

JAMA | Original Investigation

Examining Excess Mortality Associated With the COVID-19 Pandemic for Renters Threatened With Eviction

Nick Graetz, PhD; Peter Hepburn, PhD; Carl Gershenson, PhD; Sonya R. Porter, PhD; Danielle H. Sandler, PhD; Emily Lemmerman, BA; Matthew Desmond, PhD

IMPORTANCE Residential evictions may have increased excess mortality associated with the COVID-19 pandemic.

OBJECTIVE To estimate excess mortality associated with the COVID-19 pandemic for renters who received eviction filings (*threatened renters*).

DESIGN, SETTING, AND PARTICIPANTS This retrospective cohort study used an excess mortality framework. Mortality based on linked eviction and death records from 2020 through 2021 was compared with projected mortality estimated from similar records from 2010 through 2016. Data from court records between January 1, 2020, and August 31, 2021, were collected via the Eviction Lab's Eviction Tracking System. Similar data from court records between January 1, 2010, and December 31, 2016, also collected by the Eviction Lab, were used to estimate projected mortality during the pandemic. We also constructed 2 comparison groups: all individuals living in the study area and a subsample of those individuals living in high-poverty, high-filing tracts.

EXPOSURES Eviction filing.

MAIN OUTCOMES AND MEASURES All-cause mortality in a given month. The difference between observed mortality and projected mortality was used as a measure of excess mortality associated with the pandemic.

RESULTS The cohort of threatened renters during the pandemic period consisted of 282 000 individuals (median age, 36 years [IQR, 28-47]). Eviction filings were 44.7% lower than expected during the study period. The composition of threatened renters by race, ethnicity, sex, and socioeconomic characteristics during the pandemic was comparable with the prepandemic composition. Expected cumulative age-standardized mortality among threatened renters during this 20-month period of the pandemic was 116.5 (95% CI, 104.0-130.3) per 100 000 person-months, and observed mortality was 238.6 (95% CI, 230.8-246.3) per 100 000 person-months or 106% higher than expected. In contrast, expected mortality for the population living in similar neighborhoods was 114.6 (95% CI, 112.1-116.8) per 100 000 person-months, and observed mortality was 142.8 (95% CI, 140.2-145.3) per 100 000 person-months or 25% higher than expected. In the general population across the study area, expected mortality was 83.5 (95% CI, 83.3-83.8) per 100 000 person-months, and observed mortality was 91.6 (95% CI, 91.4-91.8) per 100 000 person-months or 9% higher than expected. The pandemic produced positive excess mortality ratios across all age groups among threatened renters.

CONCLUSIONS AND RELEVANCE Renters who received eviction filings experienced substantial excess mortality associated with the COVID-19 pandemic.

JAMA. 2024;331(7):592-600. doi:10.1001/jama.2023.27005

← Editorial page 570

+ Multimedia

+ Supplemental content

Author Affiliations: Princeton University, Princeton, New Jersey (Graetz, Gershenson, Lemmerman, Desmond); Rutgers University-Newark, Newark, New Jersey (Hepburn); US Census Bureau, Washington, DC (Porter, Sandler).

Corresponding Author: Nick Graetz, PhD, Princeton University, 106 Wallace Hall, Princeton University, Princeton, NJ 08544 (ngraetz@princeton.edu).

Housing instability, defined as precarious tenure due to cost burden, crowding, unsafe living conditions, or a combination of these causes has direct and indirect effects on health that were particularly acute during the COVID-19 pandemic. Stagnant wages and rising rent have combined to produce high levels of housing instability in the US.^{1,2} Renters paying a large share of income toward housing face acute and chronic health consequences resulting in part from prioritizing rent over health-related expenses (eg, food, health care),³ psychosocial distress and reduced bandwidth to address immediate and long-term health needs, risk of displacement via informal eviction (eg, landlord harassment), and risk of displacement via a formal eviction judgment.^{4,5} The COVID-19 pandemic worsened this crisis by contributing to large-scale job and wage loss, especially for Black and Hispanic renters who already experienced the highest rates of housing instability owing to an ongoing history of discriminatory housing policies and practices.^{6,7}

Landlords file more than 3.6 million eviction cases annually.⁸ An eviction filing is the first step in the eviction process that is recorded by the courts. Claims and documentation are submitted to the courts, a hearing date is scheduled, and plaintiffs' and tenants' names are entered into public dockets. Eviction filings are a clear indicator of housing instability and serve as a proxy for renters at high risk of displacement.^{9,10} Being threatened with eviction may lead to increased mortality risk,^{4,5} and this effect may be more pronounced during the COVID-19 pandemic for at least 2 reasons. First, forced displacement carried out through a court-ordered eviction judgment (which occurs in approximately half of filings, though this ratio varies substantially across jurisdictions)¹⁰ is associated with physical and mental health consequences and may increase exposure to COVID-19 infection and mortality.^{4,5,11} Second, filings signal a broader risk of displacement even if they do not result in a formal eviction judgment. Many tenants leave their homes after receiving a filing, as they know their chances of receiving a favorable judgment in housing court are low.^{9,12} Combined with associated fines and fees, filing alone can push renters into even more precarious and overcrowded housing, increasing risk of exposure to COVID-19. The Emergency Rental Assistance program¹³ and eviction moratoria prevented many evictions in 2020 and 2021, but filings remained high in many cities and largely returned to prepandemic levels in 2022.¹⁴

While studies have documented pandemic mortality in other vulnerable populations,^{15,16} data limitations have made it difficult to study renters who received an eviction filing, a population we refer to as *threatened renters* throughout this article. We use a novel data linkage of eviction court records from 36 court systems across the US and administrative all-cause mortality records to examine deaths following eviction filings from January 1, 2020, through August 31, 2021. We use similar linked records from a baseline period (2010-2016) to calculate excess mortality associated with the pandemic. We compare excess mortality among threatened renters to a similar population (renters in US Census tracts with high poverty and eviction filing rates) and to the general population. We demonstrate the significance of eviction prevention as a pandemic-era public health intervention and, more broadly, we highlight the need to treat housing instability as a

Key Points

Question What were the patterns of excess mortality associated with the COVID-19 pandemic among renters who received eviction filings?

