

Excess mortality in Riverside County during the COVID-19 pandemic 2015-2019 5-Year Average vs. 2020 and 2021

ABSTRACT

An important strategy for assessing the impact of the COVID-19 pandemic is to evaluate the overall excess of deaths as compared to previous years. This brief uses the 2015-2019 average age-adjusted all-cause mortality rate as a baseline comparison to 2020 and 2021 rates. By December 31, 2021, Riverside County had reported 398,993 COVID-19 cases and 5,585 COVID-19 deaths.

INTRODUCTION

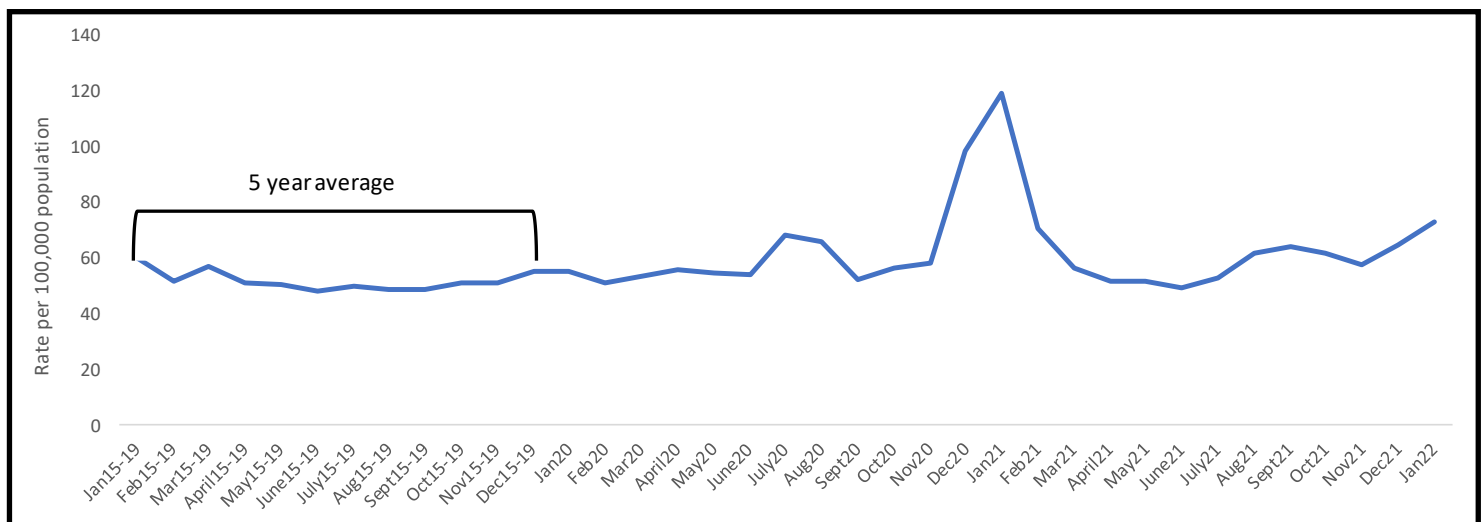
In 2020 and 2021, the age-adjusted mortality rate for all causes of death in Riverside County were 15% and 21%, greater than the baseline rates. Significant disparities are observed in all-cause mortality rates among males, Latinx, and Black populations.

The mortality rate in 2020 was 22% higher for males, 41% greater for the Latinx (all genders) population, 34% greater for the Black/African American population and 6% greater for the White population compared to the 5-year average. In 2021, the mortality rate among males was 27% higher, 45% higher among the Latinx population, 31% higher among the Black/African American population and 10% higher among the white population than the five year average, 2015—2019.

KEY POINTS

- The 2020 and 2021 death rates are 15% and 21% higher than the five-year average for 2015—2019.
- Significant excess mortality was observed among the Black, Latinx, and White communities, with substantial disparities seen in Black and Latinx compared to White.
- Mortality rates in 2021 were higher among males (27%), Latinx (45%), Black/African American (31%), and white populations (10%) compared to the 2015-2019 average.
- Excess deaths were 4,329 and 6,147 for 2020 and 2021 over the average for 2015-2019.
- In 2020, Black and Latinx populations experienced six to seven times the percent increase in death rates compared to the White population.
- In 2021, the rates were three to four times higher in Black and Latinx populations compared to the White population.

