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*Descriptive Finding*

### **Immigrant mortality advantage in the United States during the first year of the COVID-19 pandemic**

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## **Immigrant mortality advantage in the United States during the first year of the COVID-19 pandemic**

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### **Abstract**

#### **OBJECTIVES**

To investigate the mortality impact of the COVID-19 pandemic on US-born and foreign-born populations by race and Hispanic origin in the United States in 2020.

#### **METHODS**

Death records from the National Center for Health Statistics and population data from CDC WONDER were used to estimate (1) age-standardized all-cause and cause-specific mortality at ages 25+, 25–64, and 65+ in 2017–2019 and 2020 by nativity, race, Hispanic origin, and sex; (2) changes in mortality between these two periods; and (3) the cause-specific contributions to these changes.

#### **RESULTS**

Mortality increased in 2020 relative to 2017–2019 for all racial and Hispanic-origin groups. Adjusting for age, mortality increases were larger at ages 25+ among foreign-born males (390 deaths for 100,000 residents) and females (189) than among US-born males (223) and females (144). The large mortality rise among foreign-born Hispanic men (593) contributed to the narrowing of their mortality advantage relative to White men, from 426 to 134. An increase in mortality among both foreign-born and US-born Black males and females increased the Black–White mortality disparities by 318 for males and by 180 for females. Although COVID-19 mortality was the main driver of the increase among foreign-born residents, circulatory diseases and malignant neoplasms also contributed.

#### **CONTRIBUTION**

We show that the COVID-19 pandemic had a greater impact on foreign-born populations than on their US-born counterparts. These findings highlight the need to address the underlying inequalities and unique challenges faced by foreign-born populations.

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## **1. Introduction**

In 2020, life expectancy in the United States experienced an unprecedented decline due to the COVID-19 pandemic. Life expectancy at birth declined by 1.4 years for non-Hispanic White (henceforth White), by 3.3 years for non-Hispanic Black (henceforth Black), by 4.0 years for Hispanic, and by 2.0 years for non-Hispanic Asian (hereafter Asian) populations in 2020 compared to 2019, with somewhat larger declines for men than for women. These trends reversed much of the progress made by the Black population relative to the White population during the previous decades and almost eliminated the long-standing Hispanic mortality paradox – i.e., lower mortality among the Hispanic population relative to the White population despite their lower socioeconomic status (Andrasfay and Goldman 2021; Luck et al. 2023a; Sáenz and Garcia 2021; Woolf et al. 2021). Although much of the increase was driven by COVID-19 mortality, mortality also increased for circulatory diseases, Alzheimer’s disease and other dementias, diabetes, and external causes (Luck et al. 2022).

Previous studies have documented lower mortality among foreign-born US residents than among their US-born counterparts (Blue and Fenelon 2011; Hendi and Ho 2021; Mehta et al. 2016; Singh and Miller 2004). Prior to the pandemic, smoking-related causes, cardiovascular diseases, and external causes contributed to the foreign-born mortality advantage (Fenelon 2013; Lariscy, Hummer, and Hayward 2014; Singh and Siahpush 2002). The COVID-19 pandemic, however, eroded foreign-born mortality advantages. For example, Horner, Wrigley-Field, and Leider (2022) documented higher COVID-19 age-adjusted mortality in 2020 in Minnesota among foreign-born Asian, Black, and Hispanic residents than among their US-born counterparts, with much of the excess concentrated at working ages among foreign-born Hispanic men (Horner, Wrigley-Field, and Leider 2022). Similarly, Riley et al. (2021) found higher excess mortality in March through October 3, 2020, compared to the previous four years, among the foreign-born than among the native-born Hispanic population in California, with the excess being more pronounced for individuals with low education and working in manufacturing and essential occupations (Garcia et al. 2021; Riley et al. 2021). The national impact of the COVID-19 pandemic on the mortality of foreign-born Asian, Black, Hispanic, and White US residents relative to their US-born counterparts remains unknown.

