Changes in Death Rates & Life Expectancy Associated with the COVID-19 Pandemic in King County, WA
January 1, 2017 – December 31, 2022

Report date: May 6, 2024

KEY POINTS

1) **All-cause Death Rates Increased**
   - The all-cause death rate in the county rose by 6.8% during the pandemic. Notable disparities include a 5.0% increase for females versus 8.2% for males, varying rates among ethnic groups (41.4% increase for Native Hawaiian / Pacific Islander residents compared to 5.8% increase for white residents) and increases in only two of four regions (12.1% in South King County and 5.2% in Seattle).
2) **Cause-Specific Changes**
   - While suicide (-9.7%) and cancer (-6.5%) death rates decreased, there were significant increases in drug overdoses (75.1%), homicides (35.6%), unintentional injuries (33.2%), and diabetes mellitus (9.8%).
3) **Life Expectancy Declines**
   - Countywide life expectancy dropped by 1 year during the pandemic, signaling a general health decline. Life expectancy decreases varied across demographics, e.g., a 4.8-year decline among American Indian/Alaska Native residents compared to 0.8 years among white residents.
   - Hispanic residents no longer lead King County in life expectancy.

Introduction

This report investigates the effects of the COVID-19 pandemic on mortality in King County, comparing data from the pandemic years (2020-2022) with pre-pandemic years (2017-2019). It aims to provide a nuanced understanding of how the pandemic exacerbated existing health inequities and affected all-cause and cause-specific death rates across demographic groups. This analysis highlights changes in mortality rates, causes of death, and life expectancy during this period. The main analysis was limited to the leading causes of death (cancer, heart disease, unintentional injury, Alzheimer's disease, and cerebrovascular disease) as well as causes hypothesized to be impacted by the pandemic (drug overdose, diabetes mellitus, suicide, firearm, traffic, homicide, and drowning). Explicit enumeration of COVID-19 deaths is limited to the leading causes of death analysis, while a detailed report on COVID-19 deaths has been previously published.[i]

As previously reported,[ii] the first confirmed COVID-19-related death in King County, Washington, occurred in late February 2020. In response to the emerging pandemic, state and local authorities implemented a series of mitigation measures in March 2020 to safeguard the health and safety of residents. These measures included school closures, business restrictions, limitations on elective medical procedures, and guidance to practice social distancing. While these efforts helped to prevent COVID-19 associated deaths and hospitalizations, they also had unintended consequences, including increased

isolation, grief, and economic hardship. [iii,iv] Previous research has documented shifts in mortality patterns following times of economic hardship and job loss.[v,vi] Furthermore, COVID-19 medical avoidance and delays[vii] may have also contributed to excess deaths.

Based on early evidence that the total excess deaths during the pandemic period could not be directly attributed to COVID-19, Public Health – Seattle & King County (PHSKC) undertook a study of the leading causes of death and causes of death that may have been indirectly impacted by mitigation measures.[viii] The resulting brief revealed increases in all-cause death rates for the county with disproportionate burden being borne by some demographic subpopulations, thereby exacerbating pre-existing inequities. The study also revealed variation in changes in cause specific death rates. Unfortunately, due to the urgency of timely reporting during the pandemic, the brief utilized a single year of preliminary death data and non-standard methods for categorizing the cause of death and calculating death rates.

In this updated analysis, we refine our understanding of the pandemic's impact on mortality in King County by utilizing three years of pandemic data (2020-2022) and improved methodology for more accurate comparisons with other reports. This report focuses on changes in overall and cause-specific mortality across demographic groups. Our findings offer a comprehensive view of the shifts in life expectancy and the principal causes of death, shedding light on the pandemic's enduring effects on mortality and health inequities. This new analysis provides a clearer picture of the pandemic's lasting impact on mortality in King County.

Technical Concepts & Terminology

Death Rates, Rate Ratios, and Rate Differences

Below we present a summary of all-cause and select cause specific death rates from the pre-pandemic period (January 1, 2017 to December 31, 2019) and the pandemic period (January 1, 2020 to December 31, 2022) for King County residents one year of age and older. Specific causes of death were selected to align as closely as possible with the causes of death utilized in our previous brief, which were a combination of the known leading causes of death as well as causes potentially impacted by COVID-19 mitigation measures. Causes of death were defined using the International Classification of Diseases, Tenth Revision (ICD-10) underlying cause of death codes (see Technical Appendix for details). All estimates were calculated without regard to COVID-19 infection status.[ix]

This report uses rate ratios and differences to compare 2020-2022 death rates to 2017-2019 death rates. A ratio of less than one represents a decreased death rate in the pandemic period; a ratio greater than one represents an increased death rate, and a ratio equal to one represents a stable death rate. A difference of less than zero represents a decreased death rate in the pandemic period; a difference greater than zero represents an increased death rate, and a difference equal to zero represents a stable death rate. All death rates, ratios, and differences are age-adjusted unless otherwise specified. Only statistically significant findings, which are identified by having a p-value ≤ 0.05, are reported unless otherwise noted.

Life Expectancy

Life expectancy at birth is the average number of years a newborn population would live if they experienced the current age-specific death rates throughout the course of their lives. While it does not predict the life span of any specific individual, it is a common summary metric for measuring the general

health of a population. Due to regular improvements in public health, medical care, and overall quality of life, life expectancy has generally increased over time and is often an underestimate of the true average life span for a given population. To examine the impact of the pandemic on life expectancy, we calculated the difference in years between life expectancy in 2017-2019 and life expectancy in 2020-2022. A difference of less than zero represents a decreased life expectancy; a difference greater than zero represents an increased life expectancy, and a difference equal to zero represents an unchanged life expectancy.

Demographic Subpopulations

Only deaths of King County residents are included in this report, irrespective of their location of death. The designation of female or male on a death certificate is typically the sex assigned at birth. In this analysis, Hispanic is treated as a mutually exclusive race rather than an ethnicity, i.e., an individual in this data is either Hispanic or another race. Throughout this brief Native Hawaiian/Pacific Islander is abbreviated as NHPI and American Indian/Alaska Native is abbreviated as AIAN. Please refer to the Technical Appendix for the definition of King County Regions.

All-Cause Death Rates

We began by examining changes in the age-adjusted all-cause death rates by demographic subpopulations.

King County

The 2020-2022 death rate for King County was 641 deaths per 100,000 population (95% confidence interval (CI): 635, 647) (Figure 1a). The death rate increased 6.8% (95% CI: 5.4, 8.3%) compared to the years 2017-2019, with a corresponding absolute increase of 41 deaths per 100,000 (95% CI: 33, 49) during the same timeframe (Figures 1b and 1c, respectively).

Gender

Females fared better than males during the time under study regarding final death rates, relative increases, and the absolute increases.

The 2020-2022 death rate for females was 534 deaths per 100,000 (95% CI: 527, 541). The death rate increased 5.0% (95% CI: 2.9, 7.1%) compared to the years 2017-2019, with a corresponding absolute increase of 25 deaths per 100,000 (95% CI: 15, 26) during the same timeframe.