Figure 1: All-Cause Mortality Rates 2015 - 2021

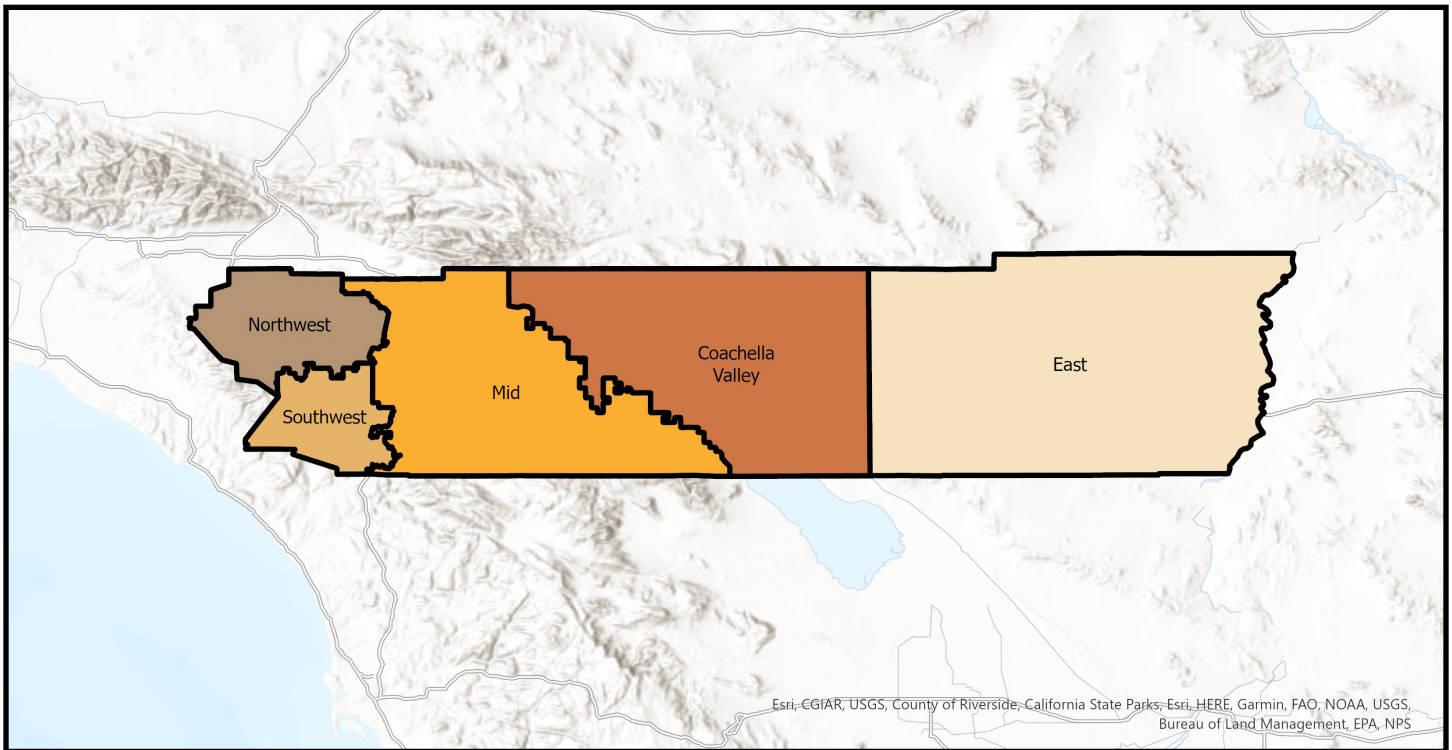


METHOD

Age-adjusted rates using the 2000 standard U.S. population were used to adjust for population growth and changes in age group. Using Riverside County mortality data for the years 2015-2021, an excess mortality analysis was conducted using rate ratios (RR) and 95% confidence intervals (CI) for total deaths, gender, race/ethnicity and county region reported on death certificates. Using 2020 and 2021 provisional death data downloaded March 2022, we calculated age-adjusted 2020 and 2021 mortality rates and compared them to average age-adjusted rates for 2015-2019 by 2-week intervals.