Findings In this retrospective study of 282 000 renters who received an eviction filing between January 1, 2020, and August 31, 2021, an excess mortality analysis found that observed mortality was 106% higher than expected. By comparison, observed mortality among similar renters was 25% higher than expected and among the general population was 9% higher than expected.

Meaning Housing instability, as measured by eviction filings, was associated with significantly increased risk of death over the first 20 months of the COVID-19 pandemic. Eviction prevention efforts may have reduced excess mortality for renters during this period.

key social determinant of health.^{17,18} Our findings contribute to the growing literature linking housing instability and racial disparities in health.¹⁹ Our findings can also inform emerging research on screening for social determinants of health including housing insecurity²⁰ and efforts to target health care outreach to individuals in unstable living arrangements.^{21,22}

Methods

Eviction Records

We identified threatened renters using data from eviction courts. Administrative data from court systems contain limited information about each case: case numbers, names of plaintiffs (landlords) and defendants (tenants), defendant addresses, and filing dates. Data linkage was therefore necessary to observe outcomes following eviction, such as mortality.

For the pandemic period, we accessed eviction case filings collected through the Eviction Tracking System (ETS) from January 1, 2020, through August 31, 2021.²³ The ETS collects data from a set of jurisdictions across the country, cleans the data, removes duplicate cases and filings against commercial defendants, and geocodes addresses. The ETS currently collects data from 36 court systems: 6 at the state level (covering a total of 338 counties or county equivalents [eg, independent cities in Virginia]), 27 at the county level, and 3 at the municipal level. The ETS covers 20 508 US Census tracts, 6992 of which had eviction filings during the study period.

The ETS represents a purposive sample of court systems that meet 2 inclusion criteria. First, the court must make the necessary data available. In most sites, these data were collected from public court websites, although in several jurisdictions, the courts shared data directly. Second, in each site, we must have historical data to establish a baseline against which pandemic-era eviction filings can be compared. In linking court data to US Census data, we needed a data use agreement for sites where data was not publicly available. The final sample of locations covered is not nationally representative (see eAppendix 1 in [Supplement 1](#)).²³ For the baseline period (2010-2016), we draw on similar eviction records compiled by

the Eviction Lab at Princeton University.^{8,24,25} We subset these records to locations covered by the ETS.

Mortality Records

Data on mortality follow-up was accessed through August 31, 2021, from the US Census Numident file.²⁶ Roughly 38 million eviction records were linked to mortality follow-up in the baseline period (65% match rate) and 282 000 in the pandemic period (58% match rate). For details on record linkage, see eAppendix 1 in [Supplement 1](#).

Demographic and Socioeconomic Characteristics

Age for all individuals in the cohort was based on the date of birth in the Numident file. Race, ethnicity, and sex were tabulated by linking virtually all individuals to their responses in the 2010 Census. These measures were self-reported using a set of fixed categories. These measures were used to proxy exposure to contemporary and historical systems of gendered racialization and racism as they relate to risks of eviction filings and premature mortality—the nuance of which is likely not captured by these limited survey categories. Terms for different self-identified categories reflect usage as reported in the Census instrument. Last, we linked a subset of individuals to their responses in the American Community Survey in the year immediately prior to eviction filing in order to measure and compare socioeconomic characteristics across the following groups: household income, educational attainment, poverty status, and nativity (see eFigure 1 in [Supplement 1](#) for a data linkage flowchart).

Statistical Analysis

We first estimate monthly all-cause, age-specific mortality rates in the population threatened with eviction from 2020 through 2021. The denominator is all renters alive at the start of the given month and previously threatened with eviction (ie, between January 1, 2020, and the given month). The numerator is deaths among these renters in the given month. We then aggregated these age-specific rates, standardizing by using the population age structure from the 2010 US Census.

Next, we used data about threatened renters in these same locations from 2010 through 2016 to estimate projected monthly mortality rates from 2020 through 2021, had the COVID-19 pandemic not occurred. The gap in eviction records between 2016 and 2020 is due to a gap in eviction data collection and data linkage; nationwide data from the Eviction Lab database is linked to US Census protected identification keys (PIKs) from 2000 through 2016 and the eviction tracking system only began collecting eviction data in 2020 in response to the COVID-19 pandemic. We fit a negative binomial model using the 2010–2016 baseline data (see details of model estimation and alternative models in eAppendix 2 in [Supplement 1](#)). We used the fitted model to forecast monthly age-specific mortality rates from January 2020 to August 2021 and age-standardized projected rates. We estimated uncertainty intervals by randomly sampling from the prediction interval of forecasted deaths. Our inferences comparing observed mortality to forecasted mortality during the pandemic assumed that this model would provide a plausible prediction for mortality among threatened renters from 2020 through 2021 had the pandemic not occurred and

would therefore be an estimate of excess mortality during the COVID-19 pandemic for threatened renters. This study reports estimates of monthly excess mortality, as well as estimates of cumulative excess mortality over the entire period (see eFigure 2 and eAppendix 2 in [Supplement 1](#) for discussion of estimation details and alternative mortality models).

In estimating excess mortality for threatened renters, our baseline and pandemic samples may not be comparable. Rather than increasing risk of excess mortality associated with COVID-19, higher mortality in the pandemic period for threatened renters may instead be driven by 2 other changes induced by the pandemic: selection of who is filed against and the type of filing activity. See eFigure 3 and eAppendix 3 in [Supplement 1](#) for discussion and tests of these assumptions, including comparisons of eviction filings before and during the pandemic for locations where data was available in terms of claim amounts (eFigure 4 in [Supplement 1](#)), serial filings (eFigure 5 in [Supplement 1](#)), and filing outcomes (eFigure 6 in [Supplement 1](#)).