The 2020-2022 death rate for males was 771 deaths per 100,000 (95% CI: 761, 781). The death rate increased 8.2% (95% CI: 6.2, 10.2%) compared to the years 2017-2019, with a corresponding absolute increase of 58 deaths per 100,000 (95% CI: 44, 72) during the same timeframe.

Race/ethnicity

All racial and ethnic groups experienced significant increases in their relative and absolute death rates. The pandemic period tended to reinforce existing inequities, with increases disproportionately impacting populations with pre-existing higher death rates. Hispanics were the exception, starting with the second lowest death rate in 2017-2019 but experiencing high relative and absolute increases in 2020-2022.

The 2020-2022 death rate for AIAN residents was 1,615 deaths per 100,000 (95% CI: 1,453, 1,794). The death rate increased 41.2% (95% CI: 22.5, 62.4%) compared to the years 2017-2019, with a corresponding absolute increase of 468 deaths per 100,000 (95% CI: 277, 660) during the same timeframe.

The 2020-2022 death rate for Asian residents was 467 deaths per 100,000 (95% CI: 454, 481). The death rate increased 10.6% (95% CI: 6.1, 15.4%) compared to the years 2017-2019, with a corresponding absolute increase of 45 deaths per 100,000 (95% CI: 26, 64) during the same period.

The 2020-2022 death rate for Black residents was 957 deaths per 100,000 (95% CI: 922, 993). The death rate increased 13.2% (95% CI: 7.5, 19.1%) compared to the years 2017-2019, with a corresponding absolute increase of 111 deaths per 100,000 (95% CI: 65, 157) during the same timeframe.

The 2020-2022 death rate for Hispanic residents was 521 deaths per 100,000 (95% CI: 494, 550). The death rate increased 21.8% (95% CI: 13.3, 31.0%) compared to the years 2017-2019, with a corresponding absolute increase of 93 deaths per 100,000 (95% CI: 59, 127) during this period.

The 2020-2022 death rate for NHPI residents was 1,914 deaths per 100,000 (95% CI: 1,653, 2,219). The death rate increased 41.4% (95% CI: 22.1, 63.0%) compared to the years 2017-2019, with a corresponding absolute increase of 556 deaths per 100,000 (95% CI: 322, 786) during this timeframe.

The 2020-2022 death rate for white residents was 655 deaths per 100,000 (95% CI: 648, 662). The death rate increased 5.8% (95% CI: 4.1, 7.5%) compared to the years 2017-2019, with a corresponding absolute increase of 36 deaths per 100,000 (95% CI: 26, 46) during this period.

Regions

Death rates in East and North Regions of King County did not significantly change between 2017-2019 and 2020-2022, whereas the rates in deaths in Seattle and South King County increased significantly and appreciably.

The 2020-2022 death rate for East King County was 535 deaths per 100,000 (95% CI: 524, 526) and did not significantly change during the time of the study. It increased 2.3% (95% CI: -0.7, 5.5%) compared to the years 2017-2019, with a corresponding absolute increase of 12 deaths per 100,000 (95% CI: -4, 28) during the same timeframe.

The 2020-2022 death rate for North King County was 656 deaths per 100,000 (95% CI: 634, 679) and did not significantly change during the time of the study. The death rate increased 3.4% (95% CI: -1.5, 8.4%) compared to the years 2017-2019, with a corresponding absolute increase of 21 deaths per 100,000 (95% CI: -10, 52) during the same period.

The 2020-2022 death rate for Seattle was 562 deaths per 100,000 (95% CI: 553, 572). The death rate increased 5.2% (95% CI: 2.7, 7.9%) compared to the years 2017-2019, with a corresponding absolute increase of 28 deaths per 100,000 (95% CI: 14, 42) during the same timeframe.

The 2020-2022 death rate for South King County was 798 deaths per 100,000 (95% CI: 786, 810). The death rate increased 12.1% (95% CI: 9.8, 14.5%) compared to the years 2017-2019, with a corresponding absolute increase of 86 deaths per 100,000 (95% CI: 70, 102) during this period.

*Figure 1a. King County all-cause 2020-2022 death rates*
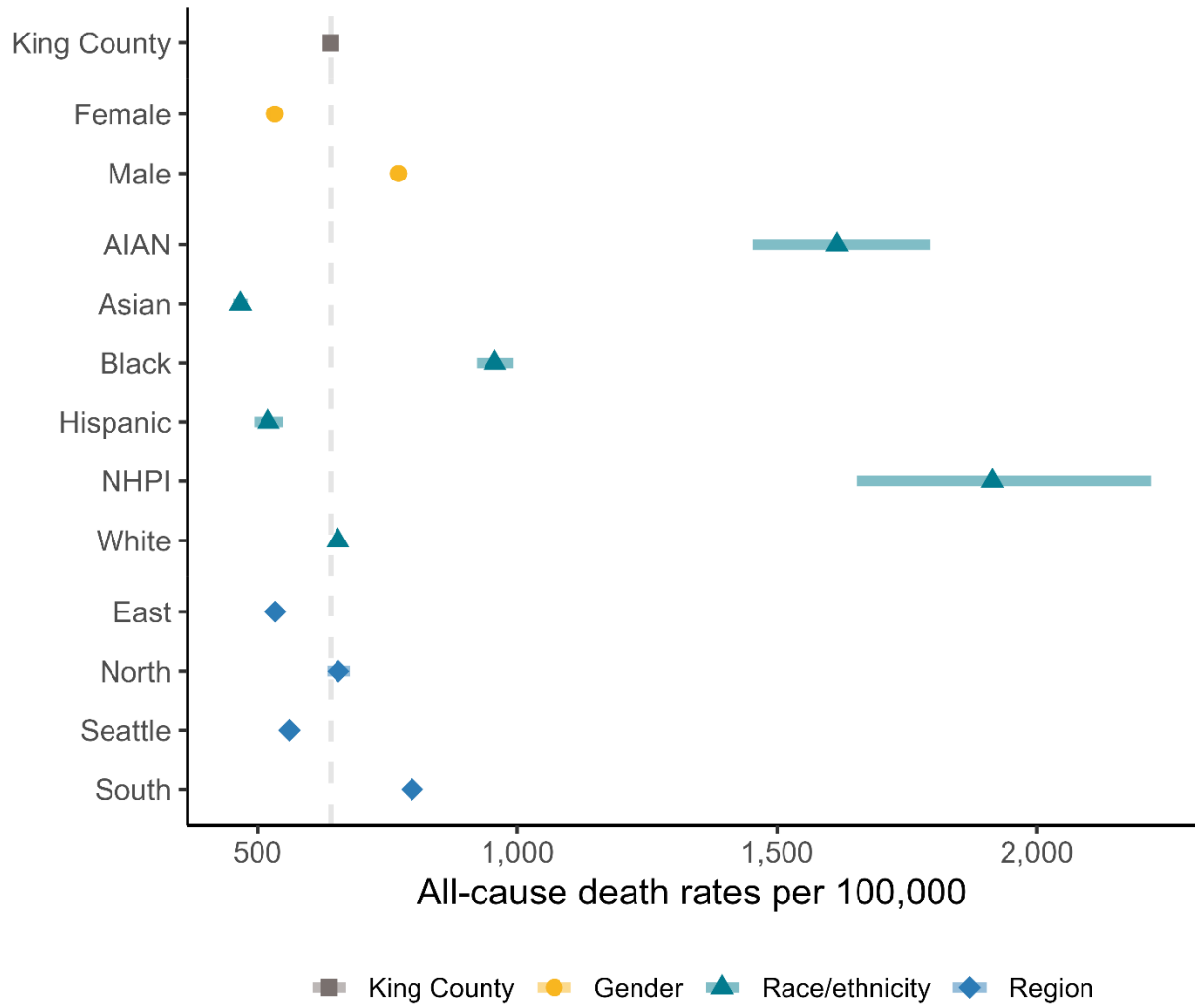
The dashed line is the King County estimate. For some demographic groups the confidence intervals are narrow and are obscured by the width of the point estimate.