This analysis required statistically stable rates for each of the two week periods under investigation. Due to this limitation, only the largest three racial/ethnic populations (Black/African American, Latinx, White) in Riverside County are discussed in this brief.

Figure 2: Riverside County Regions



RESULTS

In Riverside County, the excess mortality associated with the first two years of the COVID-19 pandemic was 10,476 in the 24 months between January 1, 2020 and December 31, 2021. This represents 4,891 more deaths than those reported as directly attributable to COVID-19 for this time period.

The highest average rate of excess mortality over the 24 months, occurred in the Mid region (1,272.0 per 100,000) followed by Coachella Valley (1,137.1 per 100,000). The lowest occurred in Northwest county (average 741.5 per 100,000).

The 5-year average mortality count (2015-2019) is 16,668 deaths/year. In 2020 and 2021, there were 21,565 and 22,782 deaths registered with the Riverside County Office of Vital Records.

Significant excess mortality was detected among both males (RR 1.22, CI 1.18 – 1.25) and females (RR 1.11, CI 1.08 – 1.14). In 2020, compared to the 2015-2019 average, excess mortality was observed among Black/African American, Latinx, and White populations. It was significantly higher among the Latinx population (RR 1.41, CI 1.35 - 1.46) and the Black population (RR 1.34, CI 1.24- 1.45) compared to the White population (RR 1.06, CI 1.04 - 1.09).

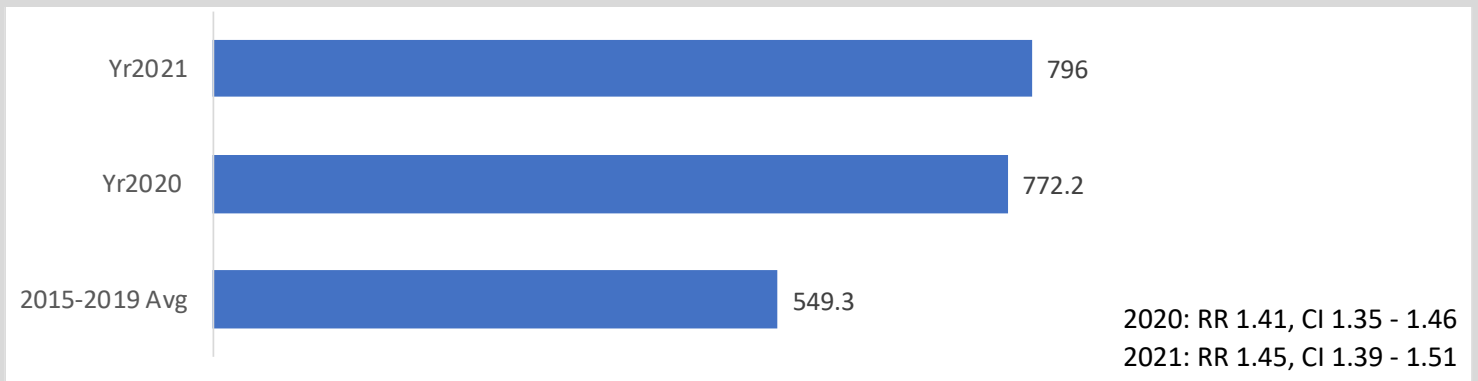
In 2021, similar trends were noted for gender and race/ethnicity rates. Significant excess mortality was also detected among males (RR 1.27, CI 1.24 – 1.30) and to a lesser degree among females (RR 1.15, CI 1.12 – 1.19). Excess mortality was also observed among Black/African American, Latinx, and White populations, and with significant increases among Latinx population (RR 1.45, CI 1.39 - 1.51) and Black/African American (RR 1.31, CI 1.21- 1.41) populations compared to White population (RR 1.10, CI 1.08 - 1.13).

