



COVID-19 AS THE LEADING CAUSE OF
DEATH IN ARIZONA DURING THE
PANDEMIC: AN EVIDENCE REVIEW



AZPHA

Arizona Public Health Association

Arizona Public Health Association, October 20, 2021

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 and Purpose:

Public health agencies and the media have done an admirable job of reporting daily updates on the numbers and rates of COVID-19 cases and deaths, as well the number of people vaccinated. However, these numbers are often missing useful context that may better inform the public as to how serious a health risk COVID-19 still represents.

To provide additional context, we utilize publicly available mortality data to compare rates of COVID-19 deaths to the usual 15 leading causes of death in Arizona. This report is an update to the February 4, 2021, AzPHA report that included COVID-19 data during the first 322 days following the first known death in Arizona. This update includes COVID-19 data for 577 days (as of October 14, 2021) since the first known death. We also include opioid overdose deaths for additional perspective.

Methods:

Two measures were used for the comparing causes of death: average daily deaths and the crude rate of deaths per 100,000. COVID-19 deaths were obtained from the ADHS COVID-19 [Data Dashboard](#) for the period 03/17/20 (date of the first reported death in Arizona) until 10/14/21. The average daily COVID-19 deaths were calculated by dividing the total number of deaths by the number of days over which those deaths had occurred (577 days). Population data for Arizona for 2019 are from estimates by the National Center for Health Statistics. The annualized crude mortality rate for COVID-19 deaths was calculated as: $(\text{total deaths}) / (\text{state population} \times 577\text{d} / 365\text{d}) \times (100,000)$.

Data for the 15 leading underlying causes of death were obtained from the [CDC Wonder Online Database](#). Detailed final 2020 mortality data are not yet available from CDC or ADHS. However, annual mortality rates over the past decade, particularly for heart diseases and cancers (all types combined) have remained relatively constant. The 2019 data were therefore used to provide an estimate of the expected causes of death during 2020-2021 in the absence of the COVID-19

pandemic. CDC Wonder data included 15 disease categories and corresponding ICD10 codes, total deaths for each category, the July 2019 estimate of the state population, and the annual crude death rate per 100,000.

Findings:

The **Table 1** below shows CDC Wonder data for the 15 most frequent underlying causes of death in Arizona during 2019. Total deaths in 2019 were 60,236 (which differs very slightly from ADHS totals).

Table 1. 15 Leading Underlying Causes of Death in Arizona, 2019	Deaths	Population	Crude Rate
Heart Disease (I00-I09, I11, I13, I20-I51)	12,587	7,278,717	172.9
Cancer (C00-C97)	12,503	7,278,717	171.8
Accidents (unintentional injuries) (V01-X59, Y85-Y86)	4,558	7,278,717	62.6
Chronic lower respiratory diseases (J40-J47)	3,685	7,278,717	50.6
Alzheimer disease (G30)	3,047	7,278,717	41.9
Cerebrovascular diseases (I60-I69)	2,851	7,278,717	39.2
Diabetes (E10-E14)	2,173	7,278,717	29.9
Suicide (U03, X60-X84, Y87.0)	1,419	7,278,717	19.5
Chronic liver disease and cirrhosis (K70, K73-K74)	1,217	7,278,717	16.7
Essential hypertension and hypertensive renal disease (I10, I12, I15)	1,010	7,278,717	13.9
Influenza and pneumonia (J09-J18)	955	7,278,717	13.1
Parkinson disease (G20-G21)	807	7,278,717	11.1
Kidney Disease (Nephritis) (N00-N07, N17-N19, N25-N27)	760	7,278,717	10.4
Nutritional deficiencies (E40-E64)	417	7,278,717	5.7
Homicide (U01-U02, X85-Y09, Y87.1)	414	7,278,717	5.7

Figure 1 shows the average daily deaths from COVID-19 reported between 03/17/20 and 10/14/21 (577 days) compared to the 15 leading underlying causes of death during 2019 in Arizona. Since the date of the first reported COVID-19 death, there were 35.4 deaths per day on average, exceeding the average daily deaths from heart disease (34.5/day) and cancer (34.3/day) or any other cause.

