Since January 2020 Elsevier has created a COVID-19 resource centre with free information in English and Mandarin on the novel coronavirus COVID-19. The COVID-19 resource centre is hosted on Elsevier Connect, the company's public news and information website.

contributions and to ensure that questions pertaining to the accuracy or integrity of any portion of the work, even one in which the author was not directly involved, are appropriately investigated and resolved, including with documentation in the literature if appropriate.

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Racial and Ethnic Disparities in Excess Deaths Among Persons With Kidney Failure During the COVID-19 Pandemic, March-July 2020

To the Editor:

Studies of excess deaths during the coronavirus disease 2019 (COVID-19) pandemic suggest a 19%-21% increase in mortality in the US population from March to July 2020.[1-3] Excess deaths (the difference between observed and expected deaths based on historical trends) capture those directly related to COVID-19 and those due to delayed or foregone medical care or economic disruption. COVID-19 has disproportionately impacted Black and Hispanic populations[4]; however, there is limited evidence about racial and ethnic disparities in excess deaths among high-risk populations, such as persons with kidney failure. This national study estimated excess deaths for the kidney failure population by race and ethnicity from March 1 through August 1, 2020.

Data on deaths for the US kidney failure population (incident and prevalent dialysis patients and transplant patients) from January 2015 through August 2020 were obtained from the Centers for Medicare and Medicaid Services (CMS) ESRD Death Notification Form (CMS 2746). CMS requires completion of the form by the treating nephrologist within 2 weeks of death for all patients who survive until the 91st day of treatment initiation. Because the form does not list COVID-19 as a separate cause, the study outcome was all-cause mortality. Decedents' race and ethnicity were identified from the ESRD Medical Evidence Report (CMS 2728).

To estimate expected deaths, we applied a Poisson regression model to data pre-COVID (January 4, 2015 to February 29, 2020), adjusting for linear time trend, year fixed effects, and seasonality using Fourier terms (detailed methods in Item S1). We then predicted the expected deaths during the COVID period (March 1 to August 1, 2020) based on the estimated Poisson model (Table S1). We estimated weekly and cumulative excess deaths and the relative increase in excess deaths separately for non-Hispanic White, non-Hispanic Black, and Hispanic patients. Brown University's Institutional Review Board approved the analyses with a waiver of informed consent.

Fig 1A plots weekly numbers of observed, expected, and excess deaths from January 5 through August 1, 2020, showing an increase beginning March 1, with a peak in the week ending April 11. From March 1 through August 1, 2020, there were a total of 6,015 (95% CI, 5,236-6,778) excess deaths (Table 1). There were substantial disparities in excess deaths across racial and ethnic groups (Fig 1B and C; Table 1), with the highest values observed among non-Hispanic Black patients (2,844 [95% CI, 2,581-3,103]), followed by Hispanic (1,482 [95% CI, 1,209-1,750]) and non-Hispanic White (1,227 [95% CI, 695-1,739])

Table 1. Excess Deaths From March 1 to August 1, 2020, by Race/Ethnicity

	No. of Observed Deaths	No. of Expected Deaths	No. of Excess Deaths	Percent Excess Deaths
All patients	44,567	38,552 (37,789-39,331)	6,015 (5,236-6,778)	15.6% (13.3%-17.9%)
White, non-Hispanic	22,010	20,783 (20,271-21,315)	1,227 (695-1,739)	5.9% (3.2%-8.6%)
Black, non-Hispanic	12,884	10,040 (9,781-10,303)	2,844 (2,581-3,103)	28.3% (25.0%-31.7%)
Hispanic	6,942	5,460 (5,129-5,733)	1,482 (1,209-1,750)	27.1% (20.8%-33.5%)

Observed deaths are the weekly number of deaths from March 1 to August 1, 2020; expected deaths are estimated as described in the text based on data from January 4, 2015 to February 29, 2020 and are projected forward until August 1, 2020; number of excess deaths is the difference between observed and expected deaths; 95% confidence interval (95% CI) indicated in parentheses. Percent excess deaths equals excess deaths divided by expected deaths; 95% CI estimated using the Delta method (Item S1).

patients. Black and Hispanic patients accounted for 47% and 25% of all excess deaths, respectively. The relative increase in deaths after March 1 was 28.3% (95% CI, 25.0%-31.7%), 27.1% (95% CI, 20.8%-33.5%), and 5.9% (95% CI, 3.2%-8.6%) for Black, Hispanic, and White patients, respectively. There were substantial state-level variations in the racial and ethnic disparities in excess deaths, with the disparity between Hispanic and White patients increasing over time (Fig S1). Overall, states with larger increases in per capita COVID-19 rates experienced greater increases in excess deaths (Fig S2).