Figure 3: DIFFERENCE IN MORTALITY RATES BY RACE/ETHNICITY IN RIVERSIDE COUNTY
*Calculated using age-adjusted mortality rates (per 100,000 population),
 2015-2019 5 Year Average vs. 2020 and 2021*

BLACK or AFRICAN AMERICAN



LATINX



WHITE

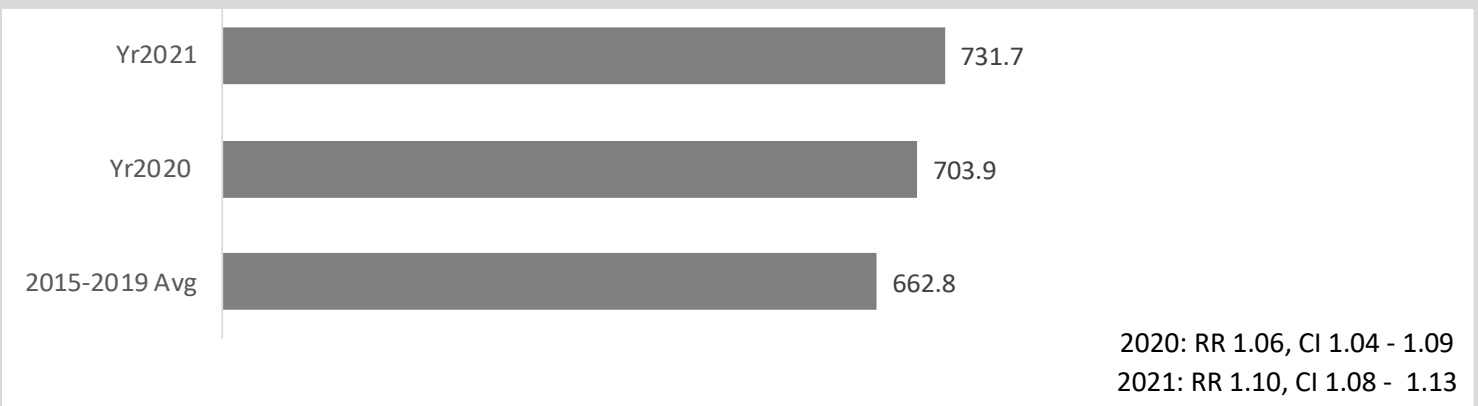


Table 1: Number of Excess Deaths by Region, 2020 - 2021					
Region	2020 # Excess	2020 % Excess	2021 # Excess	2021 % Excess	Combined 24 months
Coachella	1120	26%	1168	25%	2288
East	57	27%	80	39%	137
Mid	690	16%	1218	27%	1908
Northwest	1881	33%	2537	38%	4418
Southwest	750	20%	1250	32%	2000

Figure 4: DIFFERENCE IN MORTALITY RATES BY REGION IN RIVERSIDE COUNTY
*Calculated using crude rates (per 100,000 population),
 2015-2019 5 Year Average vs. 2020 and 2021*

COACHELLA VALLEY

(Cathedral City, Coachella, Indio, La Quinta, Mecca, Palm Desert, Palm Springs, Thermal, Thousand Palms, Whitewater)



EAST
 (Desert Center, Blythe)