As shown in **Figure 2**, the annualized crude rate of COVID-19 deaths per 100,000 to date (177.8) exceeds the 2019 annual crude rates for both heart disease (172.9) and cancer (171.8). It should be noted that the *annualized* crude rate shown here in Figure 3 is a different measure than the overall crude rate of COVID-19 deaths as shown on the [ADHS COVID-19 Data Dashboard](#) which is the number of deaths divided by the state population x 100,000 (284.5/100,000 as of Oct. 14, 2021).

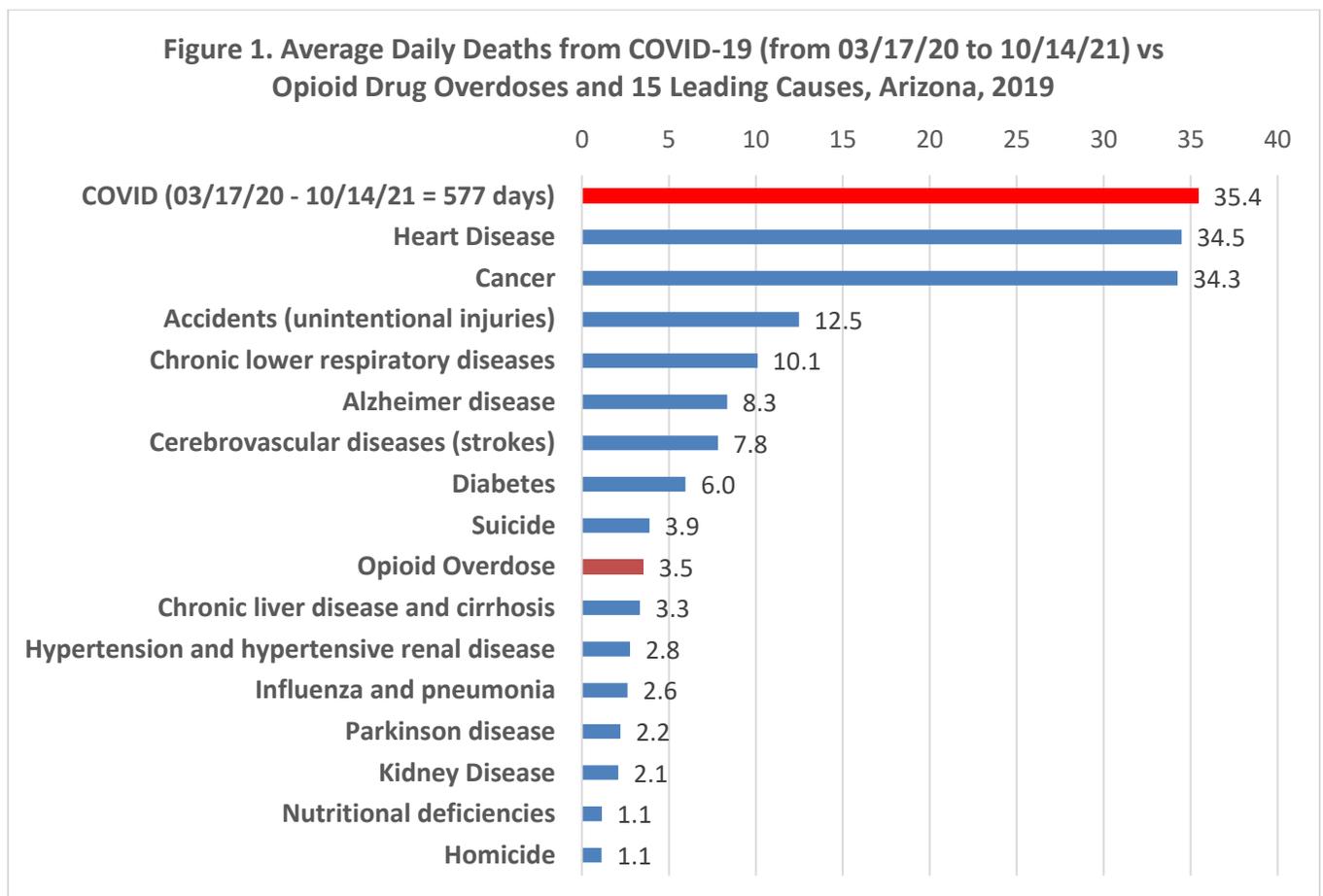
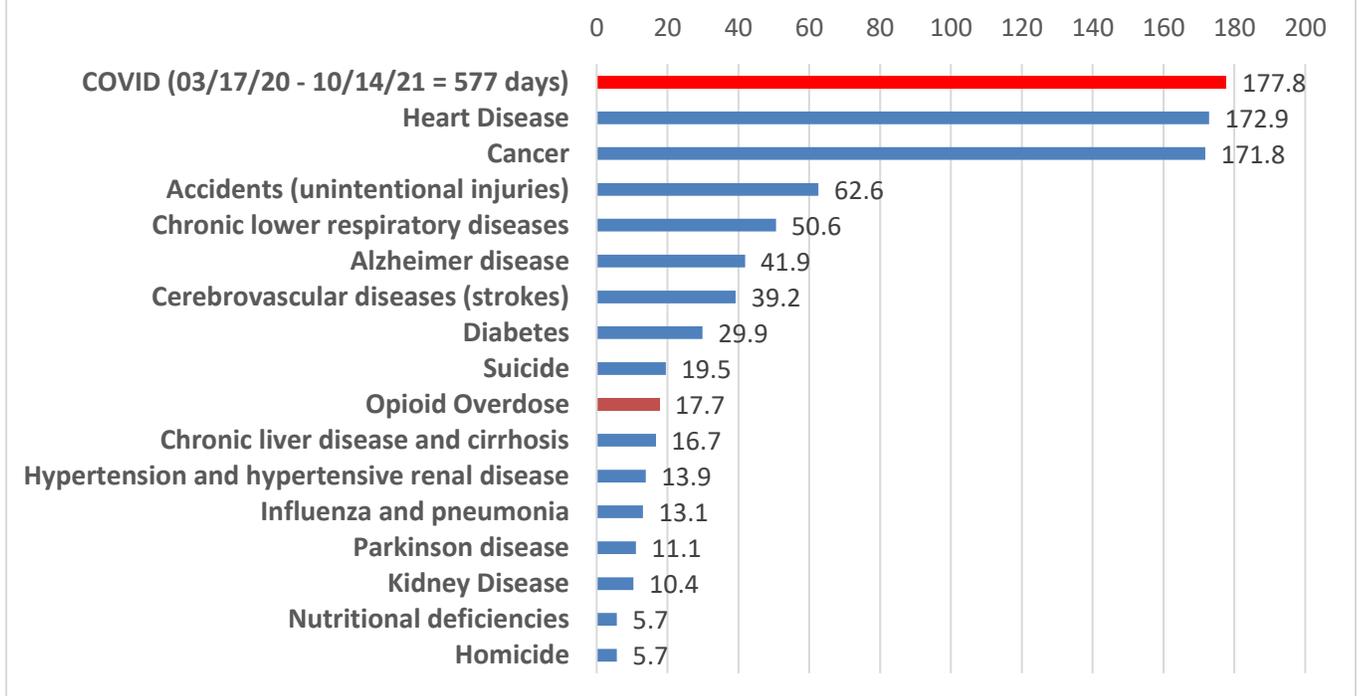


