"Racial mortality inversion": Black-white disparities in mortality among people experiencing homelessness in the United States

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ABSTRACT

Disparities in mortality between Black and White people have long been observed. These disparities persist at all income levels. However, similar patterns in racial mortality disparities are not observed among people experiencing homelessness. Instead, studies in a handful of cities show a reversal in the Black-White mortality disparity in the United States: Black people experiencing homelessness are less likely to die compared to White people experiencing homelessness. We propose a theory of "racial mortality inversion" and test whether inverted Black-White mortality patterns are observable in homeless populations throughout the United States. Using a novel dataset of 18,618 homeless decedents in 20 localities across 10 states and the District of Columbia, we find consistent evidence for "racial mortality inversion" across time and place. Between 2015 and 2020, the aggregate White homeless mortality rate was 67.8%–138.4% higher than the rate for the Black homeless population. Inverted racial mortality rates were observed in all 20 localities and in nearly every year. Across the entire sample, higher average ages of death were also observed for Black people compared to White people experiencing homelessness in 5 of 6 years, though racial inversion in age was not consistent across localities. These findings offer novel insight into racial health disparities among people experiencing homelessness and may inform policies and programs that seek to prevent homelessness and homeless mortality across racial groups.

1. Introduction

More than a century of racial health disparities research demonstrates that Black Americans have, on average, lower life expectancy and higher all-cause mortality than White Americans. Among the general population in 2019, the overall life expectancy for Black Americans was 75.3 years, compared to 78.9 years for White Americans (Dwyer-Lindgren et al., 2022). In 2017, the age-adjusted mortality rate for Black adults was 1307 per 100,000, considerably higher than the 1137 per 100,000 for White adults (Curtin & Arias, 2019). Due to historical and contemporary structural racism, these racial health disparities persist at all income levels. Both low- and high-income Black Americans live shorter lives than their White counterparts (Benjamins et al., 2021). Although racial disparities in mortality have narrowed over time, they are a persistent feature of population health in the United States.

However, similar patterns in racial mortality disparities are not observed among one very low-income population: people experiencing homelessness (i.e., homeless, unhoused, or houseless people). Instead,

the small body of research on homeless mortality shows a reversal in the Black-White mortality disparity. Black people experiencing homelessness are less likely to die compared to White people experiencing homelessness. Though research in this area is limited, lower Black homeless mortality rates than White homeless mortality rates were found among homeless decedents in Boston, MA between 2003 and 2018 and Los Angeles, CA between 2015 and 2019 (Fine et al., 2023; Nicholas et al., 2021).

Typically, studies exploring mortality patterns among people experiencing homelessness are limited to a single city or county, most often very large coastal cities (Funk et al., 2022). It is unclear whether mortality patterns identified in these localities are representative of other areas in the United States. Further, very little research explores changes in mortality patterns among people experiencing homelessness over time. That is, it is not known the extent to which observed patterns are a persistent nationwide phenomenon or a phenomenon limited to specific localities and time periods.

To understand whether inverted racial mortality patterns are

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observable in homeless populations throughout the United States, we construct a novel dataset of homeless decedents in 20 localities, which represent 27.8% of the national homeless population in 2020. Using both locality-specific and pooled mortality rates for Black and White homeless populations, we find persistent evidence for "racial mortality inversion" across time and place. Between 2015 and 2020, we find that the White homeless population's mortality rate is 67.8%–138.4% higher than the rate for the Black homeless population. These findings offer novel insight into racial health disparities among people experiencing homelessness and may inform policies and programs that prevent homelessness and homeless mortality.

1.1. Racial disparities in homelessness and homeless mortality

A home is essential for good health. Thus, experiencing homelessness is a major risk factor for poor health outcomes, including premature mortality. Academic studies and government reports from across the country consistently demonstrate that people experiencing homelessness die decades younger than their housed counterparts (Funk et al., 2022). Analyses of causes of death among people experiencing homelessness also consistently indicate that they are much more likely to die in tragic and preventable ways, such as homicide, suicide, blunt force injury, violence, and substance-involved deaths (Chang, Saxton, Bright, Jorden, et al., 2023; Fowle & Routhier, 2024; Hwang et al., 1997).

In recent years, public health practitioners and journalists across the United States have reported sharp increases in numbers of people dying while homeless (McCormick, 2022). By 2018, dozens of cities and counties had also published reports on deaths among people experiencing homelessness, and in almost all localities, the number of deaths notably increased (Fowle & Gray, 2023).

The overrepresentation of Black people among those experiencing homelessness has been documented by researchers for nearly a century (Johnson, 2010). These racial disparities in homelessness have likely existed for even longer (Fowle, 2022). Nationally, Black people comprise 13% of the general population, but more than 40% of the homeless population (Henry et al., 2019). In contrast, White people comprise approximately 74% of the general population, but less than 48% of the homeless population (Henry et al., 2019). In every US state Black people are overrepresented among people experiencing homelessness compared to the general population (National Alliance to End Homelessness, 2019). Racial disparities in homelessness are not driven by overrepresentation in particular regions.

Similar racial disparities are apparent among low-income households. Black people are more likely to live in poverty than White people in all US states. Low-income Black people also live shorter lives than low-income White people. Conversely, some homeless mortality studies find considerably higher mortality rates for White people experiencing homelessness than Black people experiencing homelessness (Baggett et al., 2013; Hibbs et al., 1994; Nicholas et al., 2021; Roncarti et al., 2018). These studies are not national, however. Study samples represent homeless populations situated in large coastal cities, such as Boston, MA, Philadelphia, PA, and Los Angeles, CA. In addition, many studies limit their focus to single subpopulations of people experiencing homelessness, such as veterans; adults, families, and youth; men and women; individuals with substance-use disorders; and people living both unsheltered and in shelters, which makes comparisons across localities difficult. Mortality rates also vary considerably across jurisdictions (Funk et al., 2022).