Figure 1b. King County all-cause death rate ratios, comparing 2020-2022 to 2017-2019
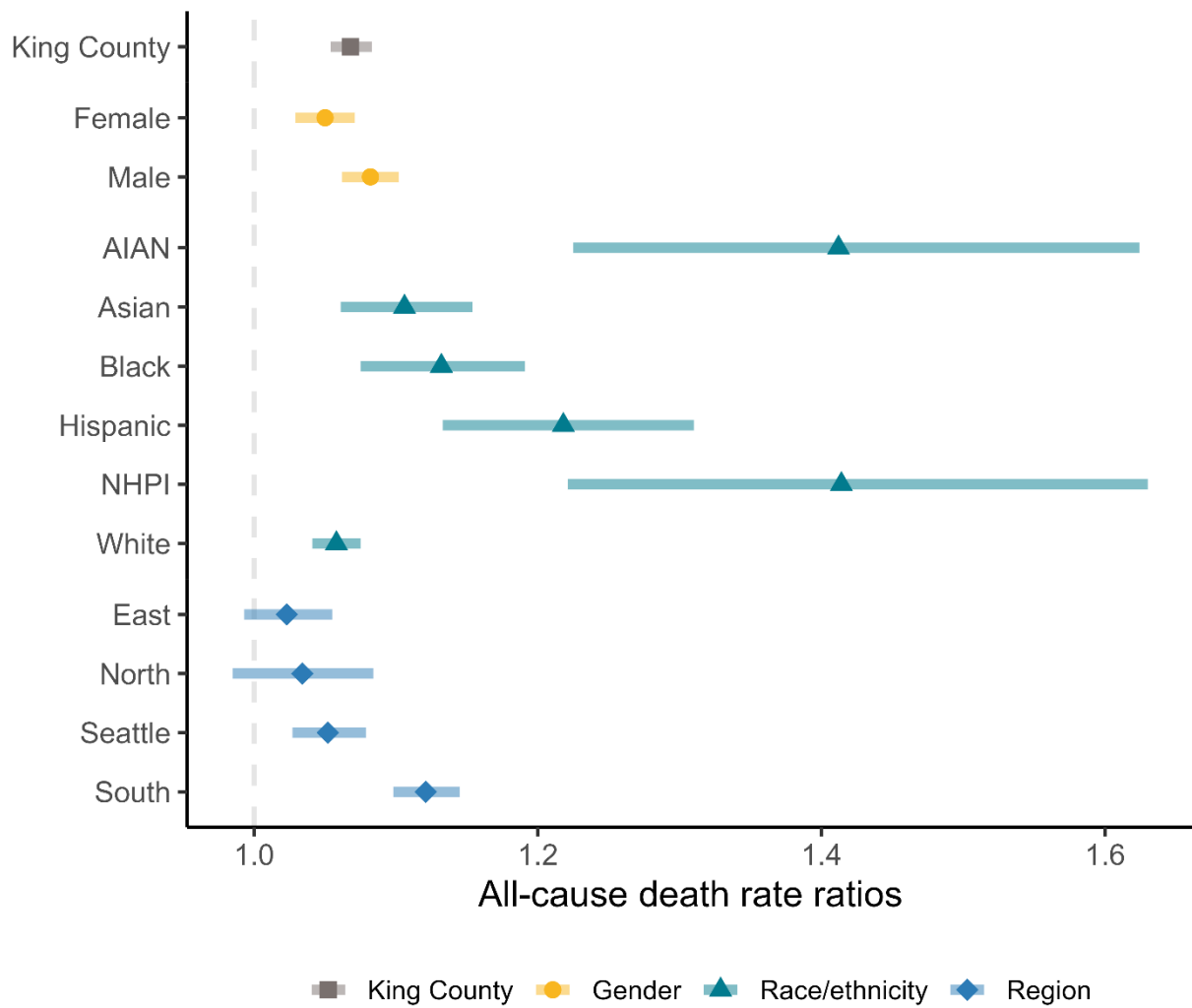
The dashed line is the line of indifference where the ratio shows no change in death rates over time.