Excess Mortality Comparisons

To contextualize our findings within the broader trajectory of excess mortality during the COVID-19 pandemic across the study area, the same exercise was repeated for 2 other populations: the general population across all tracts contained in the ETS (ETS tracts) and the subset of those tracts that have high filing and poverty rates (high-filing ETS tracts). These comparison samples were accessed from the Residence Candidate File, an administrative data set of individual residence location, based on information from the Internal Revenue Service, the Department of Housing and Urban Development, the Department of Health and Human Services, the Selective Service System, and the US Postal Service.²⁷ This study monitored data for all individuals living in an ETS location in from 2015 through 2016 and from 2020 through 2021.

The high-filing tracts group was defined as all individuals living within tracts in the top quartile of eviction filings per poor renter household in areas where tract-level poverty is greater than 25% (407 tracts). We used data from the pooled 2015 through 2019 American Community Survey to estimate tract-level filings per renter household with income below the poverty threshold. The intent was for this population to proxy excess mortality among similar renters who were living in the same or comparable neighborhoods as threatened renters but who did not receive an eviction filing. Because microdata during the pandemic period was not accessible (eg, the 2020 Decennial Census), tract-level aggregates were used to proxy this population, which ideally shares characteristics associated with being filed against for eviction (eg, low-income, precarious employment, children present). Individuals were removed from both comparison groups whom we directly matched to eviction filings, but these groups still likely included some individuals who were truly filed against and failed to match and/or were not at risk of eviction (eg, homeowners) (see eAppendix 4 in [Supplement 1](#) for a discussion of alternative comparison groups).

Differences in excess mortality between threatened renters and individuals in high-filing tracts may be driven by other factors besides the hypothesized effect of housing instability on excess mortality risk (see eFigure 7 and eFigure 3 in [Supplement 1](#)

Table. Characteristics of Threatened Renters, Individuals Living in High-Filing ETS Tracts, All Individuals Living in ETS Tracts, and the National Population^a

	Threatened renters ^{b,c}		ETS tracts ^c		National population, 2020
	2020-2021 (n = 282 000)	2010-2016 (n = 4 160 000)	High-filing 2020-2021 (n = 667 000)	2020-2021 (n = 58 400 000)	
Age, median (IQR), y ^d	36 (28-47)	35 (26-46)	37 (23-59)	44 (27-62)	37(19-56)
Male sex ^d	37.5	37.0	48.4	48.4	49.2
Female sex ^d	62.5	63.0	51.6	51.6	50.8
Race ^{d,e}					
American Indian or Alaska Native	0.9	1.4	0.7	0.7	0.9
Asian	0.7	1.5	2.1	5.2	5.7
Black	57.6	58.0	56.9	16.7	12.8
Native Hawaiian or other Pacific Islander	0.1	0.2	0.1	0.1	0.2
White	37.4	32.3	35.3	72.6	72.0
Other race or multiple races reported	3.3	6.7	4.9	4.8	8.4
Hispanic ethnicity ^d	8.0	14.9	11.1	13.0	18.8
Educational attainment ^f					
College	16.4	20.0	22.7	41.0	33.1
Some college	29.6	33.8	20.1	18.4	28.6
High school	37.1	29.6	31.2	22.2	26.9
<High school	17.0	16.1	25.5	18.4	11.4
Non-US-born ^f	3.2	2.8	5.0	9.8	13.7
2019 Household income, median (IQR), \$ ^g	38 000 (22 160-63 750)	32 080 (16 000-57 030)	48 930 (26 890-83 000)	86 000 (49 310-147 000)	70 000 (35 000-130 000)
Poverty ^f	25.9	30.0	17.0	7.2	12.8
County-level COVID-19 ^g					
Crude excess mortality rate per 100 000 person-months, mean (95% CI)	9.9 (9.7-10.1)	9.9 (9.7-10.1)	9.9 (9.7-10.1)	9.9 (9.7-10.1)	9.8 (9.7-9.8)
Crude excess mortality ratio, mean (95% CI)	1.2 (1.2-1.2)	1.2 (1.2-1.2)	1.2 (1.2-1.2)	1.2 (1.2-1.2)	1.2 (1.2-1.2)

Abbreviations: ACS, American Community Survey; ETS, Eviction Tracking System.

^a Data are reported as percent values unless otherwise indicated. Data were approved by the Census Disclosure Review Board (CBDRB-FY23-CES004-013, CBDRB-FY23-CES004-035) and sourced from the 2010 US Census and the 2009 through 2015 and 2019 ACS linked to eviction records. For comparing the population covered by study area to the national population, national statistics are calculated from the 1-Year ACS IPUMS (Integrated Public Use Microdata Series) sample (household income, age) for 2019 and from 1-Year Estimates Tables DPO3, DPO5 (sex, race, education, poverty, nativity) for 2019.²⁸

^b Indicates renters who have been directly linked to an eviction filing.

^c This study compares threatened renters to 2 other populations: the general population across all tracts contained in the ETS tracts and the population living in the subset of those tracts that have high-filing and poverty rates (high-filing ETS tracts). Individuals were removed from both comparison groups if they were

directly matched to eviction filings (threatened renters), but these groups will still likely include some individuals who were truly filed against and failed to match and/or who were not at risk of eviction (eg, homeowners).

^d Characteristics were measured in the 2010 Census and were calculated based on the entire sample for each cohort.

^e Race categories are non-Hispanic.

^f Characteristics were only measured in the ACS and were calculated based on the subsample of each cohort that we were able to link by Protected Identification Keys to the ACS in the preceding year (roughly a 1%-3% subsample).