Several studies have identified an increased risk of mortality among White homeless adults compared to their Black counterparts, suggesting a reversal of the racial mortality disparity observed in the general population. In a study of adult patients seen at the Boston Health Care for the Homeless Program between 2003 and 2008, White men had an age-standardized mortality rate ratio of 1.94 compared to Black men (Baggett et al., 2013). An earlier study of homeless adults in Philadelphia between 1985 and 1988 found White participants had a mortality

rate of 8.9 per 1000 compared to non-white men at 7.1 per 1000 (Hibbs et al., 1994). Among unsheltered adults in Boston between 2000 and 2009, the Black mortality rate (1796 per 100,000) was less than half the White mortality rate of 4645 per 100,000. A recent study in Los Angeles, CA found the Black age-adjusted mortality rate per 100,000 was 1321 compared to 2237 for White people (Nicholas et al., 2021). One challenge in interpreting many earlier studies is use of "non-white" homeless persons as the comparator to White homeless persons.

Other studies have not found strong evidence of racial disparities in mortality among people experiencing homelessness. Several studies find marginally higher mortality rates for White people experiencing homelessness, but often these differences are not statistically significant (Barrow et al., 1999). Metraux et al. (2011) found White people experiencing homelessness had an increased risk of mortality for single adults, but not families, compared to people of color experiencing homelessness. In Boston and New York, White families living in shelters had similar mortality rates to non-white families (Metraux et al., 2011). Other studies in New Orleans (Rayburn et al., 2012) and Boston (Hwang et al., 1997) have found lower mortality rates for Black compared to White men, but these differences were not statistically significant.

There are very few peer-reviewed studies examining homeless mortality at a national level. Almost all reports and studies on mortality among people experiencing homelessness use data from a single city or county, and similarly few studies explore trends over time in homeless mortality rates.

1.2. A theory of "racial mortality inversion"

We propose a theory of "racial mortality inversion" to describe the reversal of disparities in all-cause mortality rates across two distinct racial groups within a subpopulation, when compared to rates in the general population. The theory of racial mortality inversion may be considered paradoxical because, when compared to a non-marginalized group, higher mortality rates observed for a marginalized group may be expected to translate into higher mortality rates across subpopulations of that marginalized group. For instance, Black-White mortality disparities are observed regardless of socioeconomic indicators, including income, employment, wealth, and parental socioeconomic status. In this study, we examine racial mortality inversion between Black and White people experiencing homelessness. We highlight three primary hypotheses that might explain racial mortality inversion: 1) selection into homelessness, 2) experiences of homelessness, and 3) homelessness data quality.

1.2.1. Selection into homelessness

The primary explanation for racial mortality inversion among Black and White homeless populations is selection of either or both healthier Black people *or* less healthy White people from the general population into the homeless population (Dahl & Kjaersgaard, 1993). In the general population, Black Americans are, on average, less healthy and have a greater risk of mortality than White Americans. A larger proportion of the Black general population has poor health and falls below the survival threshold (upper diagram in Fig. 1). The process of selection into homelessness reverses this disparity. Among the homeless population, Black Americans show a health advantage, with a smaller proportion falling below the survival threshold (lower diagram in Fig. 1). White adults who are homeless exhibit worse health and higher mortality than Black adults who are homeless. This pattern is referred to as "racial mortality inversion," as the Black-White mortality disparity is reversed following selection into homelessness.

There are several mechanisms through which population selection into homelessness might occur. These mechanisms are related and likely reflect the lower socio-economic status of Black people in wider society. Due to historical and contemporary discrimination, racism, and marginalization, Black people have less wealth and lower incomes than White people (Hardy et al., 2018). Both wealth and income are major
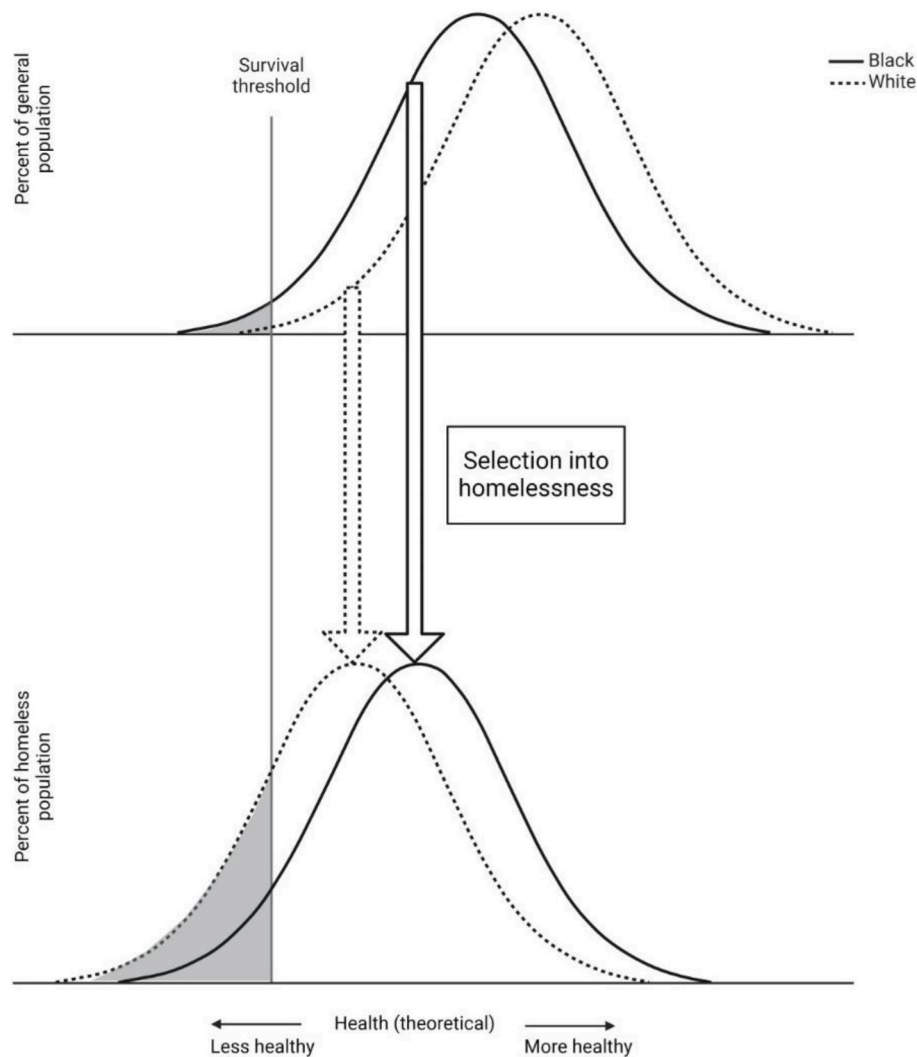
Fig. 1. Theoretical model of racial mortality inversion via population selection.
Note: Figure created using BioRender