Figure 2. Average Annual Crude Death Rates per 100,000 for COVID-19 (from 03/17/21-10-14-21) vs Opioid Overdoses and 15 Leading Causes of Death, Arizona, 2019



For additional perspective, **Figures 3 and 4** compare the 2019 leading five causes of death, along with COVID-19 deaths, for Arizona, Washington State, and Colorado. Washington, the state with a population most similar in size to Arizona (only 4.4% larger than Arizona) had recorded 8,234 COVID-19 deaths as of Oct. 19, 2021, according to [CDC data](#). This can be compared to the 20,500 COVID-19 deaths in Arizona. COVID-19 is the third leading cause of death in Washington, trailing far behind cancer and heart disease deaths. COVID-19 death rates and average daily deaths are only 39% of those rates for cancer, the leading cause of death in Washington.

Colorado with a smaller population (1.5 million fewer than Arizona) had recorded 7,917 COVID-19 deaths as of Oct. 19. COVID-19 was again the third leading cause of death in Colorado, also trailing far behind cancer and heart disease deaths in that state. COVID-19 death rates and average daily deaths were 62% of those rates for cancer, also the leading cause of death in Colorado.

National data show a similar picture. COVID-19 remains the [third leading cause of death](#) in the US (data not shown).

Opioid overdose deaths are also shown in Figures 1 and 2. This preventable cause of death ranked among the top ten causes of death in Arizona in 2019. Furthermore, the number of overdose deaths has continued to rise in the US and in Arizona. Provisional data from the [National Center for Health Statistics](#) for the 12-month period ending December, 2020, indicated 1,928 opioid overdose deaths in Arizona or an average of 5.3 deaths/day, placing it between suicide and diabetes as a cause of death.

A more detailed AzPHA analysis from February 21, 2021, of opioid overdose death trends in Arizona between 1999 and 2019 is available on the [AzPHA website](#).