Figure 1c. King County all-cause death rate differences, comparing 2020-2022 to 2017-2019
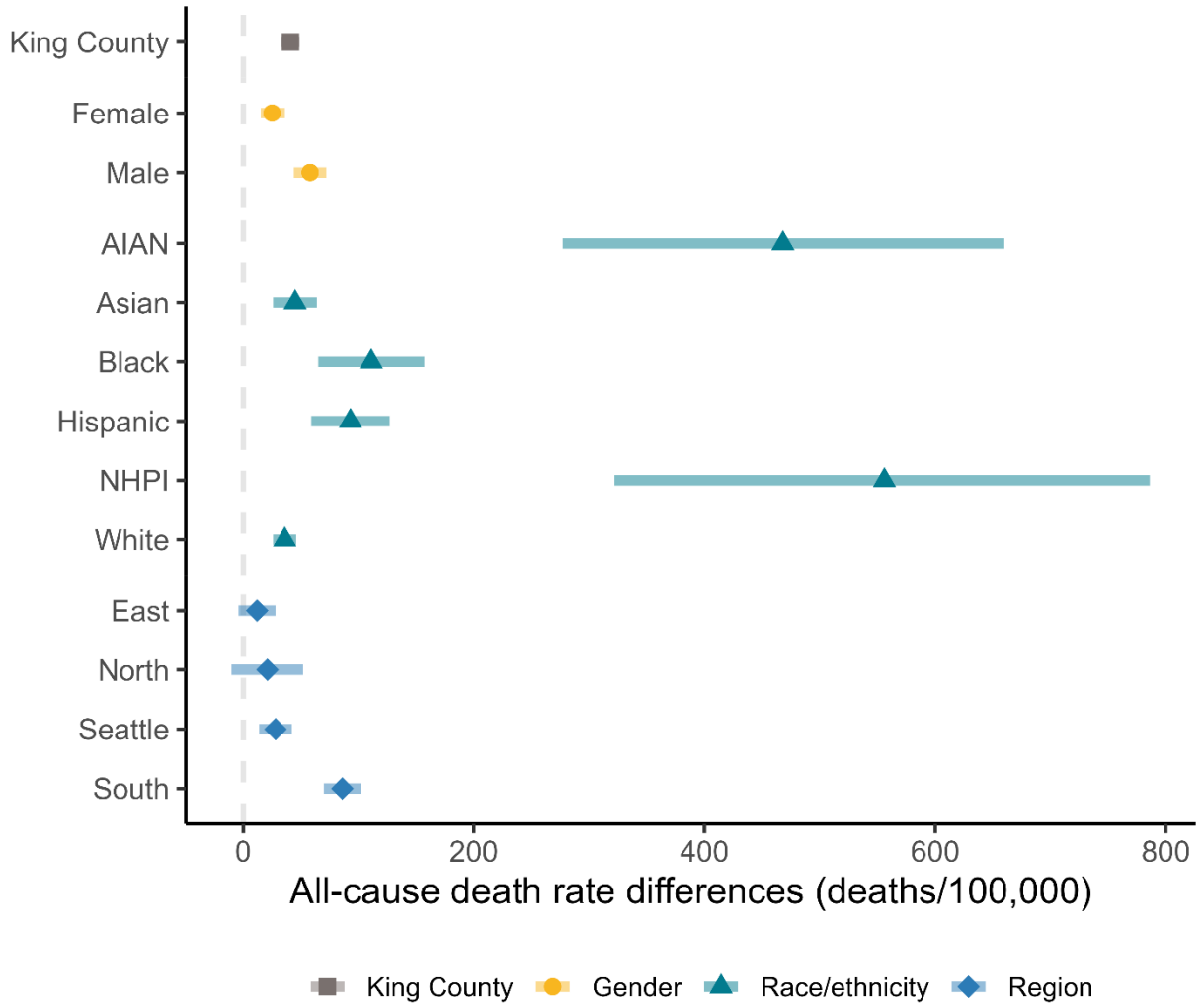
The dashed line is the line of indifference where the difference shows no change in death rates over time.

Cause Specific Death Rates

Examination of cause-specific death rates over time showed evidence of significant increases, significant decreases, and non-significant changes, dependent upon the cause of death.

Leading Causes of Death

Cancer

Cancer accounted for the greatest absolute decrease in cause-specific deaths countywide among the causes evaluated in this study. The 2020-2022 King County yearly average of cancer deaths was 2,927

(123, 95% CI: 120, 125 per 100,000) compared to an average of 2,945 (131, 95% CI: 128, 134 per 100,000) during 2017-2019. The countywide cancer death rates decreased 6.5% (95% CI: -9.3, -3.7%), corresponding to an absolute decrease of nine deaths per 100,000 (95% CI: -12, -5). Significant decreases were observed for both genders, Asian and white residents, and residents of East and South King County.

Heart disease

The 2020-2022 King County yearly average of heart disease deaths was 2,847 (122, 95% CI: 119, 124 per 100,000) compared to an average of 2,677 (120, 95% CI: 118, 123 per 100,000) during 2017-2019. Countywide heart disease death rates did not significantly change between 2017-2019 and 2020-2022 (1.0%, 95% CI: -2.0, 4.1%). However, AIAN residents experienced an increase of 62.1% (95% CI: 13.5-129.2%), which represents and absolute increase of 112 deaths per 100,000 (95% CI: 30-194) to 302 deaths per 100,000 (95% CI: 231-393).

Unintentional injury

Unintentional injury accounted for the greatest absolute increase in cause-specific deaths countywide among the causes evaluated in this study. The 2020-2022 King County yearly average of unintentional injury deaths was 1,164 (48, 95% CI: 46, 50 per 100,000) compared to an average of 828 (36, 95% CI: 35, 38 per 100,000) during 2017-2019. The countywide unintentional injury death rates increased 33.2% (95% CI: 26.6, 40.2%), corresponding to absolute increase of 12 deaths per 100,000 (95% CI: 10, 14). Significant increases were observed for all demographic subpopulations.

Alzheimer's disease

The 2020-2022 King County yearly average of Alzheimer's disease deaths was 932 (42, 95% CI: 41, 44 per 100,000) compared to an average of 942 (44, 95% CI: 42, 46 per 100,000) during 2017-2019. Countywide Alzheimer's disease death rates did not significantly change during this period. However, South King County residents experienced an increase of 18.5% (95% CI: 8.1, 29.7%), which represents an absolute increase of eight deaths per 100,000 (95% CI: 4, 12) to 50 deaths per 100,000 (95% CI: 47, 53). In contrast, residents of North and East King County experienced decreases of 24.9% (95% CI: -35.6, -13.0%) and 12.1% (95% CI: -20.4, -3%), respectively.

Cerebrovascular disease (stroke)

The 2020-2022 King County yearly average of cerebrovascular disease deaths was 676 (30, 95% CI: 28, 31 per 100,000) compared to an average of 673 (31, 95% CI: 30, 32 per 100,000) during 2017-2019. Countywide cerebrovascular disease death rates did not significantly change during this period. However, NHPI residents experienced an increase of 156.6% (2.3, 451.7%), which corresponds with an absolute increase of 67 deaths per 100,000 (95% CI: 2, 133) to 123 deaths per 100,000 (95% CI: 54, 254). Females and white residents experienced decreases of 8.3% (95% CI: -15.8, -0.6%) and 7.6% (95% CI: -13.9, -0.8%), respectively.

Causes of Death Hypothesized to be Impacted by the Pandemic Response
Drug overdose

Drug overdose deaths accounted for the greatest countywide proportional increase in cause specific death ratios. The 2020-2022 King County yearly average of drug overdose deaths was 651 (26, 95% CI: 25, 27 per 100,000) compared to an average of 358 (15, 95% CI: 14, 16 per 100,000) during 2017-2019. The countywide drug overdose death rates increased 75.1% (95% CI: 62.6, 88.7%), corresponding to

absolute increase of 11 deaths per 100,000 (95% CI: 10, 13). Every demographic group experienced significant increases during this period except for NHPI residents. The greatest increase was experienced by Black residents, with an increase of 158.0% (95% CI: 107.8, 222.5%), corresponding to an absolute increase of 39 deaths per 100,000 (95% CI: 30, 47).

Diabetes mellitus

The 2020-2022 King County yearly average of Type 1 and Type 2 diabetes mellitus deaths was 465 (20, 95% CI: 19, 21 per 100,000) compared to an average of 396 (18, 95% CI: 17, 19 per 100,000) during 2017-2019. The countywide diabetes mellitus rates increased 9.8% (95% CI: 1.6, 18.6%), corresponding to absolute increase of two deaths per 100,000 (95% CI: 0, 3). Significant increases were observed for AIAN residents (138.1%, 95% CI: 1.8, 424.5%), residents of East King County (26.9%, 95% CI: 3.2%, 55.2%), and females (14.9%, 95% CI: 2.0, 29.4%).