determinants of housing status, meaning the average Black person is more likely to live in precarious housing situations compared to the average White person. Homelessness is also more commonplace among Black people than White people throughout the life course. The lifetime prevalence of homelessness for Black Americans born in 1946–1964 is 1 in 6, compared to 1 in 21 for White Americans (Fusaro et al., 2018).

As a result of Black American's structural vulnerability to poverty and high prevalence of housing precarity, they may be more vulnerable to homelessness following single events or disruptions that can occur in everyday life, such as losing a job, family dissolution, domestic violence, or incarceration. In contrast, the average White American's relative social and economic privilege means that they need to become even more vulnerable to experience homelessness; to the extent that most or all forms of social stability are disrupted or exhausted. Therefore, the average Black person experiencing homelessness more closely resembles the average Black person in the general population whereas the average White person experiencing homelessness represents a far more disadvantaged segment of the White general population.

We theorize that this increased vulnerability and fall from social status may be an indicator that White homelessness either has a larger impact on health or is more likely precipitated by or accompanied with health issues. Greater physical and mental health issues prior to and during periods of homelessness may explain greater mortality among White homeless populations. Supporting this theory is a small body of

research describing the different average pathways into homelessness for Black people and White people. Studies show that Black people are more likely to enter homelessness after experiencing eviction, unemployment, or benefit loss (First, Roth, & Arewa, 1988). The events that precipitate homelessness are similar for White people, but higher levels of mental illness and harmful substance use are reported (North & Smith, 1994).

Disadvantaged racial groups are at greater risk of losing their housing due to human-made social systems (Paul Jr et al., 2020; Chang et al., 2022). If the precipitating event of an individual's homelessness results from structural vulnerability (i.e., structural conditions rooted in systemic racism, discrimination, and marginalization), that person may be relatively healthy or have fewer comorbidities when they become homeless. Conversely, an individual not experiencing structural vulnerability may accumulate many years of potentially worsening physiological and psychological ailments prior to becoming homeless.

1.2.2. Experiences and demographics of homelessness

A second key explanation for racial mortality inversion is differences in the experience of homelessness between Black and White individuals. Black people are considerably more likely to experience homelessness temporarily or episodically in emergency shelters than people of any other race (Culhane et al., 2007). Almost half of people living in emergency shelters across the United States are Black (Henry et al., 2019). In

contrast to Black people, White people experiencing homelessness are more likely to experience chronic homelessness in unsheltered situations, such as outdoor encampments, sidewalks, and vehicles.

In part, the difference in homelessness contexts between Black people and White people is due to increased prioritization of families over single adults for shelter beds. A disproportionate number of homeless families are Black. Further, Black people experiencing homelessness are most likely to be overrepresented in major cities rather than in smaller urban, suburban, or rural areas. Emergency shelters are disproportionately concentrated in urban areas, making access to shelters generally easier for Black people (Carter, 2011). Health interventions that reduce the risk of mortality among people experiencing homelessness, such as substance use treatment and harm reduction practices, are also concentrated in major cities and accessible by public transportation. On the outskirts of cities and in suburban areas, nonprofit human services that support health and reduce the likelihood of mortality are also less common. Compared to urban counties, suburban counties spend approximately 90% less per low-income person on nonprofit human services (Allard, 2017).

The chronic unsheltered homelessness more likely to be experienced by White people may increase health risks compared to the episodic sheltered homelessness more likely to be experienced by Black people, even when episodic homelessness is spread over a longer period. Those living unsheltered not only have higher prevalences of mental illness, harmful substance use, and chronic ailments, but also higher mortality rates (Roncarti et al., 2018; Richards, Henwood, Porter, & Kuhn, 2023). Shelter residents tend to have more routine access to medical care, better access to food and sanitation, and protection from extreme weather and victimization. However, it should be noted that the distinction between sheltered and unsheltered homelessness may be overly simplistic. Many shelter residents may spend some nights unsheltered and those residing outdoors may occasionally or even frequently use shelter.

Structural vulnerability to poverty and housing precarity due to historical and contemporary racial discrimination contributes to the demographic differences in homeless populations across racial groups. For example, Black people are more likely to be younger when they first experience homelessness. In contrast, White people experience homelessness for the first time at older ages. Also of note is that Black women comprise a larger proportion of the Black homeless population than do White women in the White homeless population. Women experiencing homelessness report harmful substance use less frequently than men (Montgomery et al., 2017) and tend to have longer life expectancies (Fine et al., 2023).

1.2.3. Homelessness data quality

The data quality hypothesis suggests that Black-White racial mortality inversion among people experiencing homelessness is simply an artifact of low data quality. Undercounting of deaths in the Black homeless population has been suggested. If Black homeless decedents are less likely to be reported by authorities, they will be disproportionately missing from mortality datasets and therefore Black homeless mortality rates will be artificially lower. One potential reason for any underreporting may be that Black decedents are more likely to be missing race data on their death certificate due to fewer pieces of relevant, official documentation, or no next-of-kin information that would allow contact by coroners and medical examiners to confirm the decedent's race. Alternatively, Black deaths may be less likely to be recognized as homeless deaths. Death investigators may incorrectly determine a Black homeless decedent to be insecurely housed rather than homeless. Overcounting of White decedents as homeless rather than living in precarious housing conditions could also skew homeless mortality data.

