



EXCESS MORTALITY IN ARIZONA DURING  
THE COVID-19 PANDEMIC



AZPHA  
Arizona Public Health Association

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Allan N. Williams, MPH, PhD  
Retired, Minnesota Department of Health (1984-2018)  
Adjunct Assistant Professor, University of Minnesota School of Public Health

Will Humble, MPH  
Executive Director, Arizona Public Health Association  
Director, Arizona Department of Health Services (2009-2015)

**Background:** On January 21, 2021, the Arizona Public Health Association documented a large and unprecedented increase in all-cause mortality in Arizona during 2020 as compared to recent years based on provisional 2020 data.

Beginning in February 2021, overall mortality was elevated every month of 2020 compared with the same month in 2019. The peak excess was seen in July with a total mortality rate 64% higher than the rate in July of 2019. While most of the excess was attributed to COVID-19, other causes were also elevated.

Published research has now documented the excess of all-cause and cause-specific mortality in the United States since the start of the COVID pandemic (see References for examples). Indeed, life expectancy in the US declined by 1.5 years between 2019 and 2020, the largest one-year decline since WWII ([CDC, Wolff et al, 2021](#)).

**Purpose:** The purpose of this report is to provide updated 2020 data and provisional and partial 2021 data on the excess of all-cause and selected cause-specific mortality in Arizona since the start of the COVID-19 pandemic.

**Methods:** Weekly, monthly, and annual all-cause and selected cause-specific deaths during 2020 and 2021 (through mid-November) were obtained from the CDC/NCHS web site, entitled "[Excess Deaths Associated with COVID-19](#)." In these detailed data sets, observed provisional deaths were compared to expected deaths based on statistical models of recent trends and seasonality from historical data.

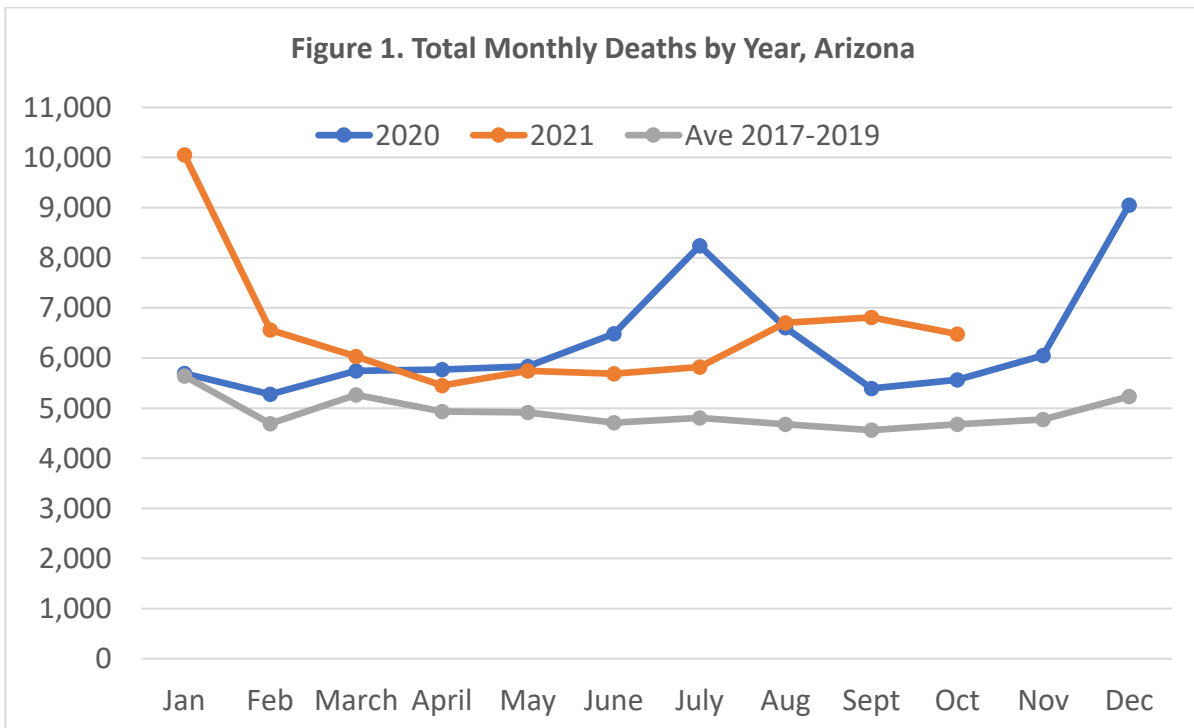
All-cause mortality with and without inclusion of COVID deaths are available; however, this report will focus on total mortality that includes COVID deaths to better characterize the overall impact of the pandemic on mortality in Arizona. Extensive methodologic details and data limitations are well-documented on the [CDC site](#) and will not be further detailed in this report. Additional data on all-cause monthly deaths was obtained from the Arizona Department of Health Services (ADHS).