Suicide

Suicides accounted for the greatest countywide proportional decrease in cause-specific death ratios. The 2020-2022 King County yearly average of suicide deaths was 282 (12, 95% CI: 11, 12 per 100,000) compared to an average of 296 (13, 95% CI: 12, 14 per 100,000) during 2017-2019. The countywide drug suicide death rate decreased 9.7% (95% CI: -18.0, -0.8%), corresponding to absolute decrease of one death per 100,000 (95% CI: -2, 0). Two demographic subpopulations experienced significant decreases in suicide death rates. White residents experienced a 14.6% (95% CI: -23.8, -4.5%) decrease and males experienced a 12.2% (95% CI: -21.2, -2.4%) decrease.

Firearm

The 2020-2022 King County yearly average of firearm deaths was 206 (9, 95% CI: 8, 9 per 100,000) compared to an average of 184 (8, 95% CI: 8, 9 per 100,000) during 2017-2019. Countywide firearm death rates did not significantly change between 2017-2019 and 2020-2022 (5.8%, 95% CI: -5.9, 18.5%). No demographic subpopulations experienced significant changes in their death rates.

Traffic

The 2020-2022 King County yearly average of traffic-related deaths was 133 (5, 95% CI: 5, 6 per 100,000) compared to an average of 123 (5, 95% CI: 5, 6 per 100,000) during 2017-2019. Countywide traffic-related death rates did not significantly change between 2017-2019 and 2020-2022 (2.0%, 95% CI: -11.7, 17.5%). However, traffic-related death rates among Hispanic residents decreased 35.8% (95% CI: -60.2, -4.4%) during this period.

Homicide

The 2020-2022 King County yearly average of homicide deaths was 104 (4, 95% CI: 4, 5 per 100,000) compared to an average of 74 (3, 95% CI: 3, 4 per 100,000) during 2017-2019. The countywide homicide rates increased 35.6% (95% CI: 13.8, 61.0%), corresponding to an absolute increase of one death per 100,000 (95% CI: 0, 2). Significant increases were observed for white (74.7%, 95% CI: 22.0, 148.2) and Black (43.3%, 95% CI: 6.7, 91.3%) residents, males (38.5%, 95% CI: 13.3, 67.4%), and residents of Seattle (46.7%, 95% CI: 6.4, 99.4%) and South King County (36.9%, 95% CI: 8.3, 71.8%).

Drowning

The 2020-2022 King County yearly average of drowning deaths was 43 (2, 95% CI: 2, 2 per 100,000) compared to an average of 33 (1, 95% CI: 1, 2 per 100,000) during 2017-2019. Countywide drowning

death rates did not significantly change between 2017-2019 and 2020-2022 (27.9%, 95% CI: -3.1, 66.1%). White residents (54.7%, 95% CI: 7.3, 119.5%) and residents of East King County (84.8%, 95% CI: 1.1, 228.7%) experienced significant increases in drowning death rates.

Figure 2a. King County 2020-2022 cause-specific death rates
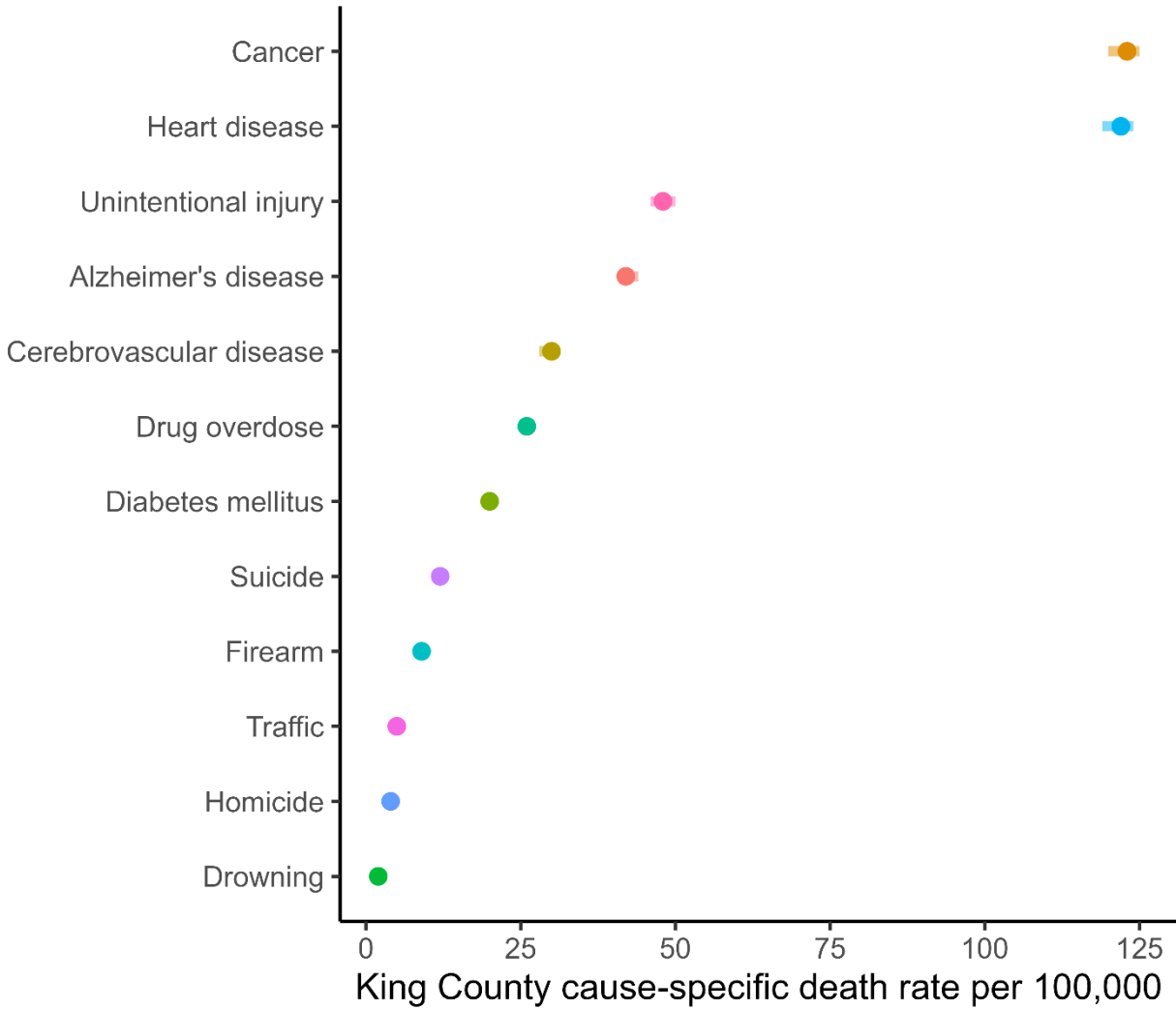
Some confidence intervals are narrow and are obscured by the width of the point estimate.