Also affecting data quality are misclassification bias and missing race data, which are documented problems in health research. Discordance in racial identification has been recorded for general population decedents between their death certificates and the race of their next-of-kin (Sandefur et al., 2004) as well as between their self-identification and electronic health records (Klinger et al., 2015). People of color are disproportionately likely to have misidentified or missing race data compared to White people (Cook et al., 2022). One possible explanation is that people who have had contact with the criminal legal system may avoid formal record-keeping institutions. (Brayne, 2014). Contact with the criminal legal system is a high probability for a Black male experiencing homelessness, due to systemic racism and the criminalization of homelessness.

Among studies of homeless mortality, evidence is mixed regarding whether Black people are more or less likely to have missing information on official records (Hibbs et al., 1994; Metraux et al., 2011). Lower homeless mortality rates for Black people have been observed across multiple data sources, including those that use medical examiner and coroner data, administrative records from Homeless Management Information System (HMIS) databases, and healthcare utilization records. However, undercounts of the living Black homeless population would lead to overestimates, rather than underestimates, of the Black homeless mortality rate, which would further reinforce the theory of racial mortality inversion among the homeless population.

There is no clear consensus on the driving factors behind inverted racial mortality patterns among the Black and White homeless populations. However, before explanations for the phenomenon can be fully tested, racial mortality inversion as a nationwide pattern must be established. In this paper, we test the theory of racial mortality inversion by asking: compared with White homeless decedents, to what extent is Black homeless decedents' mortality rate lower and average age of death higher across geography and over time in the United States?

2. Material and methods

2.1. Data

We use publicly available point-in-time count data for each locality as the population denominator for homeless mortality rates. The U.S. Department of Housing and Urban Development (HUD) requires that localities collect annual data on the number of people experiencing homelessness in a given geographic area. These data are collected by Continuums of Care, local coordinating bodies that manage a city, county, region, or state's homelessness response. HUD aggregates and publicizes homeless count data every year. However, count data disaggregated by race have only been required by HUD beginning in 2015. We match the geographic boundaries for homeless count data with the localities for which we have homeless mortality data for 2015 through 2020.

Unlike HUD's requirement that localities conduct a regular count of people experiencing homelessness, there is no federal requirement to collect data on homeless deaths. To overcome this challenge, we made direct requests, public records requests, and Freedom of Information Act requests to local Medical Examiner's Offices, Coroners, Sheriff's Offices, and Departments of Public Health for individual-level death records for people experiencing homelessness.

Our dataset contains 18,618 individuals presumed to be homeless upon death in 20 localities between January 1, 2015, and December 31, 2020. The included localities comprise 161,301 (27.8%) of the 580,466 people counted as homeless nationwide in 2020. The dataset includes 7 of the 10 cities and counties with the largest homeless populations in the United States. Each death record contains information on the date of death and the decedent's age, gender, and race collected by the locality's medical examiner or coroner. Death records with an age listed in days, weeks, or months were rounded to the nearest two decimal points.

Table 1 shows summary statistics for age of death, gender, and racial group of homeless decedents in each locality. Localities in the sample represent a range of average ages of death for homeless decedents, from 47.1 years in Philadelphia, PA to 53.5 in Alameda County, CA. The

Table 1

Summary statistics for age, gender, and racial group for homeless decedents by locality.

County	Total Deaths	Age			Gender				Racial Group			
		Avg	Min	Max	Female		Male		Black		White	
		yrs	yrs	yrs	n	%	n	%	n	%	n	%
Alameda County, CA	556	53.5	0.01	88	99	18.0%	451	82.0%	183	32.9%	246	44.2%
Broward County, FL	486	50.6	0.01	84	92	18.9%	394	81.1%	108	22.2%	341	70.2%
Clark County, NV	883	51.2	0.5	88	140	15.9%	743	84.1%	153	17.3%	624	70.7%
Dallas County, TX	558	53.4	16	85	82	14.7%	476	95.3%	226	40.5%	247	44.3%
Washington, DC	629	51.5	0.1	80	112	17.8%	517	82.2%	509	80.9%	75	11.9%
Denver Metro, CO	887	51.8	1	92	162	18.3%	725	81.7%	69	7.8%	620	69.9%
Fulton County, GA	289	51.6	0.01	81	53	18.4%	235	81.6%	205	70.9%	74	25.6%
Honolulu County, HI	626	53.6	0.01	94	118	18.9%	508	81.2%	25	4.0%	190	30.4%
King County, WA	980	48.9	0.01	84	193	19.7%	787	80.3%	148	15.1%	678	69.2%
Los Angeles County, CA	6316	50.7	1	94	1132	17.9%	5181	82.1%	1569	24.8%	2357	37.3%
Miami-Dade County, FL	572	52.8	19	87	91	15.9%	480	84.1%	164	28.7%	395	69.1%
Montgomery County, PA	86	47.5	0.01	87	26	30.6%	59	69.4%	16	18.6%	66	76.7%
Oklahoma County, OK	124	50.4	19	86	21	16.9%	103	83.1%	27	21.8%	76	61.3%
Orange County, CA	1341	49.5	0.01	93	262	19.6%	1078	80.4%	60	4.5%	885	66.0%
Orange County, FL	192	52.0	25	78	26	13.6%	165	86.4%	41	21.4%	145	75.5%
Philadelphia County, PA	661	47.1	19	86	124	18.8%	537	81.2%	246	37.2%	305	46.1%
Sacramento County, CA	661	N/A	N/A	N/A	151	22.8%	510	77.2%	129	19.5%	409	61.9%
San Diego County, CA	1410	51.8	19	88	244	17.3%	1166	82.7%	174	12.3%	938	66.5%
Santa Clara County, CA	903	52.4	0.01	101	162	18.0%	738	82.0%	91	10.1%	448	49.6%
Travis County, TX	458	49.3	12	81	64	14.0%	394	86.0%	63	13.8%	301	65.7%
Total Sample	18,618	51.0	0.01	101	3354	18.0%	15,247	82.0%	4206	22.6%	9420	50.6%

Note: Statistics represent entire timeframe (2015–2020). Age data for Sacramento County, CA were not provided for the entire time period.