^g Comparison indicates excess mortality associated with COVID-19 in our study area vs nationally over this period of the pandemic. Estimates of county-level crude excess mortality associated with COVID-19 are from Paglino et al (available for download at <https://osf.io/3e7ax>).²⁹

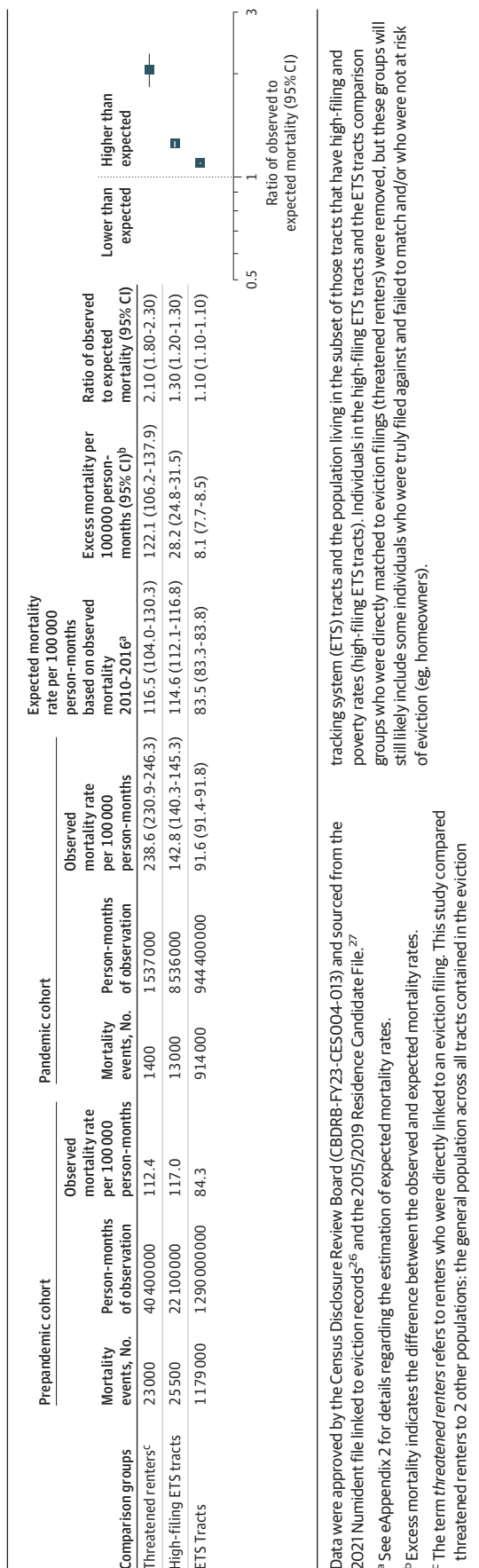
for more discussion of the assumptions required to interpret these differences as driven by the effect of housing instability).

In a secondary analysis, we used the monthly mortality rates (calculated previously in this section) to simulate deaths that (a) were averted by reducing filings below historical averages and (b) that might have been prevented had eviction filings been fully halted during this period (eAppendix 5 in [Supplement 1](#)). The institutional review board at Princeton University approved this research with a waiver of informed consent for the use of publicly available data. This study used a

significance threshold *P* value of less than .05 and 2-sided tests for all comparisons of mortality. All analyses were conducted using R version 4.3.1.

Results

The median age of threatened renters during the pandemic (n = 282 000) was 36 (IQR, 28-47) years and 62.5% were female ([Table](#)).^{28,29} The majority of threatened renters were

Figure 1. Age-Standardized Prepandemic, Pandemic, and Excess Mortality Results by Exposure Group^a

Black (57.6%). The median household income for threatened renters was \$38 000 (IQR, 22 160-63 750), and 25.9% were below the poverty threshold. Threatened renters during the pandemic were similar to threatened renters prior to the pandemic in terms of age, race, ethnicity, sex, household income, poverty status, educational attainment, and nativity.

Compared with threatened renters, renters living in high-filing ETS tracts were slightly older (median age, 37 years [IQR, 23-59]), less likely to be female (51.6%); and they had similar racial composition, higher median income (\$48 930 [IQR, \$26 890-\$83 000]), and lower poverty (17.0%). Compared with threatened renters, the general population living in ETS tracts were older (median age, 44 years [IQR, 27-62]), less likely to be female (51.6%), much less likely to be Black (16.7%); and they had much higher median income (\$86 000 [IQR, \$49 310-\$147 000]) and much lower poverty (7.2%).

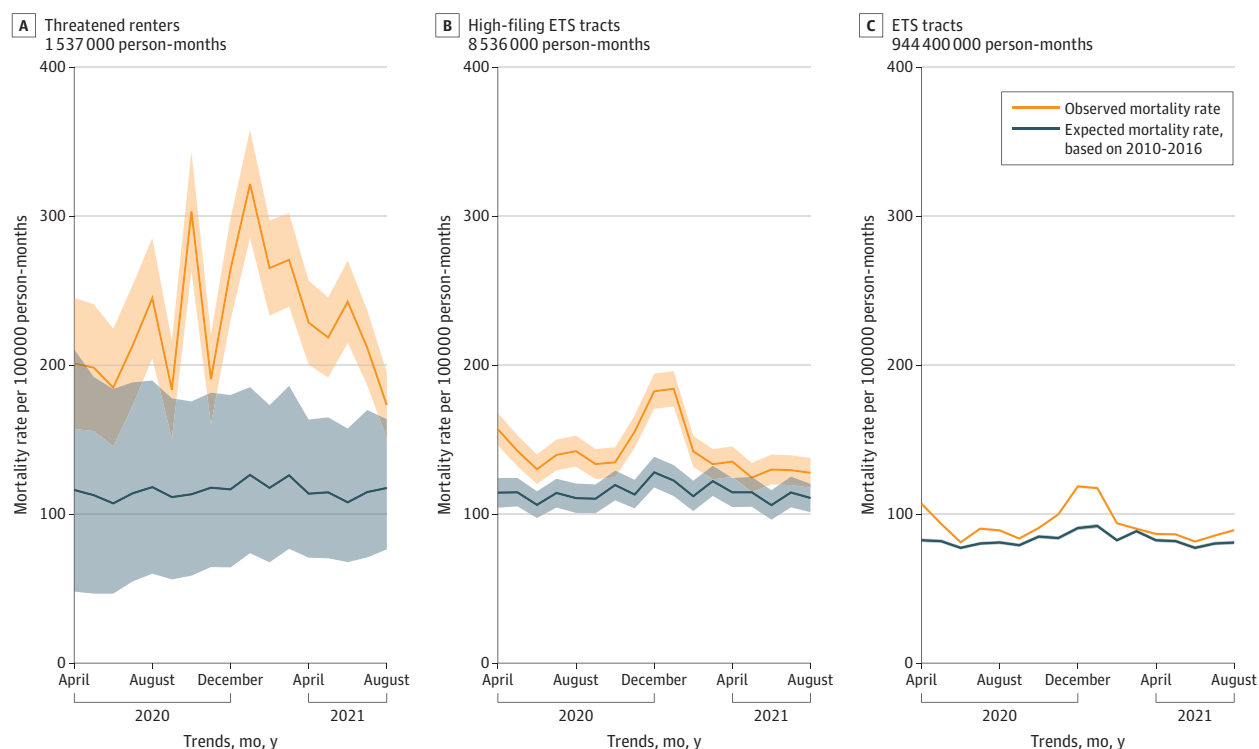
The study area covered by the ETS was similar to the national population in terms of race, ethnicity, and sex composition, but its residents were slightly older and had higher income. ETS tracts had a lower proportion non-US-born residents (9.8%) than the national population (13.7%). During this period of the pandemic, all exposure groups lived in counties with similar crude excess mortality rates associated with COVID-19.