Among the US kidney failure population, the number of excess deaths from March 1 through August 1, 2020 was 16% higher than expected, similar to reports for the general population.[1-3] However, our results showed stark racial and ethnic disparities in excess deaths: 72% of

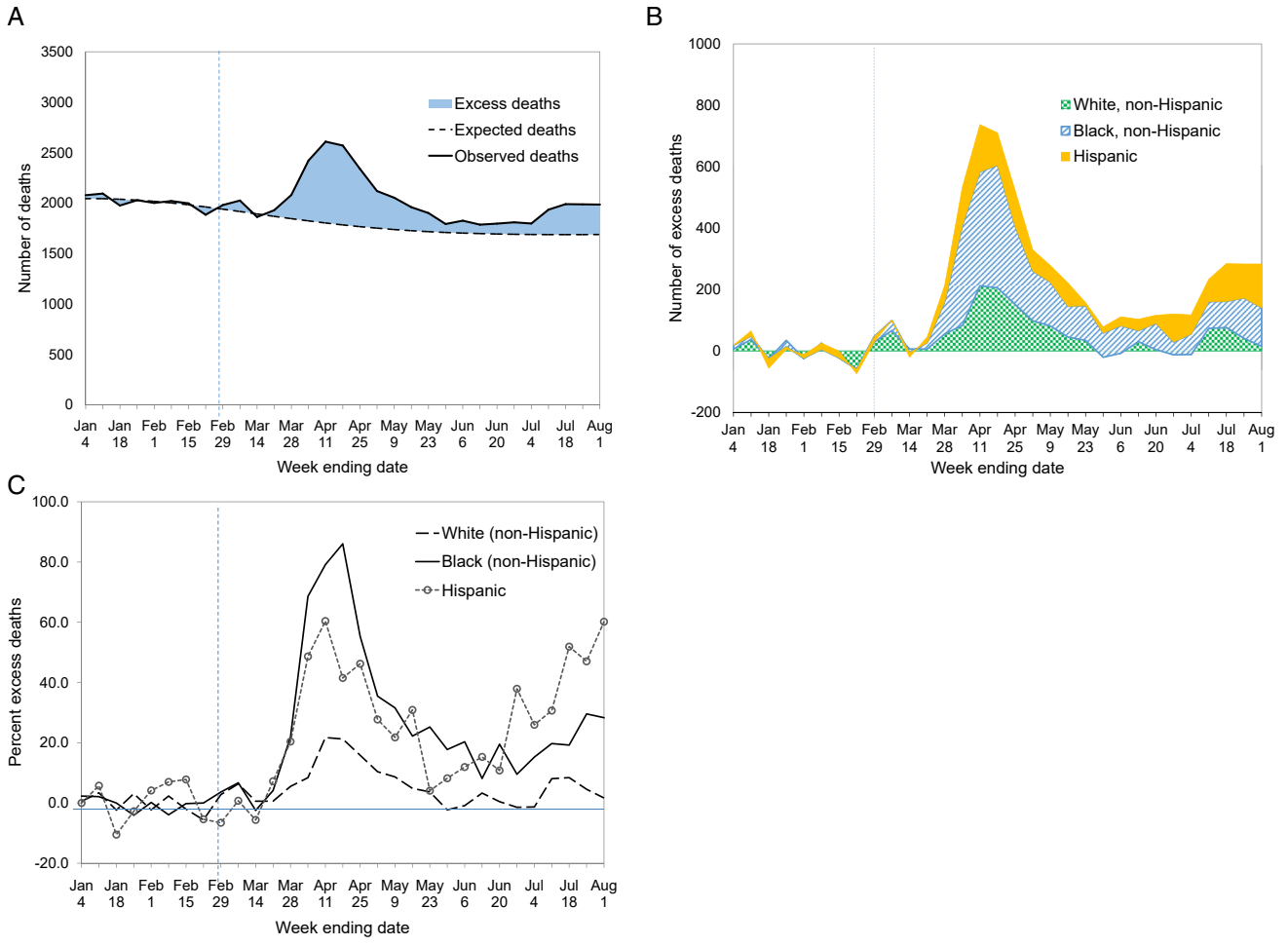

Figure 1. Weekly (A) observed, expected, and excess deaths, and, by race/ethnicity, (B) excess and (C) percent excess deaths. Expected deaths estimated as described in the text based on data from January 4, 2015, to February 29, 2020 (denoted by vertical dotted line) and are projected forward until August 1, 2020; the area between the observed and expected deaths depicts the number of excess deaths. Percentage of excess deaths (C) equals excess deaths divided by expected deaths (baseline).

all excess deaths occurred among Black and Hispanic patients, and the relative increase in deaths among Black and Hispanic patients was more than 4-fold higher than that observed among White patients. The magnitude of these disparities was larger than corresponding relative ratios reported among COVID-19–associated deaths in the general population, reported by Gross et al[5] to be 3.6 for Black persons and 1.9 for Hispanic persons, and by Bassett et al[6] to be 3.6 and 2.8, respectively.[6] The mortality disparities we observed align with the disparities in hospitalization rates reported in the US Renal Data System.[7]

Our findings on racial and ethnic disparities in excess deaths are likely explained by inequities in social determinants of health.[8] These determinants include income, living conditions, access to health care, and structural racism, the historical and contemporary societal structures that systematically disadvantage racial/ethnic minorities. Our data do not capture deaths in the first 90 days following treatment initiation, and alternative modeling assumptions may yield different estimates. Further, our data cannot distinguish deaths directly related to COVID-19 from those arising indirectly from the pandemic (eg, delayed or disrupted care). Public health interventions to mitigate the pandemic's impact on persons with kidney failure must consider the stark racial/ethnic disparities in excess deaths in this population and address the underlying social determinants that generate these disparities.

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Supplementary Material

Supplementary File (PDF)

Figures S1-S2; Item S1; Table S1.

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