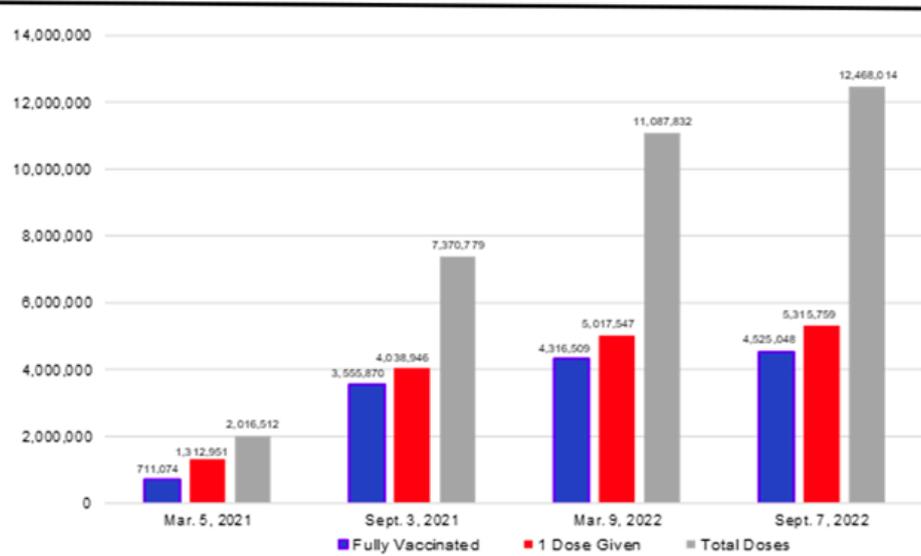
Source: Arizona Department of Health Services Hospitalized COVID-19 Cases by Age Groups Statistics.

Figure 4: Arizona Reopening Phase 3 COVID-19 Deaths by Age Groups for Three 6-Month Periods.



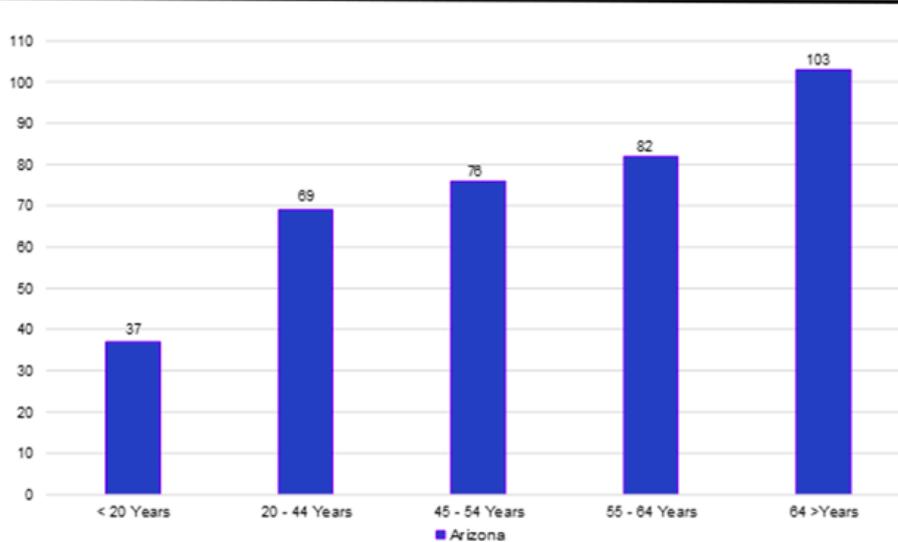
Source: Arizona Department of Health Services COVID-19 Deaths by Age Groups Statistics.

Figure 5: Arizona Reopening Phase 3 COVID-19 Vaccination Numbers: March 5, 2021 to September 7, 2022.



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

Figure 6: Arizona COVID-19 Vaccination Percentages (at least one dose) by Age Groups on September 7, 2022.



Source: Arizona Department of Health Services COVID-19 Vaccinations by Age Group Statistics.

Discussion

The Arizona Governor began Reopening Phase 3 (final phase of reopening) after the state had administered more than two million vaccine doses and several weeks of declining cases on March 5, 2021 [9,10]. The state continued its efforts to vaccinate its population. The number of vaccine dosages administered had increase from 2,016,512 on March 5, 2021 to 12,468,014 on September 7, 2022. Sixty-two percent (4,525,048) of the state population were fully vaccinated. The largest numbers of fully vaccinated persons occurred in the week of April 17 to 23, 2021 (249,755) [9,10]. The pace of vaccination began to slow down in June.

Arizona case numbers had decreased in the spring and early summer 2021. At the end of June, the Arizona State Legislature and

Governor had rescinded many of the state COVID-19 restrictions. The state used a three-pronged attack against the virus: (1) encourage preventive health behaviors, (2) increase vaccination numbers, and (3) use therapeutics. During the month of July, the highly contagious Delta variant appeared in the state and began the summer surge. Even with the increase vaccination efforts and other actions, they were not enough to stop the Delta variant. This resulted in the fall surge.

In December, the more contagious Omicron variant appeared in the state and began to surge. The Omicron variant surge in January 2022, and the cases remained high into early March. For more than two months in the spring, the cases were low. The state cases rose at the end May as the Omicron variants moved westward in the U.S. and began the summer surge. By late August, the cases declined.

It has been more than 32 months since the first COVID-19 cases appeared in Arizona on January 22, 2020; the state has not returned to pre-pandemic normal of zero cases and no face mask wearing. Most health facilities require both medical staff and patients wear masks. Many businesses require their staff wear masks and masking wearing is optional for customers, and they still have their virus protective glass/plastic barriers. There are signs of the public experiencing COVID fatigue (e.g., significant numbers did not wear masks during summer 2022 case surge and did not pay attention to the daily/weekly number of case increases).

Many still have anxiety/depression/stress associated with the virus. The causes for the mental anguish are 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 are persons who have not adapt to the new normal and have limited their interactions with people.

Overtime, the vaccines are not as effective against the later variants (Delta and Omicron) and Omicron subvariants as the original Alpha – breakthrough infections and wane over time. Even though the vaccines and their boosters reduce the risks in getting a severe case, one can still get the virus. There has been very little increase in the vaccination rate in the last six months -- the number of fully vaccinated percent increased only by 2.9 percent.

The Food and Drug Administration has approved both Pfizer and Moderna new bivalent COVID-19 vaccines that are effective against both the original virus and Omicron BA.4 and BA.5 variants on August 31, 2022. With the new vaccines, it is expected the vaccination rates will rise; the population immunity level will be high enough to keep the winter case surge lower than last year; and the state will move the closer to returning back pre-pandemic normal.

Conclusion

The vaccines, most of the Omicron variant cases are mild or moderate, and therapeutics have kept the number of hospitalizations and deaths low. Even with the occasion case surges, the state new normal are low number of severe cases, manageable hospitalization numbers, and low number of deaths.

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