Eviction filings were 44.7% lower than expected during the study period (eFigure 8 in Supplement 1). This study also examined the distribution of renters and eviction filings by race, ethnicity, and sex, comparing the pandemic period to the baseline period (eFigure 9 in Supplement 1). Black women experienced the highest share of filings during the pandemic, accounting for 38.7% of all filings despite representing only 11.5% of renters.

Expected cumulative age-standardized mortality for threatened renters during this 20-month period of the pandemic was 116.5 (95% CI, 104.0-130.3) per 100 000 person-months, and observed mortality was 238.6 (95% CI, 230.9-246.3) per 100 000 person-months, 106% higher than expected (Figure 1). In contrast, during this same time period, expected mortality in high-filing tracts was 114.6 (95% CI, 112.1-116.8) per 100 000 person-months, and observed mortality was 142.8 (95% CI, 140.3-145.3) per 100 000 person-months, 25% higher than expected. In ETS tracts, expected mortality was 83.5 (95% CI, 83.3-83.8) per 100 000 person-months, and observed mortality was 91.6 (95% CI, 91.4-91.8) per 100 000 person-months, 9% higher than expected. In other words, excess mortality among threatened renters was approximately 4 times higher than in high-filing tracts and approximately 10 times higher than in ETS tracts. We also note that observed mortality during the pandemic for the general population in ETS tracts (91.6 [95% CI, 91.4-91.8] per 100 000 person-months) was still significantly lower than prepandemic expected mortality for threatened renters (116.5 [95% CI, 104.0-130.3] per 100 000 person-months) and those living in high-filing ETS tracts (114.6 [95% CI, 112.1-116.8] per 100 000 person-months).

Figure 2 shows monthly variation in excess mortality. To avoid small monthly denominators during the early phase of the pandemic, we begin in April 2020 where the denominator is all individuals filed against since January 1, 2020. Mortality peaked for all groups between December 2020 and

Figure 2. Monthly Trends in Observed Age-Standardized All-Cause Mortality (April 1, 2020, to August 31, 2021) Compared With Expected Mortality



Expected mortality is based on a model adjusting for age, calendar month, and year. Threatened renters refers to renters who were directly linked to an eviction filing. High-filing ETS tracts are those with high filing and poverty rates. The 95% uncertainty intervals (indicated by shading) are reported from the model of expected mortality based on historical trends (note these are very

narrow for the general population in eviction tracking system [ETS] tracts). Data were approved by the Census Disclosure Review Board (CBDRB-FY23-CES004-013; CBDRB-FY22-CES004-057) and sourced from the 2021 Numident file linked to eviction records²⁶ and the 2015/2019 Residence Candidate File.²⁷

February 2021. Excess mortality was significant for threatened renters across almost all months.

The pandemic roughly doubled mortality rates across all ages for threatened renters (Figure 3 panel B), translating to large absolute excess mortality for older age groups (Figure 3 panel A). The filed-against population is much younger than the general population (Figure 3 panel C); a large proportion of filings during the pandemic targeted renters aged 25 to 40 years, ages when background mortality tends to be much lower (see eTable 2 in Supplement 1). We also examined excess mortality for threatened renters by race and ethnicity group (see eFigure 10 in Supplement 1), but CIs were large due to smaller sample sizes when stratifying.