Figure 2b. King County cause-specific death rate ratios, comparing 2020-2022 to 2017-2019
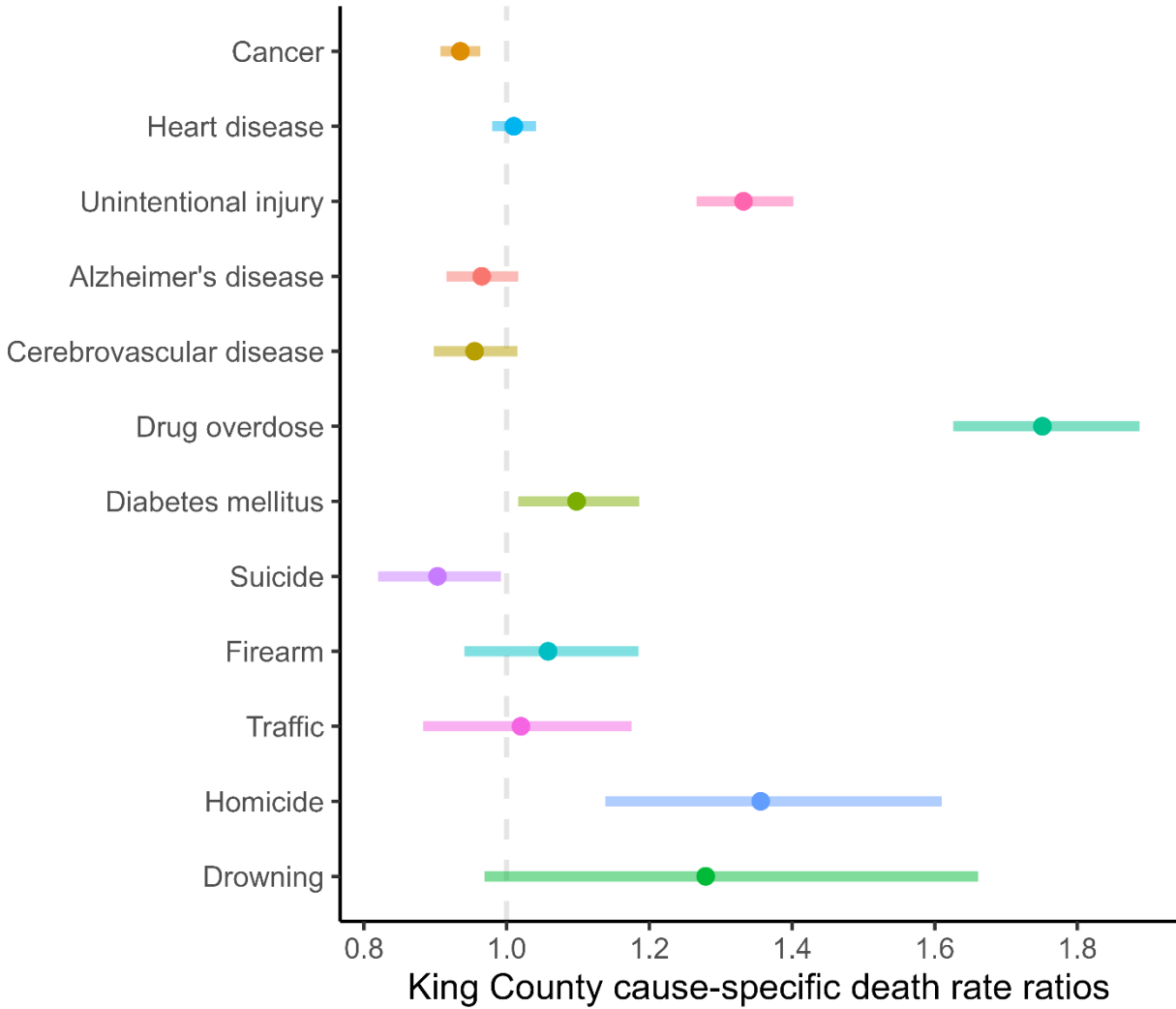
The dashed line at 1.0 is the line of indifference where the ratio shows no change in death rates over time.

Life Expectancy

Generally, King County life expectancy decreased during the period under study.

King County

King County's life expectancy was 1.0 (95% CI: -1.1, -0.8) year lower in 2020-2022 (81.0 years, 95% CI: 80.8, 81.1) compared to 2017-2019 (81.9 years, 95% CI: 81.8, 82).

Gender

The decrease in male life expectancy between 2017-2019 and 2020-2022 (-1.2 years, 95% CI: -1.4, -0.9) was greater than that among females (-0.7 years, 95% CI: -0.9, -0.5). Male life expectancy decreased to 78.5 years (95% CI: 78.3, 78.6) from 79.6 years (95% CI: 79.5, 79.8), whereas female life expectancy decreased to 83.5 years (95% CI: 83.3, 83.6) from 84.2 years (95% CI: 84, 84.3).

Race/ethnicity

All racial and ethnic groups experienced significant decreases in life expectancy between 2017-2019 and 2020-2022.

The life expectancy of AIAN residents decreased 4.8 years (95% CI: -8.2, -1.6), dropping from 71.0 years (95% CI: 68.7, 73.3) to 66.1 years (95% CI: 63.7, 68.6).

The life expectancy of Asian residents decreased by 1.2 years (95% CI: -1.6, -0.9), dropping from 86.2 years (95% CI: 86, 86.5) to 85.0 (95% CI: 84.8, 85.2).

The life expectancy of Black residents decreased by 2.0 years (95% CI: -2.7, -1.3), changing from 76.3 years (95% CI: 75.7, 76.8) to 74.3 years (95% CI: 73.8, 74.8).

The life expectancy of Hispanic residents decreased by 4.3 years (95% CI: -5.4, -3.2), dropping from 89.2 years (95% CI: 88.4, 90) to 84.9 (95% CI: 84.2, 85.6).

The life expectancy of NHPI residents decreased by 3.1 years (95% CI: -5.1, -1), dropping from 69.7 years (95% CI: 68.2, 71.2) to 66.7 years (95% CI: 65.4, 68).

The life expectancy of white residents decreased by 0.8 years (95% CI: -1, -0.6), dropping from 80.8 (95% CI: 80.7, 81) to 81.7 (95% CI: 81.5, 81.8).

Regions

Life expectancy in the East and North Regions of King County did not change significantly between 2017-2019 and 2020-2022. In the East Region, life expectancy decreased from 83.9 years (95% CI: 83.7, 84.1) to 83.7 years (95% CI: 83.5, 83.9). In the North Region, life expectancy decreased from 81.5 years (95% CI: 81.1, 81.9) to 81.0 years (95% CI: 80.6, 81.4).

Residents of the Seattle Region experienced a decrease of 0.8 years (95% CI: -1.1, -0.5), with their life expectancy decreasing from 83.4 years (95% CI: 83.2, 83.6) in 2017-2019 to 82.6 years (95% CI: 82.3, 82.8) in 2020-2022.

South Region residents experienced a decrease of 1.6 years (95% CI: -1.9, -1.3), with life expectancy dropping from 79.6 years (95% CI: 79.4, 79.8) in 2017-2019 to 78 years (95% CI: 77.8, 78.2) in 2020-2022.