The objective of our study is to assess at the national level the differential impact of the COVID-19 pandemic on mortality between foreign-born and US-born residents by race and Hispanic origin. We focus on adult mortality at ages 25–64, 65+, and 25+, and on mortality from COVID-19 and from seven other causes of death.

## 2. Data and methods

We used death records for 2017–2020 from the National Center for Health Statistics (NCHS) under a data user agreement. We classified deaths by sex, age, bridged race, Hispanic origin, nativity, and cause of death. Deaths of US-born residents include deaths of individuals who were born and resided in any of the 50 US states. Deaths of foreign-born residents include deaths of foreign-born individuals residing in any of the 50 US states.

We obtained US population counts by age, bridged race, Hispanic origin, and sex for 2017–2020 from CDC WONDER (CDC 2023). To estimate population by nativity we pooled the 2017–2019 American Community Survey (ACS) one-year files to estimate the proportion who were foreign born by age, sex, race, and Hispanic origin (Ruggles et al. 2022). We then applied these proportions to the population counts to obtain populations by 10-year age groups, sex, race, Hispanic origin, and nativity. Because the pandemic affected 2020 ACS data collection, we applied the 2019 proportions to the 2020 census population estimates. Supplementary Tables 1a and 1b present the number of deaths and populations by nativity, race, Hispanic origin, and sex for broad age groups in 2017–2019 and 2020. All supplementary tables and figures are available in a repository together with the R codes used to produce them (Paglino and Elo 2023).

We included eight exhaustive and mutually exclusive cause-of-death categories based on the underlying cause of death. These are respiratory diseases, circulatory diseases, cancers, Alzheimer’s disease and other dementias, diabetes, COVID-19, external causes, and all other causes combined (Supplementary Table 2). We chose these causes because mortality from them increased during the pandemic (Arias and Xu 2022; Luck et al. 2022).

Using the average 2017–2020 age distribution as the standard, we calculated age-standardized death rates (ASDRs) by sex, race, Hispanic origin, and nativity for all causes combined, COVID-19, and all causes other than COVID-19 at ages 25+, 25–64, and 65+ and by the more detailed causes at ages 25+ for 2017–2019 and 2020. We pooled three pre-pandemic years to adjust for year-to-year fluctuations in death rates. For each ASDR, we computed standard errors (SD) and coefficients of variation (SD/ASDR) (Chiang 1984), which are included in the supplementary material. Because the size of our smallest group (US-born Asian females in 2020) exceeds one million, all standard errors are small and the largest coefficient of variation is 3.75%.

We examined COVID-19 and other cause-specific differences in mortality in 2017–2019 and in 2020 between foreign-born and US-born residents by race and Hispanic origin, as follows:

$$Diff_{c,g,p} = ASDR_{c,g,p}^{Foreign-Born} - ASDR_{c,g,p}^{US-Born}$$

where  $Diff_{c,g,p}$  is the difference between foreign-born and US-born residents for cause  $c$ , racial or Hispanic-origin group  $g$ , and period  $p$ . Because we used mutually exclusive groups of causes, we have:

$$\sum_{c \in C} Diff_{c,g,p} = ASDR_{g,p}^{Foreign-Born} - ASDR_{g,p}^{US-Born}$$

Thus the sum of the cause-specific differences equals the total difference in the ASDRs between the foreign-born and the US-born residents.