**Findings:** As shown with the provisional 2020 data in the Feb. 2021 report, near final data for 2020 and provisional data for 2021 continue to demonstrate significant excess mortality throughout the course of the pandemic. **Figure 1** shows the total average monthly deaths for 2017-2019 (pre-pandemic), 2020 and 2021 based on [ADHS data](#). These data clearly show that excess mortality was not only evident for every month in 2020 (except January) but continued through the first 10 months of available data in 2021. The excesses are not attributable to small changes in the state population.

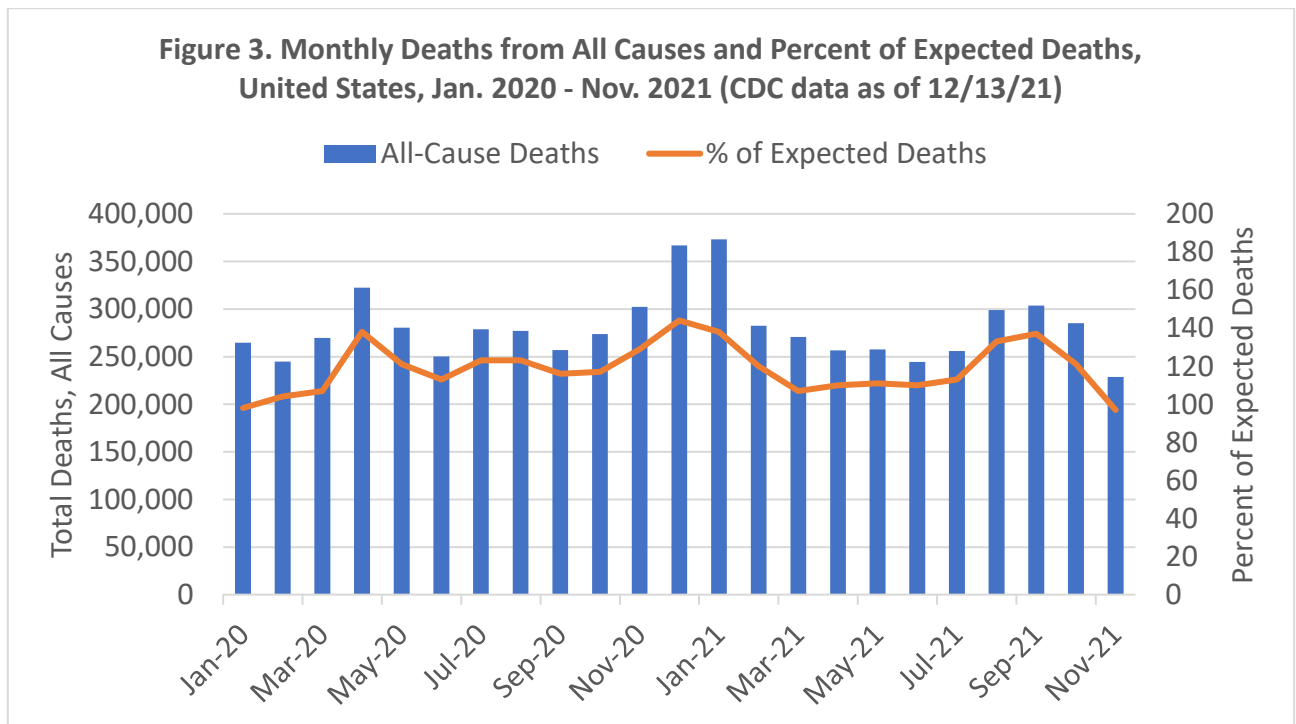
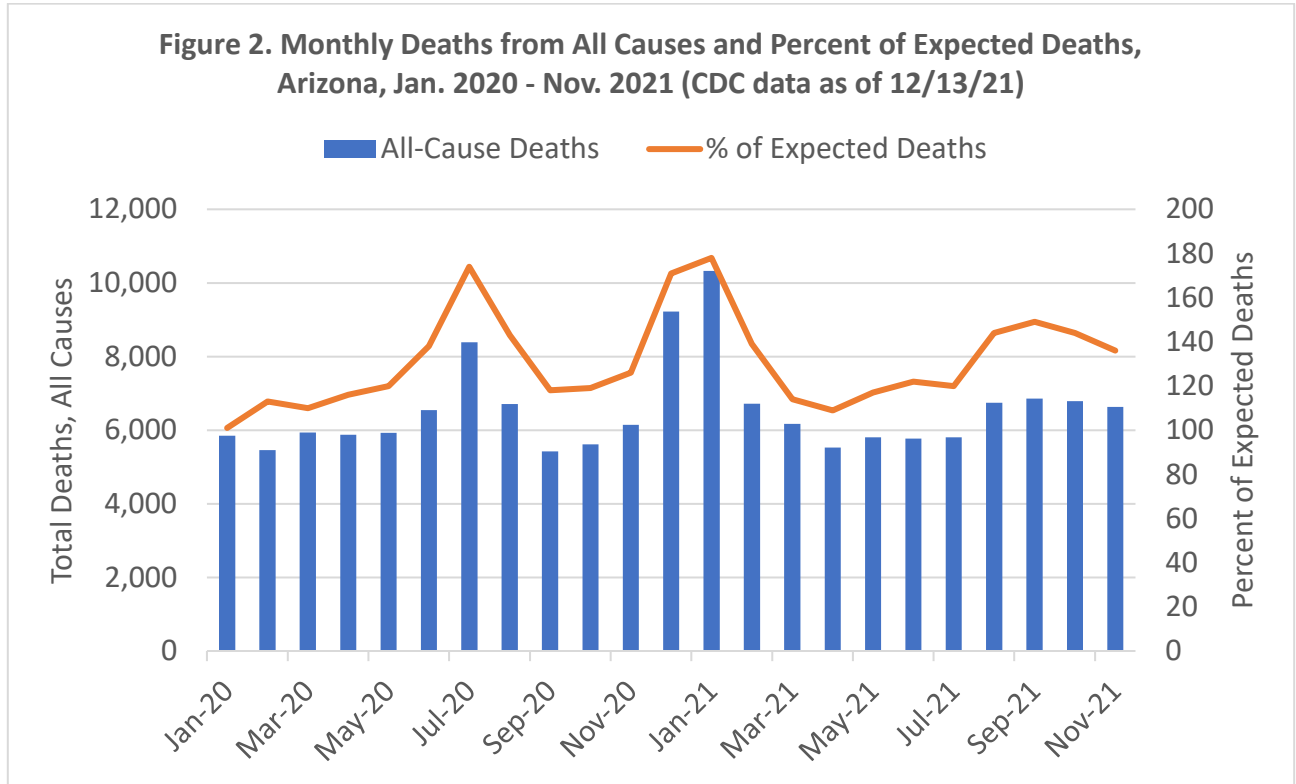
The two largest excesses (to-date) occurred in Dec. 2020 and Jan. 2021. The total number of deaths in Dec. 2020 (9,053) was 73% higher than in 2017-19. The largest peak of excess deaths followed in January 2021 when the largest COVID-19 surge occurred; 10,055 total deaths were reported that month, a death toll 78% higher than the average 5,642 deaths during that same month in 2017-19.