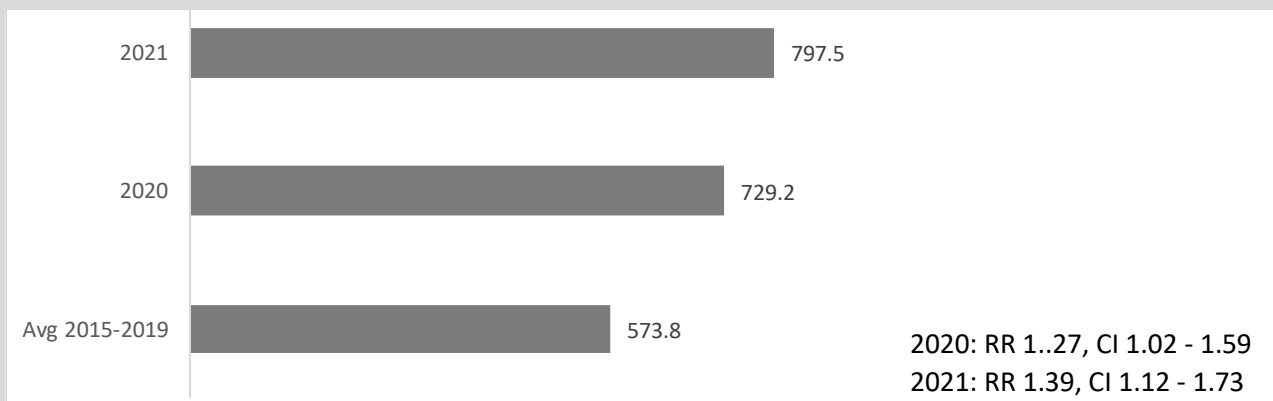


Figure 5: DIFFERENCE IN MORTALITY RATES BY REGION IN RIVERSIDE COUNTY
*Calculated using crude rates (per 100,000 population),
 2015-2019 5 Year Average vs. 2020 and 2021*

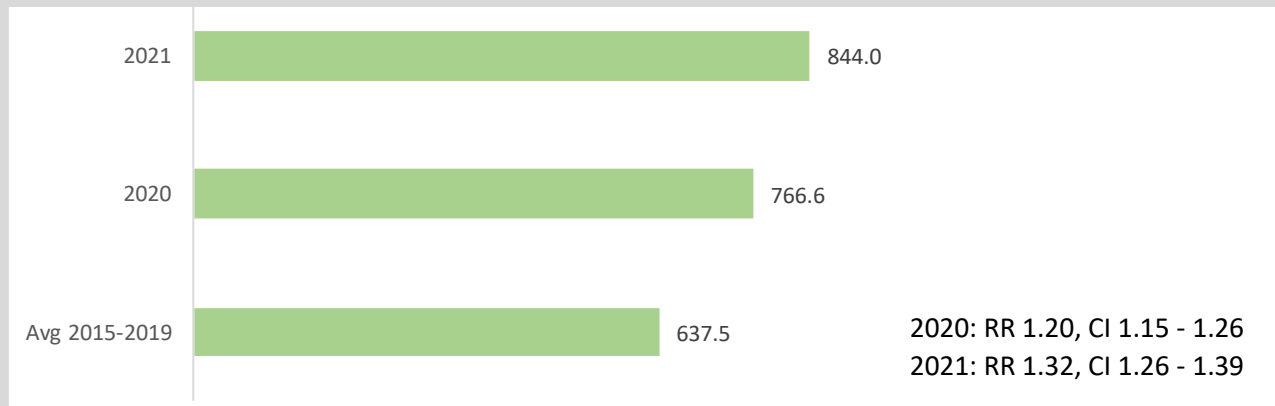
MID

(Anza, Aguanga, Banning, Beaumont, Cabazon, Calimesa, Hemet, Homeland, Idyllwild, Mountain Center, San Jacinto)



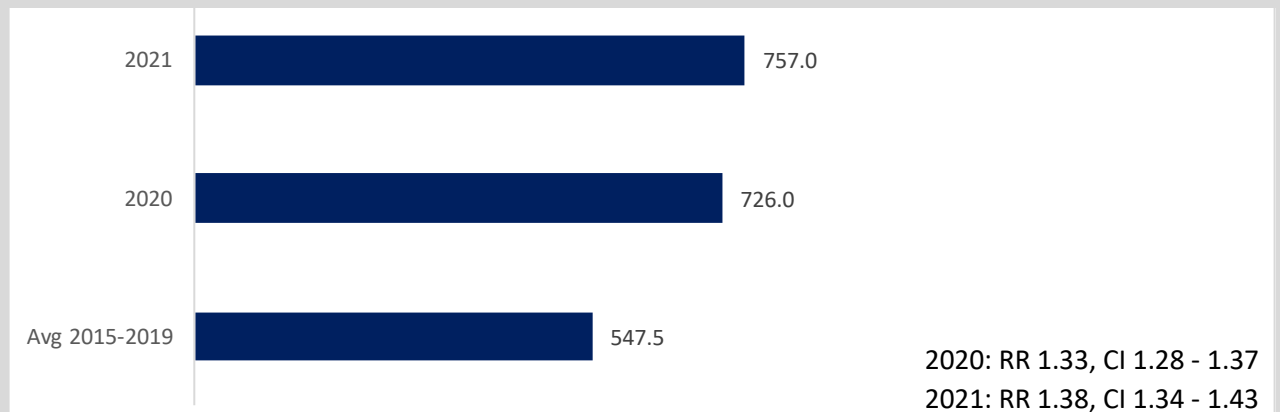
SOUTHWEST

(Lake Elsinore, Menifee, Murrieta, Romoland, Temecula, Wildomar, Winchester)