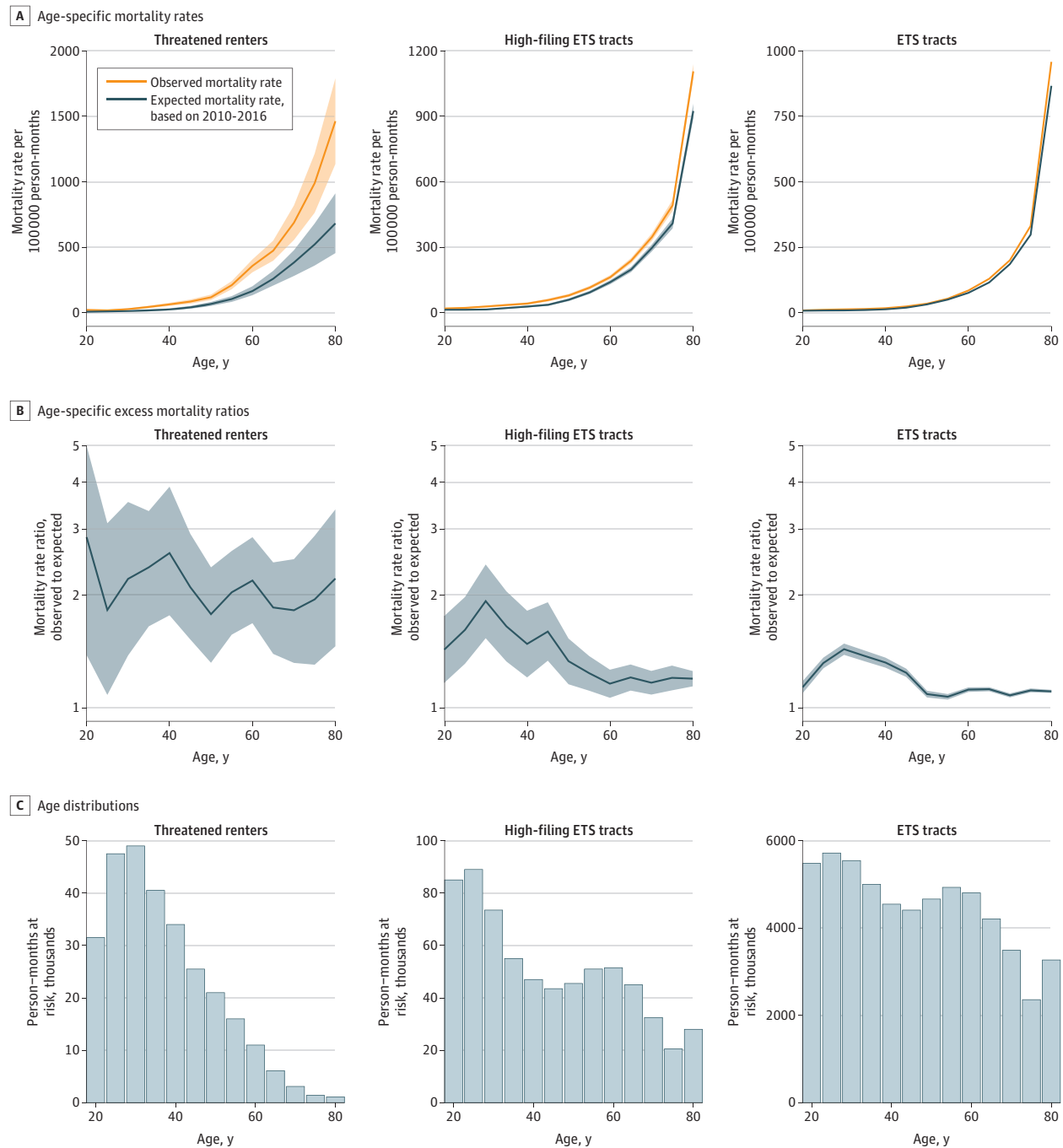
Discussion

Combining novel data linking eviction court filings to death records within an excess mortality framework, this study shows that mortality rates among renters threatened with eviction doubled during the COVID-19 pandemic. While fewer renters faced the threat of eviction during the pandemic, owing to programs such as eviction moratoria and the Emergency Rental Assistance program, threatened renters were at far greater risk of death.

Housing instability and eviction are likely to exact a toll on health across the life course through numerous pathways, including through stress and disruptions in health care access. This, in turn may, exacerbate chronic health conditions such as heart disease, diabetes, and cancer, which are among the leading causes of death in the US and the largest contributors to racial inequalities in mortality.³⁰ Several pandemic-specific mechanisms may explain the observed pattern of greater all-cause excess mortality for threatened renters. The pandemic rental market saw sharp increases in asking rent,³¹ likely increasing the difficulty of finding new housing for those displaced. The consequences of eviction, such as overcrowding and homelessness, likely increased exposure to COVID-19 infection.^{32,33} Displaced renters likely also experienced a decreased ability to follow individualized pandemic mitigation strategies (eg, social distancing and quarantine), reduced access to pandemic-related health care (eg, testing and vaccination), and pressure to enter into dangerous work conditions.^{6,11,34}

Our findings highlight housing instability as a key social determinant of health. While true under normal circumstances, mortality for threatened renters was particularly pronounced during the pandemic. Our findings can also inform emerging research on targeting resources in emergency situations, such as screening for housing instability and targeting

Figure 3. Mean Age-Specific All-Cause Mortality Age-Specific Excess Mortality Rate Ratios, and the Age Distribution of Exposure Groups During the Pandemic Period (April 1, 2020, to August 31, 2021)



The 95% uncertainty intervals (indicated by shading) are reported from the model of expected mortality based on historical trends (note these are very narrow for the general population). Note: y-axis scales differ between the 3 plots in panels A and C. Threatened renters refers to renters who were directly

linked to an eviction filing. High-filing ETS tracts are those with high filing and poverty rates. Data were approved by the Census Disclosure Review Board (CBDRB-FY23-CESQ04-016) and sourced from the 2021 Numident file linked to eviction records²⁶ and the 2015/2019 Residence Candidate File.²⁷

health care resources for individuals and families experiencing such instability.^{21,22} Our findings may also be related to the public health benefits of policy interventions that reduced eviction filings during the COVID-19 pandemic.^{6,11}

Limitations

This study has several important limitations. First, the results may be biased due to imperfect match rates to Census Protected Identification Keys (PIKs), and this bias may be

different from match rates between the baseline (65%) and pandemic periods (58%). In sensitivity analyses, inclusion was restricted to counties with match rates greater than 65% during the pandemic period, and results were unchanged. Factors associated with being less likely to receive a PIK include self-reporting of one's race as other than White, having lower socioeconomic status, being unemployed, being born outside the US, and having recently moved.³⁵ Especially when attempting to match eviction records to PIKs, it is likely that there were lower match rates for more marginalized renters who tend to move frequently and where we suspect the impact of the pandemic on mortality rates would be most pronounced. This would bias our results in a conservative direction.

Second, ETS locations are not selected to be nationally representative, and we are only able to use ETS locations where we secured data use agreements to link eviction filings to Census data (see eTable 1 in Supplement 1). The Table demonstrates that the population covered by the study area is relatively similar to the national population on observable demographic and socioeconomic characteristics, with a key difference being the lower proportion of non-US-born residents in the study area.

Third, several assumptions are required to interpret mortality differences between threatened renters before and during the pandemic as excess mortality attributable to the pandemic itself. Specifically, higher mortality in the pandemic

period for threatened renters may instead be driven by 2 changes induced by the pandemic: selection of who is filed against and the type of filing activity. Importantly, there is an especially high risk of selection bias because of the large observed reduction in eviction filings over this period (eFigure 8 in Supplement 1), which may not be random (see eAppendix 3 and eFigure 3 in Supplement 1). Several additional assumptions are required to interpret the difference in excess mortality between threatened renters and the high-filing tracts as the causal effect of eviction filing rather than driven by factors related to selection into eviction filing (see eAppendix 3 and eFigure 7 in Supplement 1).