*Overall, ADHS data indicate there were 16,824 more deaths in 2020 than in 2017-19 (a 29% excess). According to ADHS, there were 8,430 known COVID-19 deaths in 2020, accounting for approximately 50% of the total excess. (CDC provisional data shown later differ somewhat from these numbers.)*

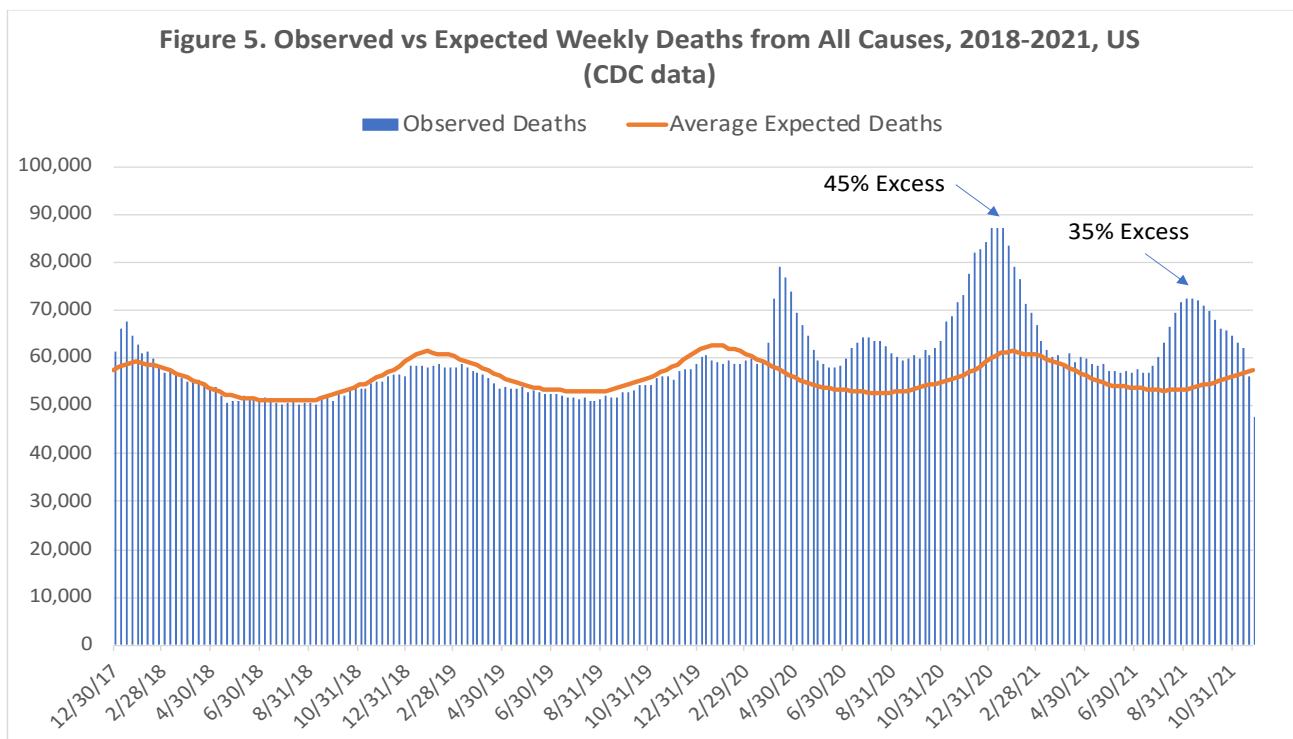
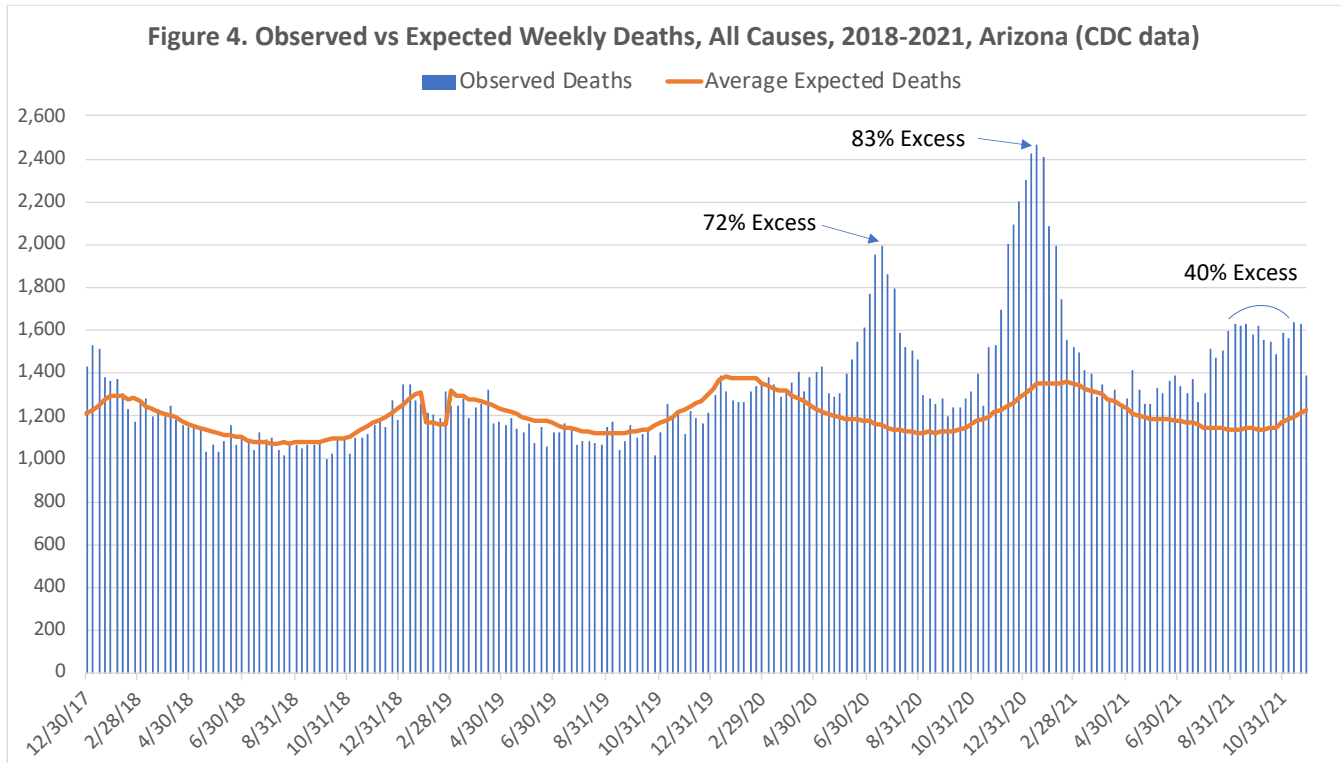
Due to very limited testing availability early in the pandemic, an increase in home and other out-of-hospital deaths in 2020, and other factors, substantial underreporting of COVID-19 deaths in 2020 occurred. Those deaths would have been attributed to other causes, contributing to the increase in all-cause mortality.