Figure 3. King County changes in life expectancy between 2017-2019 and 2020-2022
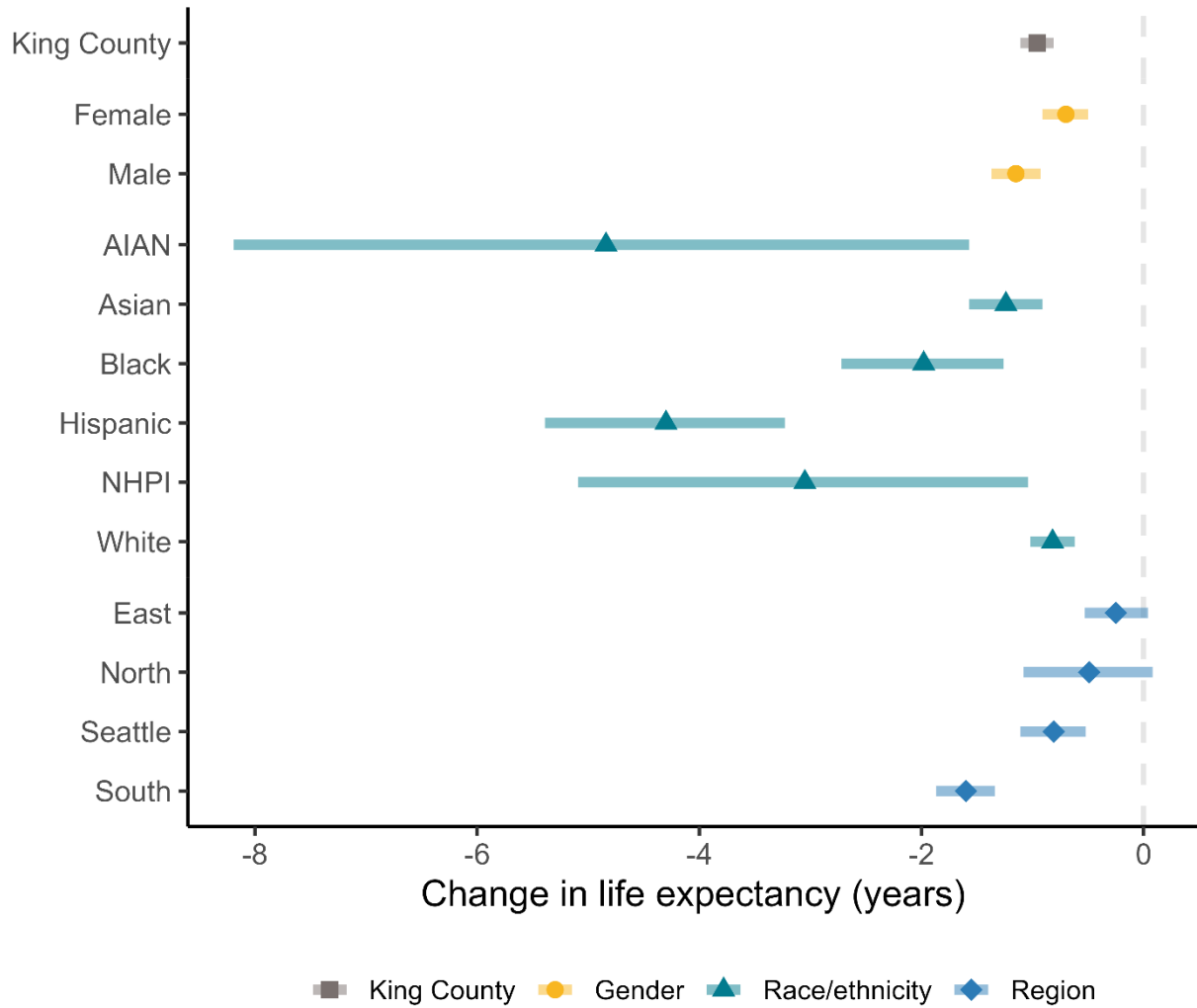
Top 10 Leading Causes of Death

With the notable exception of COVID-19 as the fifth most common cause of death in 2020-2022, the leading causes of death were similar in both time periods.

Table 1. King County leading causes of death in 2017-2019 and 2020-2022

2017-2019 Leading Causes	Deaths	Rate/100K (95% CI)		2020-2022 Leading Causes	Deaths	Rate/100K (95% CI)
Cancer	8,835	133 (130, 136)	1	Cancer	8,778	124 (122, 127)
Heart disease	8,030	122 (119, 125)	2	Heart disease	8,541	123 (121, 126)
Alzheimer's disease	2,826	45 (43, 46)	3	Unintentional injuries	3,485	49 (47, 50)
Unintentional injuries	2,476	36 (35, 38)	4	Alzheimer's disease	2,795	43 (41, 45)

2017-2019 Leading Causes	Deaths	Rate/100K (95% CI)		2020-2022 Leading Causes	Deaths	Rate/100K (95% CI)
Stroke	2,017	31 (30, 33)	5	COVID-19	2,212	32 (31, 33)
Chronic lower resp.	1,462	23 (22, 24)	6	Stroke	2,026	30 (29, 31)
Diabetes mellitus	1,188	18 (17, 19)	7	Diabetes mellitus	1,394	20 (19, 21)
Suicide	887	13 (12, 14)	8	Chronic lower resp.	1,280	19 (18, 20)
Chronic liver disease	727	10 (9, 11)	9	Chronic liver disease	914	12 (11, 13)
Influenza and pneumonia	652	10 (9, 11)	10	Suicide	845	12 (11, 13)

Discussion

In this updated analysis we found a 6.8% increase in the overall death rate for King County between 2017-2019 and 2020-2022, with noteworthy variations in demographic subpopulations. Females experienced a 5.0% increase, while males saw an 8.2% increase. Death rate increases among racial and ethnic subpopulations ranged from 5.8% among white residents to 41.4% among NHPI residents. Regional variations were observed, with only South King County (12.1%) and Seattle (5.2%) experiencing significant increases in death rates. Cause-specific analyses highlight significant decreases in suicide (-9.7%) and cancer (-6.5%) death rates but significant increases in death rates due to drug overdoses (75.1%), homicides (35.6%), unintentional injuries (33.2%), and diabetes mellitus (9.8%). As with the all-cause death rates, there was often substantial variation by demographic subpopulation. The study also reports a 1.0-year decrease in life expectancy for King County overall, varying from a 4.8-year decrease among AIAN residents to no significant changes among residents of North and East King County. The leading causes of death have remained approximately stable over time, with the notable exception of COVID-19 being ranked fifth in 2020-2022. This updated analysis provides a comprehensive and nuanced understanding of the pandemic's impact on mortality, emphasizing the complex interplay of various factors beyond direct COVID-19-related deaths.

Changes in all-cause death rates amplified existing health inequities. Males, for example, had higher baseline death rates and experienced sharper relative and absolute increases compared to females. Similarly, NHPI and AIAN residents had the highest baseline rates and experienced the most substantial increases. However, this pattern was not always consistent. While Asian residents had the lowest death rates at the outset, white residents experienced the smallest relative and absolute increases. Also, Hispanics, who had the second-lowest baseline rate, saw the fourth-largest relative increase. Geographically, South King County residents had the highest baseline rates and experienced the greatest relative and absolute increases.