Conclusions

Our findings underscore the importance of an equity perspective in documenting mortality from COVID-19.^{34,36,37} We show that those facing housing instability and eviction represent a particularly at-risk population. Our results highlight the importance of monitoring health outcomes among marginalized populations that can't currently be disaggregated in national health statistics. Our results also underscore the need for policymakers and researchers to take into consideration access to safe and stable housing when designing health interventions.

ARTICLE INFORMATION

Accepted for Publication: December 11, 2023.

Author Contributions: Dr Graetz had full access to all of the data in the study and takes responsibility for the integrity of the data and the accuracy of the data analysis.

Concept and design: Graetz, Hepburn, Gershenson, Desmond.

Acquisition, analysis, or interpretation of data: All authors.

Drafting of the manuscript: Graetz.

Critical review of the manuscript for important intellectual content: All authors.

Statistical analysis: Graetz, Lemmerman.

Obtained funding: Graetz, Hepburn, Gershenson, Desmond.

Administrative, technical, or material support: Hepburn, Gershenson, Porter, Sandler, Desmond.

Supervision: Graetz, Hepburn, Gershenson, Porter, Desmond.

Conflict of Interest Disclosures: None reported.

Funding/Support: Support for the Eviction Tracking System is provided by the Russell Sage Foundation, the C3.ai Digital Transformation Institute, and the Pew Charitable Trusts. The Eviction Lab is supported by the JPB and Bill and Melinda Gates Foundations, the Chan Zuckerberg Initiative, the Eunice Kennedy Shriver National Institute of Child Health and Human Development of the National Institutes of Health (NIH) (P2CHD047879), and the National Institute of Nursing Research of the NIH (R01NR020748).

Role of the Funder/Sponsor: The sponsors had no role in the design and conduct of the study; collection, management, analysis, and interpretation of the data; preparation, review,

or approval of the manuscript; and decision to submit the manuscript for publication.

Disclaimer: Any opinions and conclusions expressed herein are those of the authors and do not represent the views of the US Census Bureau.

Additional Information: Data were approved by the Census Disclosure Review Board (Project P-7516612: CBDRB-FY23-CES004-035, CBDRB-FY23-CES004-031, CBDRB-FY23-CES004-013, CBDRB-FY22-CES004-057, CBDRB-FY23-CES004-016).

Additional Contributions: We would like to thank Danya Keene, PhD, Department of Social and Behavioral Sciences, Yale School of Public Health; Andrew Fenelon, PhD, Division of Epidemiology and Community Health at the University of Minnesota; Emily Benfer, JD, Health Equity Policy and Advocacy Clinic, George Washington University Law School; and Julia Raifman, PhD, Alameda County Public Health Department for feedback. None of these contributors received compensation for their feedback on this article.

Data Sharing Statement: All our empirical results use confidential microdata from the US Census Bureau. We will not be able to make the data directly available. However, we can provide the code, and researchers can follow the directions on how to write a proposal to gain access to the data via a Federal Statistical Research Data Center using the standard application process. See Supplement 2.

REFERENCES

1. Desmond M. Heavy is the house: rent burden among the american urban poor. *Int J Urban Reg Res*. 2018;42(1):160-170. doi:10.1111/1468-2427.12529

2. Joint Center for Housing Studies of Harvard University. The State of the Nation's Housing 2021. Published 2021. Accessed January 25, 2024. https://www.jchs.harvard.edu/sites/default/files/reports/files/Harvard_JCHS_State_Nations_Housing_2021.pdf

3. Airgood-Obyrick W, Hermann A, Wedeen S. Joint Center for Housing Studies of Harvard University website. The Rent Eats First: Rental Housing Unaffordability in the US. Published January 2021. Accessed January 26, 2024. https://www.jchs.harvard.edu/sites/default/files/research/files/harvard_jchs_rent_eats_first_airgood-obrycki_hermann_wedeen_2021.pdf

4. Desmond M, Tolbert Kimbro R. Eviction's fallout: housing, hardship, and health. *Soc Forces*. 2015;94(1):295-324. doi:10.1093/sf/sov044

5. Hoke MK, Boen CE. The health impacts of eviction: evidence from the national longitudinal study of adolescent to adult health. *Soc Sci Med*. 2021;273(Feb):113742. doi:10.1016/j.socscimed.2021.113742

6. Benfer EA, Vlahov D, Long MY, et al. Eviction, health inequity, and the spread of COVID-19: housing policy as a primary pandemic mitigation strategy. *J Urban Health*. 2021;98(1):1-12. doi:10.1007/s11524-020-00502-1

7. Hepburn P, Louis R, Desmond M. Racial and gender disparities among evicted Americans. *Social Sci*. 2020;7:649-662. doi:10.15195/v7.a27

8. Gromis A, Fellows I, Hendrickson JR, et al. Estimating eviction prevalence across the United States. *Proc Natl Acad Sci U S A*. 2022;119(21):e2116169119. doi:10.1073/pnas.2116169119