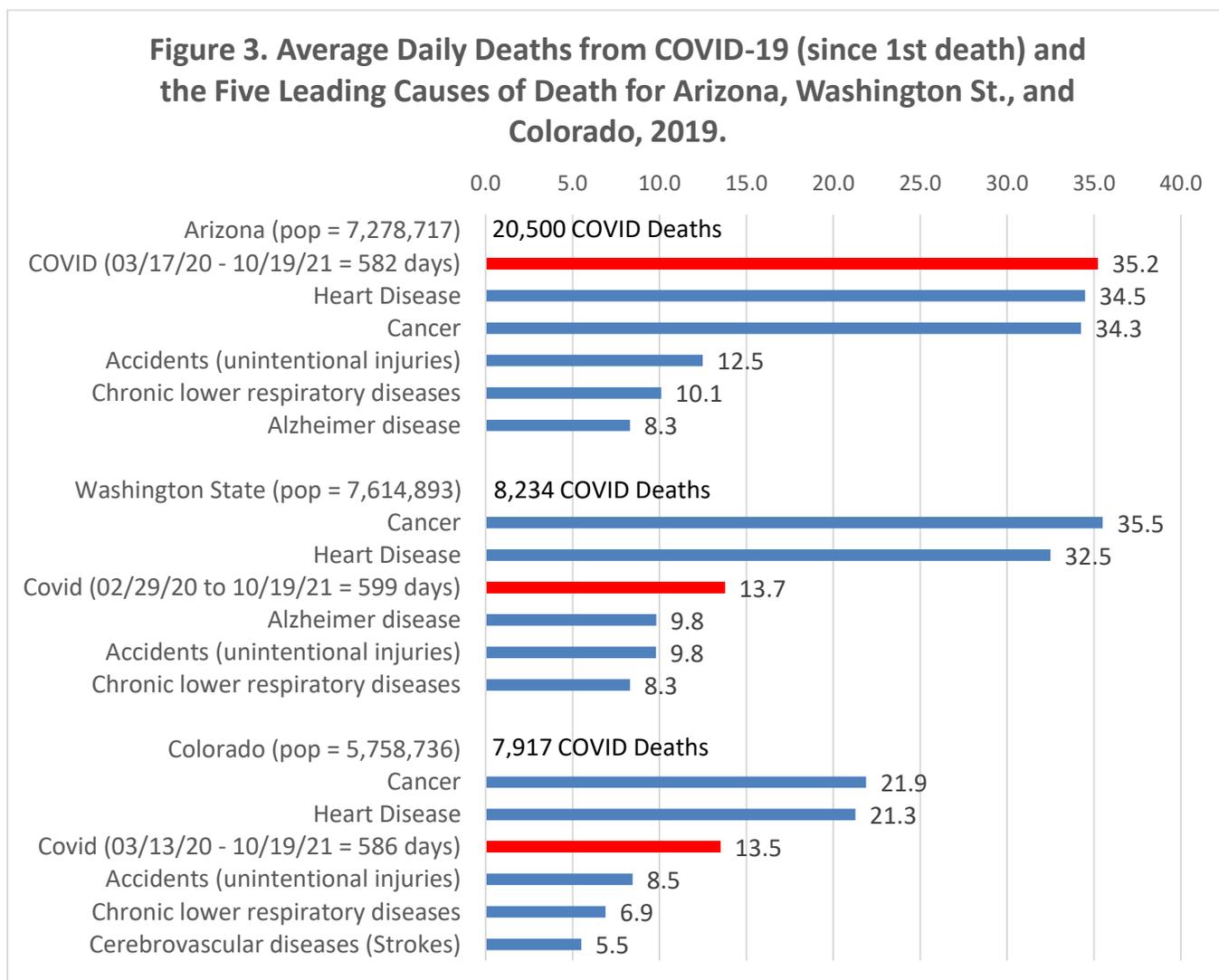