**Figure 2** shows monthly deaths from all causes and the percent of the expected deaths based on recent pre-pandemic trends. **Figure 3** shows those data for the entire US. *While the patterns of excess deaths are similar, the deaths in Arizona exceed the expected deaths to a greater degree than in the US.* The highest percent of expected deaths in Arizona was 178% (Jan. 2021), while the highest percent of expected deaths in the US was 144% (Dec. 2020).



Even greater excesses of total deaths are evident when examining weekly mortality data. CDC compared weekly provisional deaths in 2020 and 2021 to expected deaths based on five years of pre-pandemic deaths and statistical models.



**Figure 4** shows observed and expected deaths from all causes for the period 2018 through November-2021. Observed deaths began consistently exceeding expected deaths by April-2020, rapidly reaching a 72% excess by the week ending July 18-2020. This was followed six months later by an even greater 83% excess the week ending January 16-2021, during the largest COVID surge to date.

Beginning in August-2021, consistent excesses of 30-40% were found. **Figure 5** shows similar patterns for the US, although as with monthly data, the excesses are not as extreme as in Arizona.

**Figure 6** displays the percentage of all-cause excess deaths in all 50 states in 2020 and 2021. New York City had the greatest increase in excess total mortality (50%) during 2020 followed by Arizona, which had the 2<sup>nd</sup> highest total excess mortality (29% above expected).