In addition, we investigated changes in the difference in cause-specific mortality between foreign-born and US-born residents by race and Hispanic origin for causes of death other than COVID-19 between 2020 and 2017–2019, as follows:

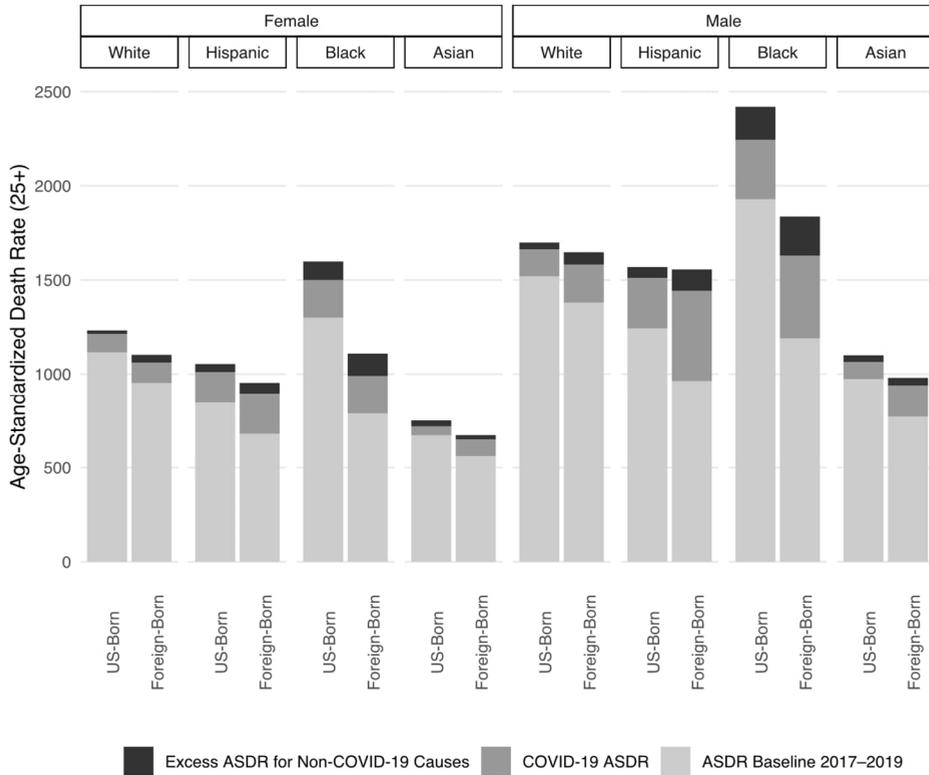
$$\begin{aligned} DD_{c,g} &= Diff_{c,g,2020} - Diff_{c,g,2017-2019} \\ &= (ASDR_{c,g,2020}^{Foreign-Born} - ASDR_{c,g,2020}^{US-Born}) \\ &\quad - (ASDR_{c,g,2017-2019}^{Foreign-Born} - ASDR_{c,g,2017-2019}^{US-Born}) \end{aligned}$$

where  $DD_{c,g}$  is the change in the difference for cause  $c$  and racial or Hispanic-origin group  $g$  between 2020 and the pre-pandemic period 2017–2019. As above:

$$\begin{aligned} \sum_{c \in C} DD_{c,g} &= (ASDR_{g,2020}^{Foreign-Born} - ASDR_{g,2020}^{US-Born}) \\ &\quad - (ASDR_{g,2017-2019}^{Foreign-Born} - ASDR_{g,2017-2019}^{US-Born}) \end{aligned}$$

Again, the changes in cause-specific differences between foreign-born and US-born residents between 2020 and 2017–2019 sum to the total change in the difference in ASDRs between foreign-born and US-born residents. All analyses were conducted using the R language, version 4.2.1 (R Core Team 2021).

**Figure 1: Age-standardized death rates per 100,000, ages 25 and above, 2017–2019 and 2020, by race, Hispanic origin, sex, nativity, and cause of death**