It is noteworthy that at the beginning of our study, King County Hispanic residents were exemplars of the "Hispanic Paradox".[1,x,xi] In 2017 they had a life expectancy of over 90 years (90.2 years, 95% CI: 88.6-91.7, data not shown), the highest by far among all racial and ethnic groups in King County. However, by 2022 their life expectancy had fallen to second place, behind Asian King County residents. This was entirely due to worsening health among Hispanics rather than improving outcomes among Asians. Among the causes of death examined in this study, the greatest contributors to the increase in Hispanic death rates were drug overdose and unintentional injuries (data not shown). However, it is important to note that unintentional injury deaths can be comprised in part by some drug overdose deaths, so we cannot directly sum their contributions.

The popular press[xii] and scientific literature[xiii] have expressed concerns that pandemic-related reductions in cancer screenings and failures to initiate timely treatment could increase cancer mortality rates. Counter to this expectation, we found a decrease in cancer death rates during the time of our study. Since cancer increases the risk of death from COVID-19, some individuals who could have died from cancer may have instead died from COVID-19, with COVID-19 being recorded as the underlying cause of death.[xiv] In addition, it is possible that the end of 2022 is still within the lag period before which we would see substantial increases in cancer mortality. Therefore, it is important to continue monitoring this situation, with specific attention being given to breast cancer, cervical cancer, and colorectal cancer which have effective screening recommended by the United States Preventive Services Task Force.[xv]

Injury mortality changes during the first year of the pandemic have been reported in the literature. In concordance with the results in this brief, they report that unintentional injuries (falls, motor vehicle accidents, accidental poisonings, etc.), drug overdoses, and homicides significantly increased in the pandemic period.[xvi,xvii] One of the publications also aligned with our report of a decreased suicide death rate,[xviii,] whereas the other found no meaningful change in this rate. [xix] Though our ongoing surveillance work shows that unintentional injury death rates have been increasing over time, there was a sizeable jump during the pandemic, suggesting this is due in part to the COVID-19 response.[xx] Overdose deaths also began rising pre-pandemic, and experienced rapid growth during the pandemic due primarily to fentanyl and methamphetamines.[xxi] Similarly, homicides began increasing in the pre-pandemic period.[xxii] These pandemic period increases may be due to economic and social stress or may simply represent the maturation of nascent public health crises that were already in process. The reduction in the suicide death rate was contrary to the expectation that pandemic-associated depression and anxiety would result in increased suicide death rates. Examining our emergency department surveillance estimates shows an increase in suicide attempts.[xxiii] This increase in suicide attempts paired with a decrease in suicide deaths could be due to shifts in the risk profiles of those attempting suicide during the pandemic.[xxiv]

The nearly 10% increase in diabetes deaths is not unexpected.[xxv] It may be attributed in part to the loss of continuity of care, which includes disruptions in the regular monitoring of HbA1c, blood pressure, and urine albumin, essential for ongoing diabetes management.[xxvi] There are also direct biological mechanisms connecting diabetes mellitus and COVID-19, with COVID-19 infection reducing glycemic control[xxvii] and diabetes being a risk factor for severe COVID-19 morbidity and death.[xxviii] Reduced access

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[1] The Hispanic Paradox refers to the observation that Hispanic populations in the United States tend to have more favorable health outcomes and longer life expectancies than would be expected based on their socioeconomic status and access to healthcare.

to nutritionally appropriate foods early in the pandemic may also have contributed to the observed increase.

Limitations

This study has multiple limitations.

First, in accordance with established conventions for such analyses, we employed the underlying cause of death. However, this approach prioritizes simplicity over nuanced considerations. Readers desiring information on the causal chain of events, or the immediate cause of death, will have to look elsewhere. Second, providing granular insights by stratifying deaths for smaller populations and less common causes, such as American Indian/Alaskan Native and Native Hawaiian/Pacific Islander residents and drowning deaths, results in limited observations for calculations. This is reflected in the wide confidence intervals around some estimates and necessitates cautious interpretation of the estimates. Third, exclusion of children under one year of age restricts the study's ability to offer a comprehensive overview of all deaths in King County. This exclusion is a result of distinguishing between the standard list of 130 causes of infant death and those for individuals aged one year and older (see Technical Appendix for details). Fourth, as explained in the Technical Appendix, since race and ethnicity designations are determined separately for numerators (i.e., deaths) and denominators (i.e., populations), this may introduce bias in results for certain populations. Finally, this analysis lacks a hypothesis-driven approach, and no statistical adjustments have been made for multiple comparisons. Recognition of the potential for statistically significant findings due to chance is crucial, emphasizing the importance of considering the magnitude of a change in conjunction with the expectation of that change in addition to its statistical significance.

Conclusion

This updated analysis reveals a significant increase in King County's death rate and decrease in life expectancy, with marked variations across demographic subpopulations. The leading causes of death remained relatively stable, except for COVID-19 ranking fifth in 2020-2022. The analysis also highlights complex trends in specific causes of death, including decreases in cancer and suicide deaths and substantial increases in drug overdose deaths, homicides, and deaths due to unintentional injuries and diabetes. These findings underscore the pandemic's diverse and often inequitable impacts on mortality, highlighting the need for further investigation and targeted interventions.

Technical Notes

We analyzed deaths among King County residents from 2017-2019 and 2020-2022 using death certificate data from the Washington State Department of Health Center for Health Statistics. We calculated age-adjusted all-cause death rates for demographic subpopulations. We also calculated select cause-specific death rates using standard ICD-10 code based definitions. We then compared the death rates from 2020-2022 to those from 2017-2019 to calculate the death rate ratios and differences. Additionally, we calculated the life expectancy at birth using standard methods and identified the leading causes of death in both periods.

Please refer to our technical appendix for complete details:
https://kingcounty.gov/-/media/king-county/depts/dph/documents/covid/reports/changes-in-death-rates-2022-tech-app

Resources

- Guidance related to COVID-19: https://kingcounty.gov/en/dept/dph/health-safety/disease-illness/covid-19
- Summary Report on Deaths Associated with COVID-19 in 2020-2022: https://kingcounty.gov/en/dept/dph/health-safety/disease-illness/covid-19/data/-/media/king-county/depts/dph/documents/covid/reports/report-deaths-associated-with-covid-19-2020-2022

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For more information, see: https://www.kingcounty.gov/covid/impacts

Endnotes

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[xxi] https://kingcounty.gov/en/dept/dph/health-safety/safety-injury-prevention/overdose-prevention-response/data-dashboards/

xxii https://kingcounty.gov/en/legacy/depts/health/data/community-health-indicators/washington-state-vital-statistics-death.aspx?shortname=Homicide

xxiii https://kingcounty.gov/en/legacy/depts/health/data/community-health-indicators/rhino.aspx?shortname=Suicide%20attempt

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