*Remarkably, Arizona had the highest increase over expected all-cause mortality in the U.S. in 2021, with total mortality 24% higher than expected. Utah is a distant 2<sup>nd</sup> with total mortality 20% higher than expected during 2021. For perspective, New York City's total mortality during 2021 was only 7% higher than expected.*

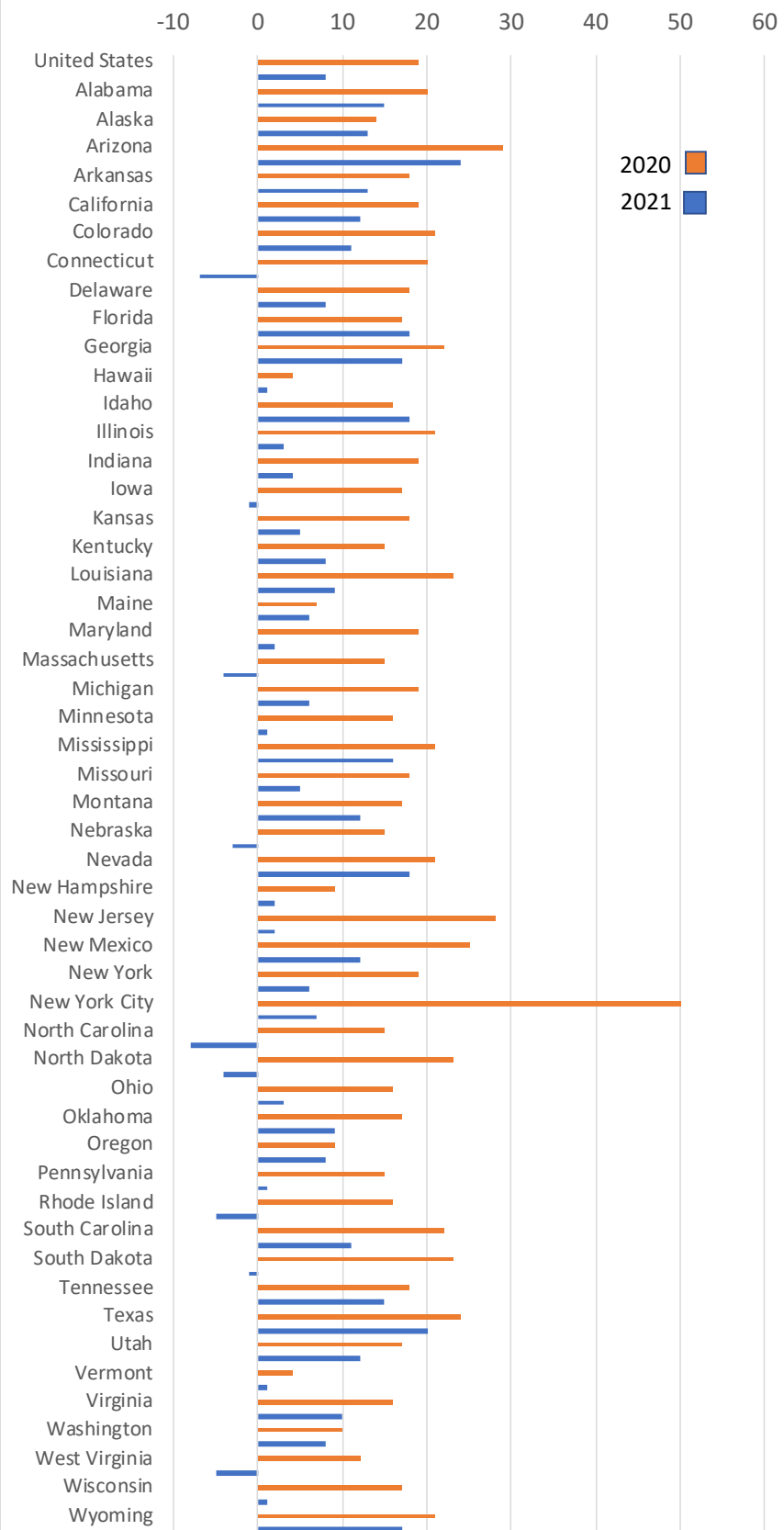
In **Figure 7**, we display the percentage change in rates among the 15 leading causes of death in Arizona during 2020 (in rank order as the leading causes of death during 2018-19). Heart disease, accidents, cerebrovascular disease, diabetes, and liver diseases were the dominant causes of excess mortality during 2020.