Source: Medical Examiner's Offices, Coroners, Sherriff's Offices, and Departments of Public Health in select localities.

proportion of female homeless decedents across localities ranges from 13.6% in Orange County, FL to 30.6% in Montgomery County, PA. There is considerable variation in the racial composition of homeless decedents across localities: Black homeless decedents comprise 4.0% in Honolulu County, HI compared to 80.9% in Washington, DC; White homeless decedents comprise 11.9% in Washington, DC to 76.7% in Montgomery County, PA. This variation across localities enables us to examine whether racial mortality inversion among the homeless population is observable across localities with differing age, gender, and racial compositions of homeless decedents.

In Table 2, the aggregate homeless population in the 20 sample localities is compared with the nationwide homeless population across several demographic variables. The study sample represents fewer children, women, families, and White people than in the national homeless population. Nationally, the homeless population has a considerably larger number of people living in emergency shelters, many of whom are located in East Coast localities with right-to-shelter policies. Until very recently, people experiencing homelessness in New York City, for example, had an enforceable entitlement to a shelter bed (Siebert, 1986). The study's sample does not include New York City or other localities in which residents are guaranteed shelter beds, in particular children and families.

2.2. Analysis

We calculated race-specific all-cause crude mortality rates by dividing the number of homeless deaths by the observed homeless population in a given year for each racial group. This process was conducted for all localities to create aggregate mortality rates and for each locality to create locality-specific mortality rates. All mortality rates are reported per 100,000 people experiencing homelessness. Black-White ratios of homeless mortality rates were computed by dividing the Black mortality rate by the White mortality rate for each locality-year.

For the analysis of average age of death, we use the median age of death to avoid overdue influence of outliers. Analyses of average age of death by locality are reported for the entire 2015–2020 period because sample sizes were too small to produce valid estimates for single years in smaller localities. Black-White differences in the median age of death

Table 2

Demographic composition of homeless populations in 20 Sample Localities and Nationwide, 2020

	Nationwide (%)	20 Sample Localities (%)
Age		
Under 18	18.3	13.8
18-24	7.8	8.8
Over 24	73.9	77.3
Gender		
Female	38.5	34.1
Male	60.7	64.7
Non-binary or transgender	0.8	1.2
Ethnicity		
Hispanic	22.5	24.5
Non-Hispanic	77.5	75.5
Race		
Asian	1.3	1.9
Black or African American	39.4	41.9
American Indian or Alaska Native	3.3	3.3
Native Hawaiian or Other Pacific Islander	1.5	2.3
Multiple Races	6.1	7.1
White	48.3	43.5
Family Status		
Individual	70.4	79.4
Family	29.6	20.5
Homelessness Type		
Sheltered	61.1	41.7
Unsheltered	38.9	58.3

Source: HUD point-in-time estimates of people experiencing homelessness in 2020 and authors' analysis of individual-level homeless decedent data from Medical Examiners, Coroners, Sherriff's Offices, and Departments of Public Health in select localities in 2020.

were computed by subtracting the White median age of death from the Black median age of death for each locality, pooled across all years in the sample. As ages of death distribution did not meet the assumption of normality, Mann-Whitney tests were used to determine whether the population distributions were the same between the two racial groups.

3. Results

3.1. Homeless mortality rates

In aggregate, there was a substantial rise in the mortality rate for both Black and White people experiencing homelessness between 2015 and 2020 (Fig. 2). The White mortality rate increased 44.0% between 2015 and 2020, from 1902 (95% CI [1793–2012]) to 2739 (95% CI [2622–2855]) per 100,000 people experiencing homelessness. The rise in mortality rate for the Black homeless population was even higher with a 104.6% increase between 2015 and 2020, from 798 (95% CI [724–872]) to 1632 (95% CI [1536–1729]) per 100,000.

In 2015, the White homeless mortality rate was 138.4% (95% CI [130.7–147.7%]) larger than the Black homeless mortality rate. By 2020, the disparity had reduced to 67.8% (95% CI [65.1–70.7%]). The decreasing racial disparity in homeless mortality rates is represented in Table 3, which is consistent with the increase in the Black-White mortality rate ratio from 0.42 (95% CI [0.40–0.43]) in 2015 to 0.60 (95% CI [0.59–0.61]) in 2020. Though these results indicate a relative narrowing in the inverted racial disparity, the difference in mortality rates between the Black and White homeless populations was consistently more than 1000 per 100,000 people experiencing homelessness.

The Black-White ratio of homeless mortality rates for all 20 localities demonstrates the ubiquity of racial mortality inversion (Table 4). In only one year for two different counties was the Black homeless mortality rate higher than the White homeless mortality rate: Honolulu County, HI in 2016 (Black-White ratio of homeless mortality rates: 1.5) and Oklahoma County, OK in 2015 (1.1). In all other years and across all localities, the White homeless mortality rate was higher. Black-White ratios of homeless mortality rates ranged from 0.1 in Philadelphia County, PA in 2015 to 1.0 in Santa Clara County, CA in 2018 and Oklahoma County, OK in 2018 and 2019.

3.2. Median age of homeless deaths

Racial mortality inversion in the median age of homeless death was observable in 5 of 6 years across the 20 localities (Fig. 3). In these 5 years, the Black median age of homeless death was between 1 and 3 years higher than the White median. However, these differences were

Table 3
Black-White aggregate homeless mortality rates and rate ratios, 2015–2020.

