

2020 ALL-CAUSE MORTALITY TRENDS IN ARIZONA DURING THE COVID-19 PANDEMIC



Arizona Public Health Association, January 21, 2021

Our Question: What is the magnitude of the increase in all-cause deaths in Arizona during the SARS CoV2 pandemic (January – December 2020)?

Our Method: We reviewed the [population health](#) and [vital statistics](#) data collected by the Arizona Department of Health Services from 2011 to 2020 and calculated total mortality rates per 100,000 populations. Because total mortality rates vary by month, with peak rates in December through March, we calculated rates per month for this 10-year period to capture all-cause mortality trends.

For our analysis, we:

- Pulled death data from ADHS vital statistics by month
- Pulled population estimates data 2011-2019 from ADHS population health and vital statistics, population denominators
- Projected estimate for 2020 population based upon the prior 3-year average annual population growth
- Calculated rates (# of deaths in a month/ estimated population in corresponding year) * 100,000 and Percent change [(new year's rate - previous year's rate)/ previous year's rate] *100

| | Annual Population | Percent Change |
|-----------------------------------|--------------------------|------------------------------------|
| 2016 | 6,835,518 | |
| 2017 | 6,965,897 | 1.9% |
| 2018 | 7,076,199 | 1.6% |
| 2019 | 7,189,020 | 1.6% |
| 2020 (not provide by ADHS) | 7,311,233 | $(1.9+1.6+1.6)/3 =$ 1.7% |

Our Findings: We found a large increase in all-cause mortality in Arizona during 2020 as compared to previous years. Significant

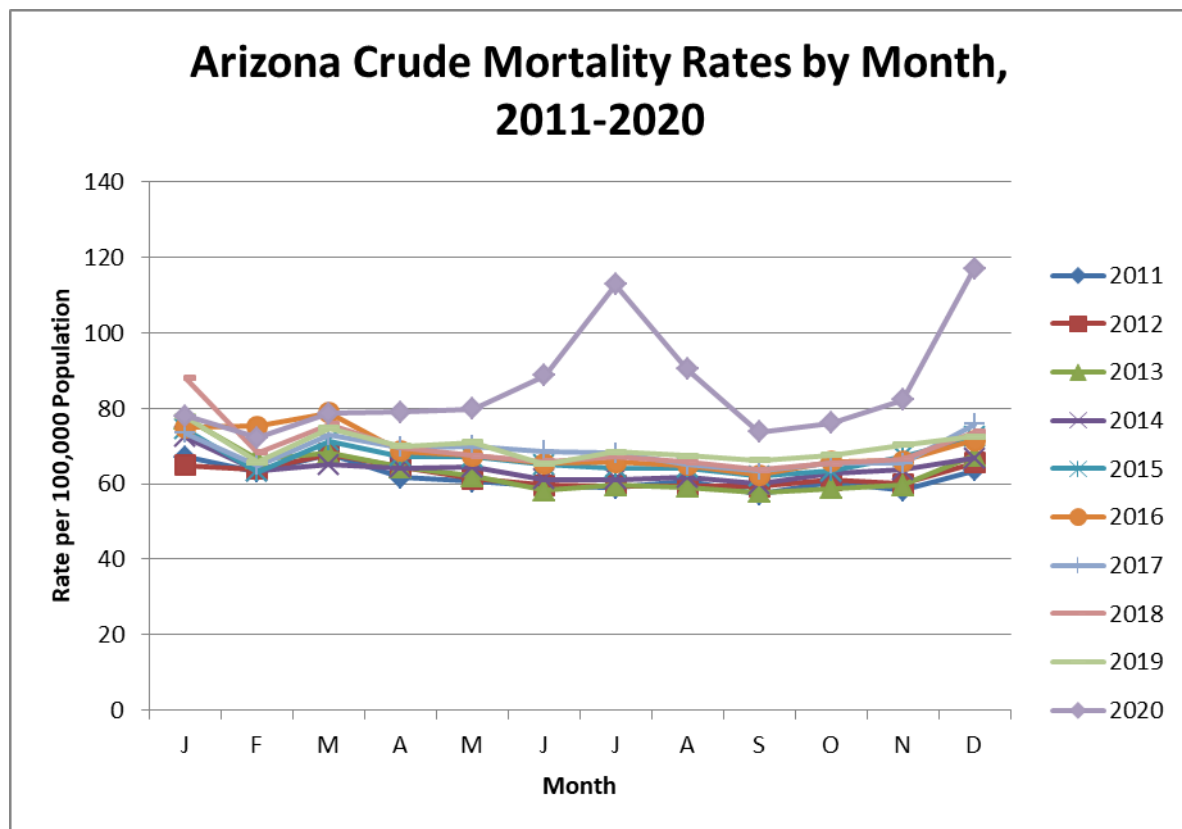
increases in all-cause mortality are seen in June and August with profound increases in July and December.