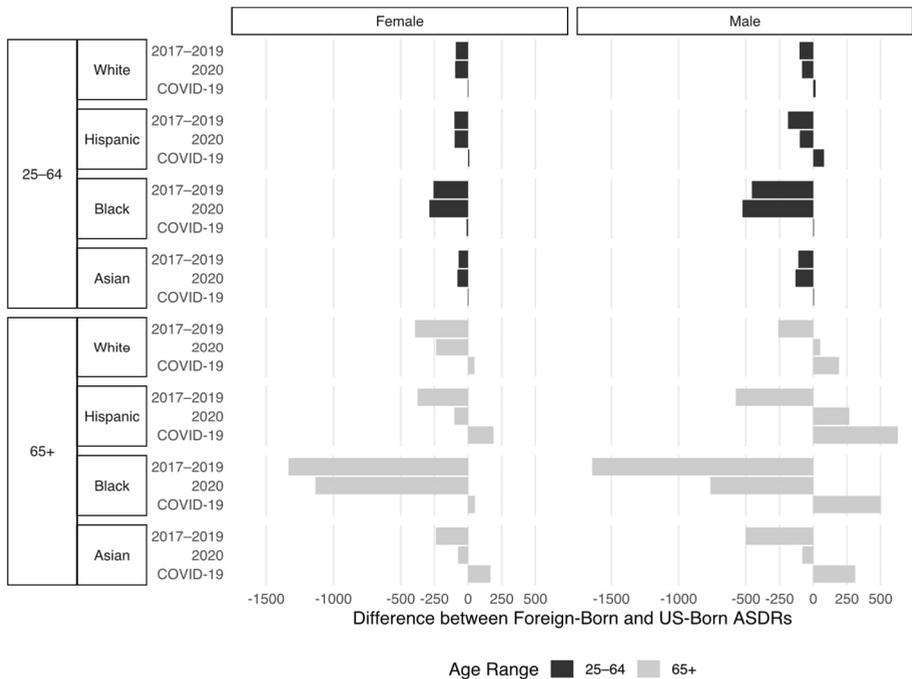
### 3. Results

#### 3.1 Mortality trends between 2017–2019 and 2020 among US-born and foreign-born residents within racial and Hispanic-origin groups

Figure 1 (ages 25+) and Supplementary Tables 3a and 3b (ages 25–64, 65+, and 25+) present ASDRs by nativity, race, and Hispanic origin for 2017–2019 and 2020. Consistent with prior studies, in 2017–2019 foreign-born individuals had lower mortality

than their US-born counterparts among all subgroups. The gap ranged from  $-738.2$  per 100,000 among Black men to  $-139.9$  among White men and from  $-513.4$  among Black women to  $-110.5$  among Asian women at ages 25+. Excluding deaths from COVID-19 in 2020, the foreign-born mortality advantage from all other causes of death was similar to what it had been in 2017–2019. The pandemic, however, increased all ASDRs, with the increases being greater for all foreign-born subgroups than for their US-born counterparts, such that the foreign-born advantages at ages 25+ in 2020 across all race–sex subgroups were reduced, ranging from  $-582.7$  among Black men to  $-12.7$  among Hispanic men and from  $-489.1$  among Black women to  $-78.2$  among Asian women.

**Figure 2: Differences between foreign-born and US-born age-standardized death rates by race, Hispanic origin, and sex, 2017–2019 and 2020 (adults 25+)**