Year	Black homeless mortality rate per 100,000 (95% CI)	White homeless mortality rate per 1000,000 (95% CI)	Homeless mortality rate ratio (95% CI)
2015	798 (724–872)	1902 (1793–2012)	0.42 (0.40–0.43)
2016	951 (870–1032)	2063 (1953–2174)	0.46 (0.45–0.47)
2017	984 (907–1061)	2514 (2392–2636)	0.39 (0.38–0.40)
2018	1246 (1155–1337)	2524 (2405–2642)	0.49 (0.48–0.51)
2019	1282 (1195–1370)	2383 (2271–2494)	0.54 (0.53–0.55)
2020	1632 (1536–1729)	2739 (2622–2855)	0.60 (0.59–0.61)

Source: Medical Examiner's Offices, Coroners, Sherriff's Offices, and Departments of Public Health homeless decedent data in select localities; HUD point-in-time counts of homeless populations in corresponding localities.

statistically significant in only two years, 2015 (p < .01) and 2017 (p < .01). There was no difference in medians in 2019, with both Black and White homeless populations at a median age of death of 55 years.

The average age of death among people experiencing homelessness across all localities in the sample was relatively stable between 2015 and 2020 for both racial groups. For the Black homeless population, the median age of death trended downwards from 56 to 54 years over the six-year period. The White average age of death was 53 years in both 2015 and 2020, though was as high as 55 years in 2019.

Black-White differences in the median age of homeless death across the 19 localities with age data varied considerably more than differences in homeless mortality rates (Table 5). The largest difference was in Philadelphia County, PA where the average age of death for White people was 10 years lower than for Black people. Eleven of 19 localities had positive differences in the median age of homeless death, indicating higher ages for Black compared to White people. However, these differences were statistically significant in only 5 localities (Clark County, NV; Fulton County, GA; Los Angeles County, CA; Oklahoma County, OK; and Philadelphia County, PA). For 2 localities the Black and White homeless populations had the same median age of death and for 6 localities the difference was negative, indicating a higher age of death for White compared to Black people experiencing homelessness.

Across localities, the Black median age of death ranged from 47 years (Montgomery County, PA) to 57 years (Alameda County, CA and Denver
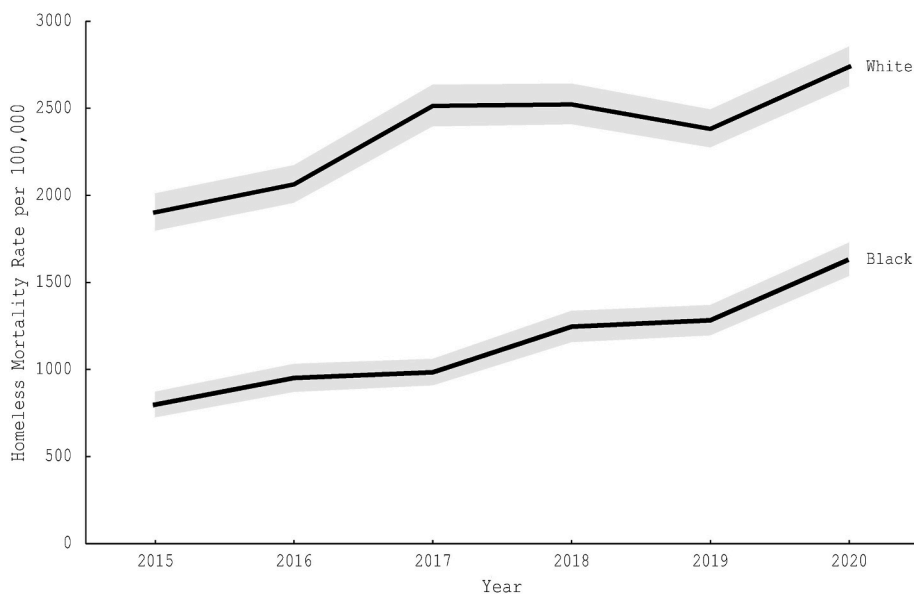

Fig. 2. Black-White aggregate homeless mortality rates, 2015–2020.
Note: Grey shaded areas represent 95% confidence intervals.
Source: Medical Examiner's Offices, Coroners, Sherriff's Offices, and Departments of Public Health homeless decedent data in select localities; HUD point-in-time counts of homeless populations in corresponding localities.

Table 4
Black-White ratio of homeless mortality rates by locality, 2015–2020.

County	2015	2016	2017	2018	2019	2020
Alameda County, CA	0.3	0.3	0.7	0.4	0.5	0.6
Broward County, FL	0.1	0.2	0.3	0.2	0.3	0.2
Clark County, NV	0.2	0.3	0.3	0.4	0.4	0.6
Dallas County, TX	0.8	0.5	0.3	0.7	0.6	0.6
Washington, DC	0.4	0.4	0.4	0.4	0.4	0.8
Denver Metro, CO	0.5	0.2	0.3	0.4	0.3	0.2
Fulton County, GA	0.3	0.6	0.4	0.3	0.5	0.4
Honolulu County, HI	0.4	1.5	0.3	0.5	0.5	0.3
King County, WA	0.2	0.3	0.4	0.4	0.4	0.5
Los Angeles County, CA	0.7	0.8	0.5	0.7	0.8	0.8
Miami-Dade County, FL	0.3	0.4	0.3	0.2	0.3	0.6
Montgomery County, PA	0.2	0.1	0.2	0.1	0.2	0.2
Oklahoma County, OK	1.1	0.4	0.6	1.0	1.0	0.7
Orange County, CA	0.2	0.2	0.3	0.6	0.3	0.6
Orange County, FL	0.4	0.2	0.1	0.4	0.2	0.2
Philadelphia County, PA	0.1	0.2	0.1	0.2	0.2	0.2
Sacramento County, CA	0.7	0.3	0.4	0.3	0.7	0.4
San Diego County, CA	0.5	0.4	0.5	0.5	0.4	0.6
Santa Clara County, CA	0.7	0.3	0.6	1.0	0.4	0.5
Travis County, TX	0.3	0.4	0.2	0.5	0.3	0.5

Source: Medical Examiner's Offices, Coroners, Sheriff's Offices, and Departments of Public Health homeless decedent data in select localities; HUD point-in-time counts of homeless populations in corresponding localities.Note: Ratios lower than 1.0 represent a Black homeless mortality rate lower than the White homeless mortality rate for a given locality in a given year. Ratios higher than 1.0 represent a Black homeless mortality rate higher than the White homeless mortality rate. Ratios of 1.0 represent equal Black and White homeless mortality rates.