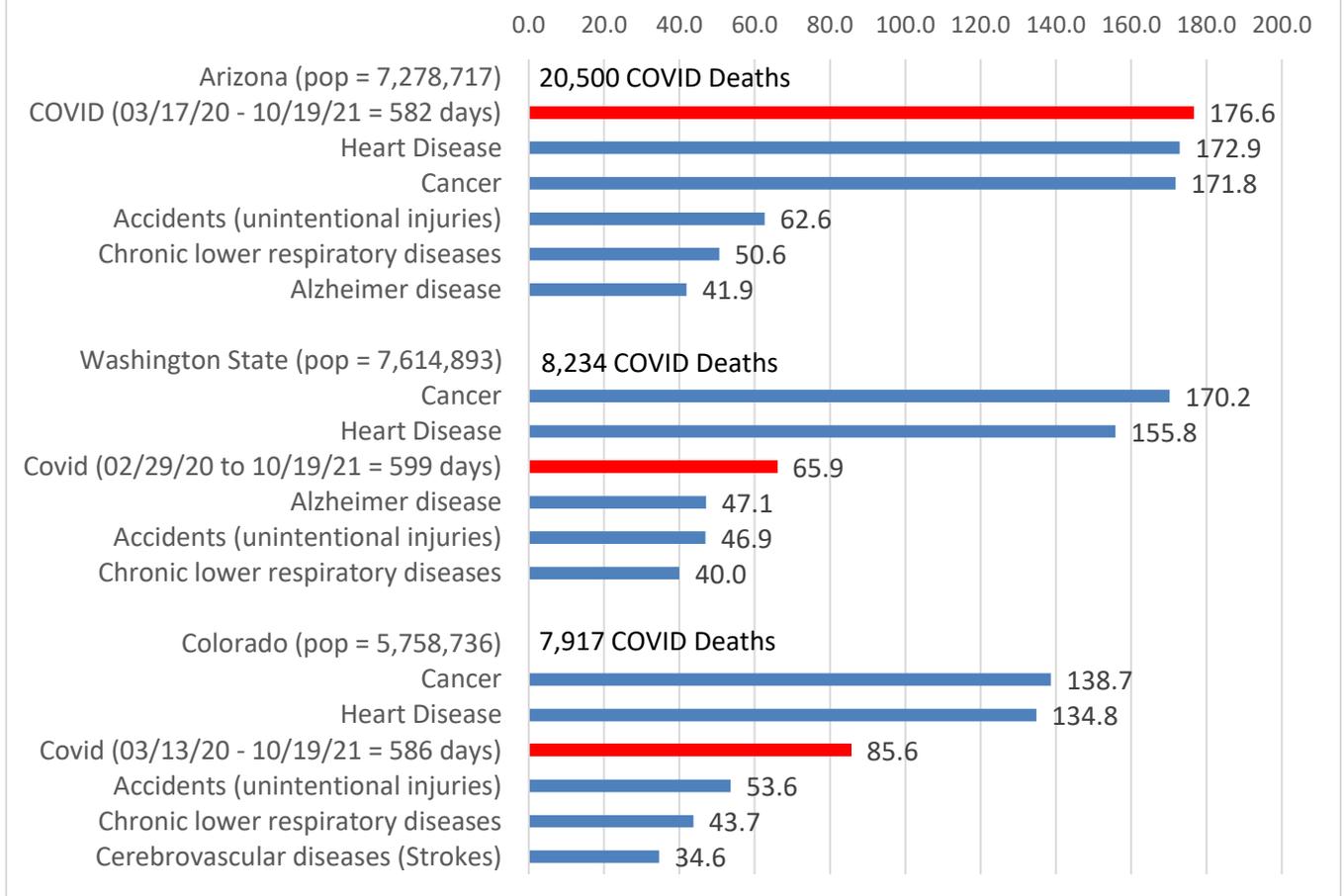