9. Hartman C, Robinson D. Evictions: the hidden housing problem. *Hous Policy Debate*. 2003;14(4):461-501. doi:10.1080/10511482.2003.9521483
10. Summers N. Eviction court displacement rates. *Northwest Univ Law Rev*. 2022;117(1):287-303. doi:10.1073/pnas.2116169119
11. Leifheit KM, Linton SL, Raifman J, et al. Expiring eviction moratoriums and COVID-19 incidence and mortality. *Am J Epidemiol*. 2021;190(12):2503-2510. doi:10.1093/aje/kwab196
12. Desmond M, Shollenberger T. Forced displacement from rental housing: prevalence and neighborhood consequences. *Demography*. 2015;52(5):1751-1772. doi:10.1007/s13524-015-0419-9
13. US Department of the Treasury. Emergency rental assistance program: keeping families in their homes. Accessed January 26, 2024. <https://home.treasury.gov/policy-issues/coronavirus/assistance-for-state-local-and-tribal-governments/emergency-rental-assistance-program>
14. Hepburn P, Haas J, Graetz N, et al. Protecting the most vulnerable: policy response and eviction filing patterns during the COVID-19 pandemic. *Russell Sage Found J Soc Sci*. 2023;9(3):186-207. doi:10.7758/RSF.2023.9.3.08
15. Marquez N, Ward JA, Parish K, Saloner B, Dolovich S. COVID-19 incidence and mortality in federal and state prisons compared with the US Population, April 5, 2020, to April 3, 2021. *JAMA*. 2021;326(18):1865-1867. doi:10.1001/jama.2021.17575
16. Porter NAC, Brosnan HK, Chang AH, Henwood BF, Kuhn R. Race and ethnicity and sex variation in COVID-19 mortality risks among adults experiencing homelessness in Los Angeles County, California. *JAMA Netw Open*. 2022;5(12):e2245263. doi:10.1001/jamanetworkopen.2022.45263
17. Koh HK, Restuccia R. Housing as health. *JAMA*. 2018;319(1):12-13. doi:10.1001/jama.2017.20081
18. Leifheit KM, Schwartz GL, Pollack CE, Linton SL. Building health equity through housing policies: critical reflections and future directions for research. *J Epidemiol Community Health*. 2022;76(8):759-763. doi:10.1136/jech-2021-216439
19. Hernández D, Swope CB. Housing as a platform for health and equity: evidence and future directions. *Am J Public Health*. 2019;109(10):1363-1366. doi:10.2105/AJPH.2019.305210
20. Harle CA, Wu W, Vest JR. Accuracy of electronic health record food insecurity, housing instability, and financial strain screening in adult primary care. *JAMA*. 2023;329(5):423-424. doi:10.1001/jama.2022.23631
21. Sullivan CM, Simmons C, Guerrero M, et al. Domestic violence housing first model and association with survivors' housing stability, safety, and well-being over 2 years. *JAMA Netw Open*. 2023;6(6):e2320213. doi:10.1001/jamanetworkopen.2023.20213
22. Chen KL, Miake-Lye IM, Begashaw MM, et al. Association of promoting housing affordability and stability with improved health outcomes: a systematic review. *JAMA Netw Open*. 2022;5(11):e2239860. doi:10.1001/jamanetworkopen.2022.39860
23. Hepburn P, Louis R, Fish J, et al. US eviction filing patterns in 2020. *Socius*. 2021;7(1). doi:10.1177/23780231211009983
24. Desmond M, Gromis A, Edmonds L, et al. Eviction Lab national database: version 1.0. Princeton University. Published 2018. Accessed January 25, 2024. www.evictionlab.org
25. Desmond M, Gromis A, Edmonds L, et al. Eviction Lab methodology report: version 1.0. Princeton University. Published 2018. Accessed January 25, 2024. www.evictionlab.org/methods
26. Finlay K, Genadek KR. Measuring all-cause mortality with the Census Numident file. *Am J Public Health*. 2021;111(suppl 2):S141-S148. doi:10.2105/AJPH.2021.306217
27. Graham MR, Kutzbach MJ, Sandler DH. US Census Bureau website. Developing a residence candidate file for use with employer-employee matched data. Center for Economic Studies (CES 17-40). Published May 18, 2017. Accessed January 25, 2024. <https://www2.census.gov/ces/wp/2017/CES-WP-17-40.pdf>
28. Minnesota Population Center. Integrated Public Use Microdata Series International. University of Minnesota; 2015. Accessed April 6, 2017. <https://international.ipums.org/international/>
29. Paglino E, Lundberg DJ, Zhou Z, et al. Monthly excess mortality across counties in the United States during the COVID-19 pandemic, March 2020 to February 2022. *Sci Adv*. 2023;9(25):eadf9742. doi:10.1126/sciadv.adf9742
30. Riddell CA, Morrison KT, Kaufman JS, Harper S. Trends in the contribution of major causes of death to the black-white life expectancy gap by US state. *Health Place*. 2018;52:85-100. doi:10.1016/j.healthplace.2018.04.003
31. Kuk J, Schachter A, Faber JW, Besbris M. The COVID-19 pandemic and the rental market: evidence from Craigslist. *Am Behav Sci*. 2021;65(12):1623-1648. doi:10.1177/00027642211003149
32. Kamis C, Stolte A, West JS, et al. Overcrowding and COVID-19 mortality across US counties: are disparities growing over time? *SSM Popul Health*. 2021;15:100845. doi:10.1016/j.ssmph.2021.100845
33. Mosites E, Parker EM, Clarke KEN, et al; COVID-19 Homelessness Team. Assessment of SARS-CoV-2 infection prevalence in homeless shelters—four US cities, March 27-April 15, 2020. *MMWR Morb Mortal Wkly Rep*. 2020;69(17):521-522. doi:10.15585/mmwr.mm6917e1
34. McClure ES, Vasudevan P, Bailey Z, Patel S, Robinson WR. Racial capitalism within public health-how occupational settings drive COVID-19 disparities. *Am J Epidemiol*. 2020;189(11):1244-1253. doi:10.1093/aje/kwaa126
35. Bond B, Brown JD, Luque A, O'Hara A. US Census Bureau website. The nature of the bias when studying only linkable person records: evidence from the American Community Survey. Center for Administrative Records Research and Applications working paper series No. 2014-08. Published April 22, 2014. Accessed January 25, 2024. <https://www.census.gov/library/working-papers/2014/adrm/carra-wp-2014-08.html>
36. Krieger N. Enough: COVID-19, structural racism, police brutality, plutocracy, climate change—and time for health justice, democratic governance, and an equitable, sustainable future. *Am J Public Health*. 2020;110(11):1620-1623. doi:10.2105/AJPH.2020.305886
37. Laster Pirtle WN. Racial capitalism: a fundamental cause of novel coronavirus (COVID-19) pandemic inequities in the United States. *Health Educ Behav*. 2020;47(4):504-508. doi:10.1177/1090198120922942