Metro, CO). The White median age of death ranged from 44 years in Philadelphia County, PA to 58 years in Honolulu County, HI. These findings indicate that racial mortality inversion in the median age of death among the Black and White homeless populations is not consistently observable across localities.

4. Discussion

In this study, we find clear evidence for inverted racial mortality patterns among the Black and White homeless populations in all 20 localities between 2015 and 2020. During the six-year period, the White homeless mortality rate ranged from between 67.8% and 138.4% higher than the Black homeless mortality rate, on aggregate. Inverted racial mortality patterns were also consistently observed in all 20 localities in the sample. Similarly, racial mortality inversion in the average age of homeless death was observable in 5 of 6 years in aggregate and in most

localities, though only some of these differences were statistically significant. We find some evidence to suggest that racial mortality inversion may be eroding over time, though it is difficult to make concrete conclusions within a relatively short period. We offer three hypotheses for racial mortality inversion, which warrant further investigation: 1) selection into homelessness, 2) experiences of homelessness, and 3) homelessness data quality.

The study offers novel insight into racial disparities in mortality among an understudied and highly marginalized population. As the first study to analyze trends in mortality by racial groups in multiple localities over several years, we demonstrate the ubiquity of inverted racial mortality rates across place and time. However, it does not appear that the theory of racial mortality inversion holds as consistently for the average age of homeless death, either across localities or time. The relatively small aggregate differences and inconsistent differences across localities in average age of death between Black people experiencing homelessness and White people experiencing homelessness indicate that age differences may only be a minor contributor to reversed racial mortality patterns.

Several limitations deserve consideration when interpreting this study's results. There is considerable measurement error in the datasets used to measure both homelessness and homeless mortality. The lack of a fixed address and sometimes infrequent connection to government services makes it difficult for an accurate homeless population census to be conducted. Counts of people experiencing homelessness are at best annual snapshots of a highly transient population, often making them undercounts of the true extent of homelessness. As homelessness is a mutable circumstance with limited visual indicators for its presence, it is also not always possible to determine if a decedent was experiencing homelessness at the time of death. These difficulties lead to measurement error when calculating both homeless mortality rates and average ages of homeless death.

The extent of measurement error in each locality is a function of many variables, making comparison across localities highly challenging. In addition, localities use a variety of definitions for homelessness and processes for identifying homelessness. Although almost all localities use the HUD definition of homelessness, localities vary in the extent to which they adhere to this definition in practice, the resources they devote to identifying homeless decedents, and the extent to which they investigate deaths within their jurisdiction. Most localities across the United States do not track homeless deaths. Therefore, the localities included in the study's sample over-represent larger, urban counties with likely better resourced agencies to collect housing status among decedents. The study's sample contains a higher proportion of older unsheltered men experiencing homelessness compared to the national
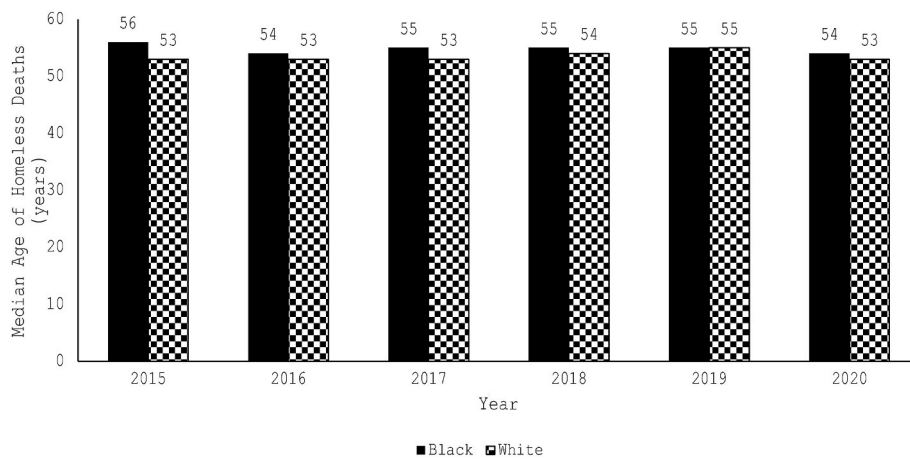

Fig. 3. Black-White median age of homeless deaths, 2015–2020.
Source: Medical Examiner's Offices, Coroners, Sheriff's Offices, and Departments of Public Health homeless decedent data in select localities; HUD point-in-time counts of homeless populations in corresponding localities.

Table 5
Black-White differences in median age of homeless death by locality.

County	Black (years)	White (years)	Difference (years)	Mann-Whitney (z)
Alameda County, CA	57	56	1	0.99
Broward County, FL	51	53	−2	−0.35
Clark County, NV	49	54	−5	−3.39[b]
Dallas County, TX	56	55	1	−0.49
Washington, DC	54	51	3	0.88
Denver Metro, CO	57	54	3	1.01
Fulton County, GA	56	49	7	3.75[b]
Honolulu County, HI	56	58	−2	−0.62
King County, WA	52.5	51	1.5	1.00
Los Angeles County, CA	56	54	2	4.39[b]
Miami-Dade County, FL	56	55	1	−0.14
Montgomery County, PA	47	48	−1	0.45
Oklahoma County, OK	50	50.5	−0.5	1.71[a]
Orange County, CA	49.5	54	−4.5	−1.62
Orange County, FL	57	53	4	0.88
Philadelphia County, PA	54	44	10	5.90[b]
Sacramento County, CA	N/A	N/A	N/A	N/A
San Diego County, CA	55	54	1	0.79
Santa Clara County, CA	56	56	0	−1.13
Travis County, TX	51	51	0	0.28

Note: Statistics represent entire timeframe (2015–2020). Age data for Sacramento County, CA were not provided for the entire time period so were excluded from the analysis. Positive differences represent higher ages of homeless death for the Black population compared to White population. Negative differences represent the reverse. Zero difference indicates average age of death was the same for the Black and White populations.