There was a 7% reduction in suicides in Arizona during 2020. We note this because of statements made by the Director of the Arizona Department of Health Services in 2020 suggesting that suicides were increasing because of mitigation measures. This was not the case. The Arizona suicide rate declined 7% in during 2020.

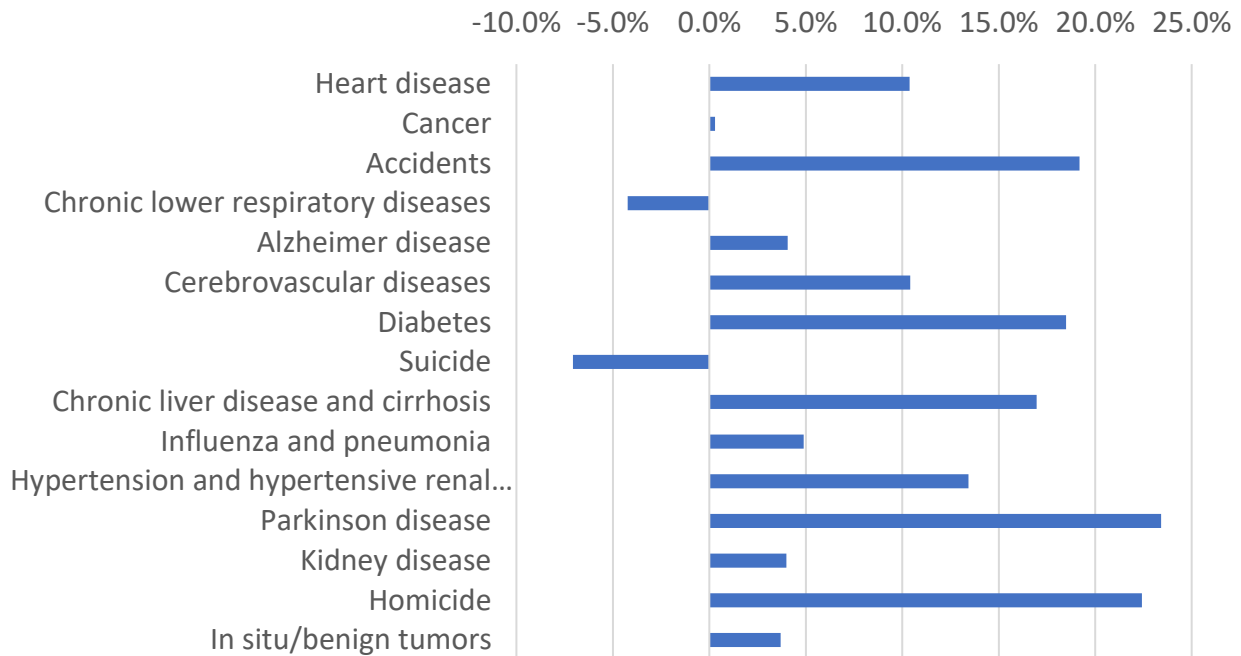
**Figure 8** shows provisional CDC data indicating the number of monthly COVID deaths in Arizona compared to the number of excess deaths from all causes, along with the percent (gray line) of the excess due to COVID (these figures differ slightly from the previously noted ADHS data).

Monthly percentages of excess deaths due to COVID varied widely, ranging from 12% of excess deaths (March 2020) to 89% (January 2021). Overall, approximately 58% of the excess deaths in Arizona could be attributed to known COVID deaths.