NORTHWEST

(Corona, Jurupa, Lake Mathews, Norco, Nuevo, Moreno Valley, Perris Valley, Riverside)



DISCUSSION

In 2020, the authors conducted similar excess mortality analyses in May, June, July, and August. The first two studies indicated no significant excess mortality, both overall and by race/ethnicity. Additionally, a trend towards excess mortality was observed in the Black and Latinx populations but was not statistically significant. The third analysis in July documented excess mortality due to all causes in the Black and Latinx populations. The fourth analysis demonstrate significant excess deaths among the Black and Latinx populations, but not among the White population (Gardner, Hetherington, Patel, 2020). This final analysis, including all of 2020 and 2021, demonstrates excess mortality among all three groups, with the higher significant excess deaths among the Black and Latinx communities.

When analyzed by region, crude death rates showed significant increases in excess deaths over the 24 month period from January 2020 - December 2021. It is interesting that the region with the largest population had the lowest rate of excess deaths at 741.5 per 100K population.

Excess deaths during the pandemic have resulted in growing disparities in overall mortality in Riverside county. Both scientific journals and media outlets have reported increased COVID-19 mortality for Black and Latinx population. One such study of different racial/ethnic neighborhoods in New York City showed that minority communities were not only affected in terms of COVID-19, but also in all-cause mortality (Webb Hooper, et al., 2020). Such racial/ethnic health disparities are caused by inequalities in social and economic conditions that places certain racial/ethnic communities at higher risk for negative health outcomes, including mortality (Phelan & Link, 2015). Further analysis by cause of death may assist in the development of policies to reduce economic and social inequities that leads to increased and early death.

References: Krieger, N., Chen, J. T., & Waterman, P. D. (2020). Excess mortality in men and women in Massachusetts during the COVID19 pandemic. *The Lancet*.

Phelan, J.C., Link, B.G. Is racism a fundamental cause of inequalities in health? *Annual Review of Sociology*:41:311–30.

Webb-Hooper M, Nápoles, A.M., Pérez-Stable, E.J.(2020). COVID-19 and Racial/Ethnic Disparities. *JAMA*;323(24):2466–2467.

Gardner, A., Hetherington, W., Patel, S. Excess mortality in Riverside County during the COVID-19 pandemic, January 1 –August 25, 2020. Riverside University Health System — Public Health, Epidemiology & Program Evaluation. September 2020.

Suggested Citation: Napier, R., Gardner, A., Hetherington, W., Patel, S., Martinez Luna, D. Excess mortality in Riverside County during the COVID-19 pandemic, 2020 - 2021. Riverside University Health System — Public Health, Epidemiology & Program Evaluation. August 2022.

TABLES

AGE-ADJUSTED MORTALITY RATES PER 100,000 POPULATION, 2015-2019 AVERAGE (5-YR) AND 2020 OVERALL, RIVERSIDE COUNTY, CALIFORNIA

Riverside County		Male		Female		White		Latinx		Black	
5-YR	2020	5-YR	2020	5-YR	2020	5-YR	2020	5-YR	2020	5-YR	2020
624.5	720.8	733.1	891.4	520.2	579.0	662.8	703.9	549.3	772.2	858.9	1151.7

AGE-ADJUSTED MORTALITY RATES PER 100,000 POPULATION, 2015-2019 AVERAGE (5YR) AND 2020 BY WEEK, RIVERSIDE COUNTY, CALIFORNIA