*p < 0.05.
**p < 0.01.
[a] p < .10.
[b] p < .001.

Source: Medical Examiner's Offices, Coroners, Sherriff's Offices, and Departments of Public Health homeless decedent data in select localities; HUD point-in-time counts of homeless populations in corresponding localities.

homeless population. This bias may have led to an undercount of Black homeless deaths in the sample and therefore produced underestimates in Black homeless mortality rates. The use of data from Medical Examiner's Offices, Coroners, and Sherriff's Offices also means deaths that occur in more ordinary circumstances are likely to be missed.

As many localities only began collecting data on homeless mortality in the last decade and homeless count data disaggregated by race was only mandated by HUD beginning in 2015, only six years of data analysis was possible. It is not known the extent to which racial mortality inversion is observable prior to this period. Further, homeless mortality data for smaller racial groups, such as Asians, Native Americans, and Pacific Islanders, and ethnic groups, in particular Hispanics, are less accurate due to their relatively small numbers in many localities. For the same reason, analyses disaggregated by gender and adjusted for age were not possible. As this study focuses only on Black and White homeless decedents, there is a need for further research on racial mortality disparities between other racial and ethnic groups.

Understanding whether racial mortality inversion is observable across genders, ages, and other socio-demographic characteristics would further understanding of its ubiquity and explanations for its presence. Studies might also consider how access to different public services and forms of assistance might affect homeless mortality rates across racial

groups. For example, racial disparities in access to healthcare shape both vulnerability of selection into homelessness and the experience of homelessness. In studies examining access to healthcare among homeless veterans, Black veterans are overrepresented among people experiencing homelessness compared to all other races. However, in a systematic review, Black veterans were less likely to use their health insurance, less likely to receive follow-up care, less likely to find healthcare affordable, and more likely to distrust the healthcare system (Crone, Metraux, & Sbrocco, 2022). Future studies might use new theories and methods to elucidate the roles of race, healthcare access, and veteran status on mortality among people experiencing homelessness.

It is important to reiterate that we focus only on race and homelessness in the US. Racial groupings are socially constructed categories that have specific criteria and meaning based on regional and national social histories. Thus, we anticipate that there will be variation in how racial disparities in homeless mortality present across the world. We encourage further study of our proposed theory of racial mortality inversion in other contexts and countries, involving different racial categories.

There is also a need for further investigation into the cause of death by race. Cause of death data is a public health surveillance tool that provides important insights into the health experiences of homeless populations. For example, recent studies have shown that reported causes of death vary for different racial groups. In Boston, MA, Black and Latino people experiencing homelessness had higher rates of homicide deaths than Whites (Fine et al., 2023). In Santa Clara County, CA, Asian and Pacific Islander people experiencing homelessness had higher rates of illness and injury deaths, and wide variation in causes of death when further broken down by ethnicity (Chang, Saxton, Bright, Ryan, et al., 2023). Further research examining the cause of death by race is needed to disentangle the dynamics of race and homelessness on health. Qualitative research that focuses on people's lived experiences might be particularly adept at drawing new insights on these topics.

Critically, in this analysis, we were unable to include underlying health or health behaviors by race and region, which could yield insights into the intersection of race, health, and homelessness in mortality outcomes. These specific pathways can be identified and focused upon at the regional level for programs seeking to reduce homeless racial disparities. When pathways into homelessness are understood at the local level, this can help housing and public health departments and organizations to direct and tailor interventions or services.

Homeless mortality data is increasingly used by stakeholders because it can be made publicly available when de-identified and it provides an invaluable glimpse into the lived experiences of homeless individuals at the population level. Currently, there are no federal mandates or guidelines on collecting homeless mortality data. Although the number of localities collecting and using this data is increasing, it is still not common, particularly in non-urban areas. Those regions that do collect these data are not required to report it in any standardized way. There is a strong need for standardized data collection, monitoring, analysis, storage, and reporting procedures of homeless deaths. We also need policies and technologies to respect the privacy of decedents who are categorized as homeless, given the stigma of homelessness. These data are necessary to build more accurate measures of homeless mortality, which are foundational for effective interventions.

From a policy perspective, the results may indicate that interventions for addressing homelessness can have different effects on racial groups. Nevertheless, all people experiencing homelessness suffer from a lack of safe, stable, and affordable housing. People who die while experiencing homelessness are more likely to be chronically without housing, have significant health problems, and limited ability to self-resolve their homelessness. Housing First interventions, in particular permanent supportive housing offering long-term financial subsidies and supportive services, have been proven effective in supporting this high-needs population (Aubry et al., 2020). However, Housing First interventions are persistently underfunded across the United States. If this continues,

deaths are likely to continue to rise for both Black and White people experiencing homelessness.

CRediT authorship contribution statement

Matthew Fowle: Writing – review & editing, Writing – original draft, Visualization, Project administration, Methodology, Investigation, Funding acquisition, Formal analysis, Data curation, Conceptualization. **Jamie Chang:** Writing – review & editing, Writing – original draft, Project administration. **Katherine Saxton:** Writing – review & editing, Writing – original draft, Visualization, Validation, Software, Methodology.

Declaration of competing interest

The authors declare the following financial interests/personal relationships which may be considered as potential competing interests:
Matthew Fowle reports financial support was provided by West Coast Poverty Center Horowitz Foundation for Social Policy. If there are other authors, they declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

Data availability

The authors do not have permission to share data.

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