Figure 4. Average Annual Crude Death Rates per 100,000 for Total COVID-19 Deaths and the Five Leading Causes of Death for Arizona, Washington St., and Colorado, 2019.



Discussion:

The available data indicate that *COVID-19 remains the leading cause of death in Arizona and the third leading cause of death in the US.* [CDC data](#) as of October 15, 2021, indicated that the overall COVID-19 death rate in Arizona was 281/100,000, trailing only New York City and four other states. The overall rate for the US was 216/100,000. Despite the widespread availability of highly effective vaccines at no individual cost, the fact that COVID-19 deaths remain comparable in frequency to our two long-standing major killers – heart disease and cancer – is a sobering statistic and represents a deadly failure to control this pandemic.

The politicization of proven and effective public health preventative measures – vaccines and masks – have clearly contributed to the ongoing death toll as well as serious illness from COVID-19. As shown in **Table 2**, CDC data as of Oct. 16, 2021, indicate that only 56.8% of the US population had been fully vaccinated. The

situation in Arizona is even worse than in the US with only 51.0% of the Arizona population fully vaccinated according to the [ADHS COVID dashboard](#).

Table 2. COVID-19 Vaccination Rates as of Oct. 16, 2021		
	At Least One Dose	Fully Vaccinated
US - % of Total Population	65.8%	56.8%
US - % of Eligible Population (≥12 years of age)	76.9%	66.5%
AZ - % of Total Population	58.2%	51.0%
AZ - % of Eligible Population (≥12 years of age)	68.5%	Not Listed

The actual death toll due directly or indirectly to COVID-19 is likely to be considerably higher than the currently reported numbers. As previously noted in the January 24, 2021 AzPHA Report [2020 All-Cause Mortality Trends in Arizona During the COVID-19 Pandemic](#) and in recent media (*Arizona Republic*, Feb. 1, 2021 “Arizona Deaths Rose 25% in 2020”), preliminary 2020 mortality data show a significant increase (14,972 additional deaths) in overall deaths compared to 2019.

While most of this increase is clearly attributable to COVID-19 deaths, the AzPHA mortality analysis indicated that some 3,444 of the excess deaths were not reported as COVID-19 deaths. An increase of opioid overdose deaths from 2019 to 2020, while very concerning, accounts for only about 638 (4.3%) of the 14,972 excess deaths in 2020.

These findings are consistent with other national and state estimates of excess deaths vs COVID-19 deaths in 2020. For example, [Weinberger et al](#) found a 19% excess of overall deaths in the US from March through May 2020, with 78% of those deaths attributed to COVID-19. They also found that states varied widely in the proportion of excess deaths attributed to COVID-19 and noted that the discrepancy between total excess deaths and COVID-19 deaths could be influenced by such factors as the timing and intensity of testing, guidelines for recording suspected deaths without lab confirmation, and the location of the death (e.g., home vs hospital).

In a similar analysis, [Wolf et al](#) found that there was a 20% excess of expected deaths in the US from March through July 2020 and that 67% of that excess was attributed to COVID-19 and again with states varying widely in the proportion of the excess deaths attributed to COVID-19.

Unattributed deaths could reflect both undercounts of COVID-19 deaths and indirect effects of the pandemic. For example, [deferral of care for serious non-COVID-19](#) medical conditions or [reduced screenings](#) during the pandemic also account for a portion of the non-COVID-19 excess. Unfortunately, COVID-19 will remain a significant cause of death well into 2022.



AZPHA
Arizona Public Health Association