2-Week Intervals	Riverside County		Male		Female		White		Latinx		Black	
	5-YR	2020	5-YR	2020	5-YR	2020	5-YR	2020	5-YR	2020	5-YR	2020
01/01 to 01/14	27.6	25.6	32.8	31.3	23.0	21.3	29.4	26.0	23.8	25.3	36.7	45.7
01/15 to 01/28	26.5	23.5	31.2	27.4	22.3	20.5	28.6	25.5	23.0	22.1	33.0	34.1
01/29 to 02/11	26.5	24.7	30.7	29.7	22.7	21.0	28.6	27.3	24.2	21.7	31.3	35.0
02/12 to 02/25	25.3	26.0	29.6	24.7	21.5	14.7	26.8	20.0	22.3	17.4	35.0	38.8
02/26 to 03/11	26.8	25.5	31.4	31.5	22.8	20.7	28.6	25.6	24.0	23.9	33.9	52.5
03/12 to 03/25	26.0	23.9	31.2	30.2	21.3	19.0	27.9	26.8	23.6	20.4	35.5	37.7
03/26 to 04/08	24.4	26.4	28.8	32.1	20.5	22.1	25.9	26.9	21.6	22.6	33.3	46.9
04/09 to 04/22	23.7	26.0	23.3	30.7	18.4	22.6	24.2	25.7	21.4	27.7	35.5	44.4
04/23 to 05/06	24.1	25.1	28.5	32.1	20.2	19.5	25.8	25.2	19.6	26.9	36.6	38.6
05/07 to 05/20	22.4	24.1	26.5	29.2	18.5	20.4	23.3	24.6	21.2	25.0	30.5	39.2
05/21 to 06/03	23.0	24.6	28.2	30.1	18.4	20.5	24.6	26.1	20.6	24.0	30.9	35.4
06/04 to 06/17	22.3	24.0	26.1	29.9	18.9	19.6	23.9	22.5	19.0	28.2	34.1	36.7
06/18 to 07/01	22.8	27.6	26.2	35.5	19.7	21.5	24.5	28.5	18.6	27.4	31.1	44.3
07/02 to 07/15	22.2	31.7	27.0	39.9	18.1	25.6	23.4	29.2	20.5	36.6	30.3	57.3
07/16 to 07/29	24.2	29.1	26.8	35.6	19.1	24.5	24.9	27.7	18.6	34.8	33.9	36.5
07/30 to 08/12	22.4	31.6	26.7	41.3	18.6	23.8	23.9	29.4	18.4	37.4	29.1	44.9
08/13 to 08/26	21.9	30.2	25.9	39.0	18.3	23.3	23.9	29.6	18.5	33.2	32.2	48.8
08/27 to 09/09	22.6	25.1	26.7	30.4	18.9	20.9	23.8	27.0	21.0	25.1	31.7	26.0
09/10 to 09/23	22.8	24.6	27.0	30.3	19.2	20.3	24.0	24.8	20.4	25.3	32.3	46.9
09/24 to 10/07	22.3	24.7	26.8	29.6	18.3	21.0	23.3	24.8	19.9	24.0	34.7	42.1
10/08 to 10/21	23.1	25.8	26.9	32.0	19.6	21.1	24.8	25.7	19.5	26.8	31.8	48.6
10/22 to 11/04	23.6	25.6	27.4	32.7	20.2	20.0	25.8	25.8	20.2	28.6	31.1	37.0
11/05 to 11/18	23.7	25.1	28.5	31.4	19.7	20.3	25.0	27.3	21.0	25.3	34.9	35.2
11/19 to 12/02	24.4	29.4	29.4	38.1	20.0	23.1	25.7	26.9	21.6	36.3	34.1	49.9
12/03 to 12/16	24.5	39.7	29.2	50.3	20.5	31.9	25.6	34.9	22.4	48.3	30.8	65.6
12/17 to 12/30	25.6	51.2	30.3	66.1	21.5	40.0	26.5	40.0	24.7	77.9	34.6	83.6

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AGE-ADJUSTED MORTALITY RATES PER 100,000 POPULATION, 2015-2019 AVERAGE (5-YR) AND 2021 OVERALL, RIVERSIDE COUNTY, CALIFORNIA

Riverside County		Male		Female		White		Latinx		Black	
5-YR	2021	5-YR	2021	5-YR	2021	5-YR	2021	5-YR	2021	5-YR	2021
624.5	756.8	733.1	930.4	520.2	600.6	662.8	731.7	549.3	796.0	858.9	1124.6