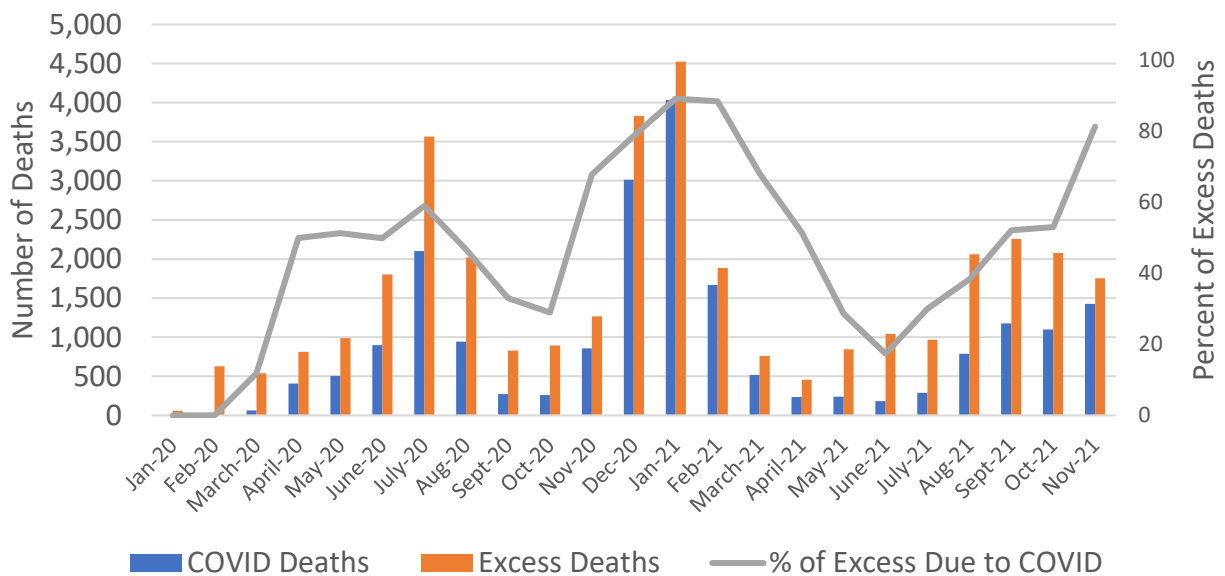
**Figure 6. Percent of Excess Deaths (All Causes) Over Expected Deaths, by State, 2020 and 2021 (CDC data as of 12/13/21)**



**Figure 7. Percent Change in the Rates of the 15 Leading Causes of Death from 2018-19 to 2020, Arizona (CDC provisional data for 2020)**



**Figure 8. Monthly COVID Deaths, Excess Deaths From All Causes, and Percent of Excess Due to COVID, Arizona, 2020-Nov2021 (CDC provisional data as of 12/13/21)**





For all causes of death, CDC provisional data ***indicate that since the start of the COVID pandemic, approximately 36,000 excess deaths have occurred in Arizona due directly or indirectly to the COVID pandemic.*** In the US, an estimated 902,000 excess deaths have occurred. These pandemic-related deaths have resulted in a decline of 1.5 years in average life expectancy between 2019 and 2020 in the US, the steepest one-year decline since WWII.

**Discussion and Conclusions:** As shown in this analysis and in numerous published studies, the COVID-19 pandemic has taken and continues to take an enormous toll in lives in Arizona, the US, and worldwide.

Excess deaths include known COVID-19 deaths, undercounted COVID-19 deaths attributed to other causes (especially early in the pandemic), overwhelmed healthcare systems and staff, and limits and delays in access to healthcare providers, exams, screenings, treatments, surgeries, and other medical needs (see References).

*Arizona continues to have one of the highest death rates in the US from COVID, trailing only four other states and New York City. As of Dec. 15, 2021, some 23,324 known COVID deaths have occurred in Arizona since the start of the pandemic.*

Tragically, 14,894 of these 2021 deaths occurred after safe and effective vaccines became readily available at no cost. As of Dec. 14, 2021, only 56.0% of the total population in Arizona have been fully vaccinated, [trailing 26 other states](#).

With the new more infectious variants (such as Delta and Omicron), vaccine booster shots are now considered essential for protection, but only 25% of Arizona residents have been fully vaccinated with a booster, putting Arizona among the 13 states with the lowest rates in the US.

A [Kaiser Family Foundation study](#) estimated that since vaccines became widely available in June, 2021, 163,000 U.S. COVID deaths could have potentially been prevented with vaccinations, 51,000 in September alone.

The slow uptake of vaccinations, the lack of vaccine and mask mandates, and the extreme politization of these proven effective public health measures ([PEW](#), [Brookings](#), [NY Times](#), [Kaiser Family Foundation](#)) will undoubtedly result in many more avoidable hospitalizations and deaths in Arizona.

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