Table 1 (below) displays positive percent change between 2019 and 2020. July had the largest percent change with a 64% increase in July 2020 when compared to 2019. Total mortality in December 2020 was 61% higher than 2019.

| Arizona Crude Mortality Rate Percent Change, 2019-2020 (Deaths per 100,000) | | | |
|--------------------------------------------------------------------------------------------|--------------|---------------|---------------|
| | 2019 | 2020 | % Δ |
| January | 77.8 | 77.8 | 0.05% |
| February | 65.7 | 72.1 | 9.82% |
| March | 74.7 | 78.5 | 5.15% |
| April | 69.9 | 78.8 | 12.77% |
| May | 70.9 | 79.7 | 12.45% |
| June | 65.2 | 88.6 | 35.96% |
| July | 68.4 | 112.7 | 64.62% |
| August | 67.4 | 90.2 | 33.84% |
| September | 66.1 | 73.6 | 11.29% |
| October | 67.5 | 76.0 | 12.50% |
| November | 70.3 | 82.1 | 16.70% |
| December | 72.5 | 117 | 61.38% |
| Total | 836.8 | 1027.6 | 22.8% |

From 2011-2019, all-cause mortality death data are consistent from year to year with increased total mortality from December through

March. All-cause mortality increased significantly in 2020, with an increase in deaths beginning in April 2020, large increases in June and August and profound increases in July and December (Figure 1, below).



Discussion: Arizona has **recorded 14,972 more deaths in 2020** as compared to 2019. According to the Arizona Department of Health Services data dashboard, about **11,528** of these deaths have been a direct result of a SARS CoV2 infection. This suggests that an additional **3,444** deaths during this period may be indirectly attributable to the pandemic.

For example, persons with chronic obstructive pulmonary disease may have developed a mild SARS CoV2 infection that worsened their underlying medical condition. Only a more detailed review of the medical record and death certificate would reveal that the coronavirus was a core cause of the death.

Perhaps of most importance, non-emergency procedures were not available for many Arizonans unless the procedure was urgent. This

causes delays in care that may be responsible for many of the additional deaths.

There is also ample evidence that delayed care during the late spring and early summer because of fears of coronavirus infections in healthcare facilities. These decisions may have also resulted in deaths indirectly related to the novel coronavirus because of the social disruption caused by the rapid increase in cases Arizona experienced in June and July.

**All-Cause Mortality by Month in Arizona
(total deaths)**

| Month | 2019 | 2020 |
|---------------------|----------------------|----------------------|
| January | 5,595 | 5,693 |
| February | 4,724 | 5,276 |
| March | 5,372 | 5,745 |
| April | 5,029 | 5,767 |
| May | 5,098 | 5,830 |
| June | 4,689 | 6,483 |
| July | 4,923 | 8,242 |
| August | 4,848 | 6,599 |
| September | 4,755 | 5,382 |
| October | 4,858 | 5,559 |
| November | 5,058 | 6,003 |
| December | 5,212 | 8,554 |
| <u>Total</u> | <u>60,161</u> | <u>75,133</u> |

Some have suggested that a substantial portion of the increase in all-cause mortality is attributable to heat-related deaths, unintentional poisonings with opioids or suicides. Our review revealed no evidence that this is the case.

For example, an [August 11, 2020 report from Dr. Gregory Hess](#), Chief Medical Examiner for Pima County concluded that: "*Suicide deaths in Pima County have not increased in 2020. There was a thought that Stay at Home Orders and the social isolation caused by it could have increased the number of suicide deaths in Pima County. These deaths have not increased in 2020.*" The same report could find no link to accidental poisonings and the increases in total mortality in 2020. However, we still need to stay vigilant by improving strategies to enhance preventative health services in these areas.

Our Conclusions: The COVID-19 pandemic is having a profound impact on public health in Arizona. We found clear and convincing evidence that total mortality has substantially increased during 2020, particularly in June, July, and December.

Indeed, the total mortality rate per 100,000 during July 2020 was 64% higher than July 2019. December 2020 was 61% higher than 2019. Total deaths in 2020 in Arizona were 14,972 higher than in 2019. Total mortality in 2020 was 23% higher than 2019 mortality.

These findings are consistent with the exponential growth in the number of persons infected with COVID-19 during the summer and winter in Arizona.

We find that the increases in deaths are highly likely correlated with the direct and indirect effects of the pandemic including COVID-19 disease and delayed or suspended care for non-COVID illnesses. We could find no evidence that suicides or accidental poisonings are responsible for this increase.