AGE-ADJUSTED MORTALITY RATES PER 100,000 POPULATION, 2015-2019 AVERAGE (5YR) AND 2021 BY WEEK, RIVERSIDE COUNTY, CALIFORNIA

2-Week Intervals	Riverside County		Male		Female		White		Latinx		Black	
	5-YR	2021	5-YR	2021	5-YR	2021	5-YR	2021	5-YR	2021	5-YR	2021
01/01 to 01/14	27.6	56.6	32.8	74.1	23.0	41.5	29.4	43.0	23.8	79.7	36.7	77.6
01/15 to 01/28	26.5	52.1	31.2	66.2	22.3	39.9	28.6	41.4	23.0	73.4	33.0	71.4
01/29 to 02/11	26.5	42.7	30.7	52.0	22.7	34.6	28.6	37.8	24.2	53.6	31.3	59.9
02/12 to 02/25	25.3	32.2	29.6	40.1	21.5	25.4	26.8	28.2	22.3	39.3	35.0	45.9
02/26 to 03/11	26.8	27.3	31.4	33.0	22.8	22.2	28.6	26.5	24.0	29.1	33.9	40.9
03/12 to 03/25	26.0	25.7	31.2	30.2	21.3	21.4	27.9	25.9	23.6	25.2	35.5	43.5
03/26 to 04/08	24.4	23.4	28.8	28.9	20.5	18.7	25.9	25.8	21.6	20.6	33.3	43.4
04/09 to 04/22	23.7	22.4	23.3	28.1	18.4	17.4	24.2	23.2	21.4	22.3	35.5	41.6
04/23 to 05/06	24.1	23.7	28.5	27.0	20.2	20.3	25.8	24.4	19.6	23.9	36.6	29.0
05/07 to 05/20	22.4	22.8	26.5	26.8	18.5	18.9	23.3	24.0	21.2	22.6	30.5	31.3
05/21 to 06/03	23.0	23.5	28.2	27.6	18.4	19.6	24.6	23.5	20.6	20.1	30.9	32.6
06/04 to 06/17	22.3	23.4	26.1	28.8	18.9	18.5	23.9	25.7	19.0	18.0	34.1	38.3
06/18 to 07/01	22.8	22.2	26.2	27.1	19.7	17.8	24.5	23.8	18.6	22.9	31.1	28.7
07/02 to 07/15	22.2	23.2	27.0	28.2	18.1	18.7	23.4	24.3	20.5	19.9	30.3	36.5
07/16 to 07/29	24.2	24.5	26.8	29.6	19.1	19.7	24.9	26.1	18.6	21.8	33.9	38.6
07/30 to 08/12	22.4	26.3	26.7	31.9	18.6	21.3	23.9	25.5	18.4	25.7	29.1	42.9
08/13 to 08/26	21.9	28.0	25.9	35.0	18.3	21.5	23.9	27.7	18.5	26.7	32.2	35.0
08/27 to 09/09	22.6	30.7	26.7	38.7	18.9	23.6	23.8	32.3	21.0	29.9	31.7	43.5
09/10 to 09/23	22.8	30.1	27.0	36.3	19.2	24.1	24.0	27.4	20.4	31.7	32.3	45.8
09/24 to 10/07	22.3	29.9	26.8	37.3	18.3	23.3	23.3	28.1	19.9	31.7	34.7	39.1
10/08 to 10/21	23.1	26.6	26.9	32.8	19.6	21.0	24.8	26.3	19.5	26.5	31.8	36.6
10/22 to 11/04	23.6	28.3	27.4	34.3	20.2	22.9	25.8	27.9	20.2	28.1	31.1	46.3
11/05 to 11/18	23.7	27.6	28.5	34.5	19.7	21.4	25.0	28.5	21.0	24.1	34.9	47.4
11/19 to 12/02	24.4	26.2	29.4	30.9	20.0	22.0	25.7	27.5	21.6	23.9	34.1	35.8
12/03 to 12/16	24.5	27.6	29.2	34.8	20.5	21.2	25.6	27.3	22.4	25.2	30.8	45.9
12/17 to 12/30	25.6	29.7	30.3	36.3	21.5	23.8	26.5	29.5	24.7	30.1	34.6	47.1