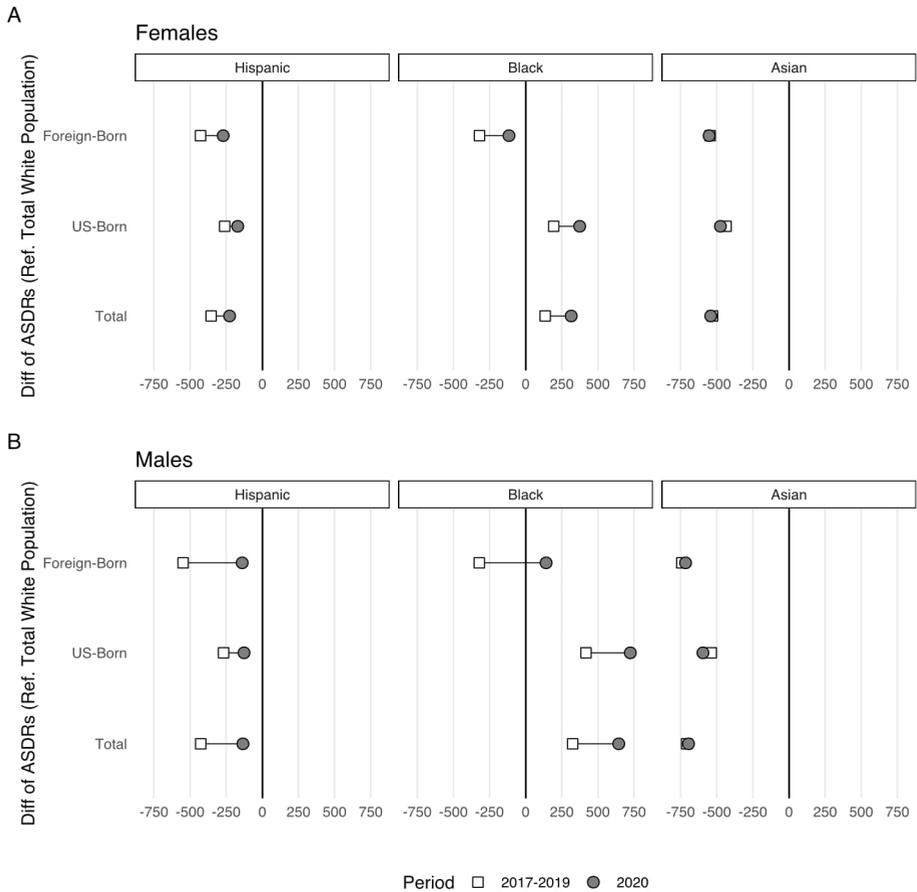
Notes: Bars for 2017–2019 and 2020 represent the difference between foreign-born and US-born ASDRs for all-cause mortality in the respective periods. The bar for COVID-19 presents the same difference for COVID-19 mortality in 2020. Standard errors for the underlying ASDRs (included in the supplementary material) are extremely small and thus are not reported for the differences.

As seen in Figure 2 and Supplementary Tables 3a and 3b, the reduction in the foreign-born mortality advantages was largely driven by deaths attributable to COVID-19. In 2020, COVID-19 mortality was higher for all foreign-born subgroups than for their US-born counterparts at ages 25–64 and 65+, except for Black women at ages 25–64. Among men, foreign-born Hispanic men had the highest ASDR from COVID-19 at ages 25–64 (168.6 per 100,000), whereas Black foreign-born men had the highest COVID-19 mortality at ages 65+ (1,515.8). Among foreign-born women, Hispanic women had the highest COVID-19 mortality at ages 25–64 (58.3) and at ages 65+ (723.5). The foreign-born mortality advantage was erased for Hispanic and White men at ages 65+, nearly eliminated for Hispanic women and Asian men and women, and substantially reduced for all other groups.

### **3.2 The impact of the COVID-19 pandemic on racial/ethnic disparities in mortality at ages 25 and above**

To examine the impact of the pandemic on overall racial/ethnic disparities in mortality, in Figure 3 (Supplementary Table 4) we present the differences between the ASDRs of foreign-born and US-born Asian, Black, and Hispanic populations and those of the total White population by sex in 2017–2019 and 2020. The greater impact of the COVID-19 pandemic on the foreign-born Hispanic population narrowed the Hispanic mortality advantage relative to White residents from –426.4 deaths per 100,000 residents to –134.3 for men and from –354.5 to –226.7 for women. The adverse mortality trends among both foreign-born and US-born Black populations led to an increase in the Black–White mortality disparity, from 325.6 to 644.2 for men and from 135.3 to 315.3 for women, eliminating gains made in prior years. The pandemic’s impact on the mortality advantage of the Asian population relative to the White population was small in comparison.

**Figure 3: Differences between the age standardized death rates of racial and Hispanic-origin groups and those of the White population at ages 25+ in 2017–2019 and 2020. Panel A: females; Panel B: males**



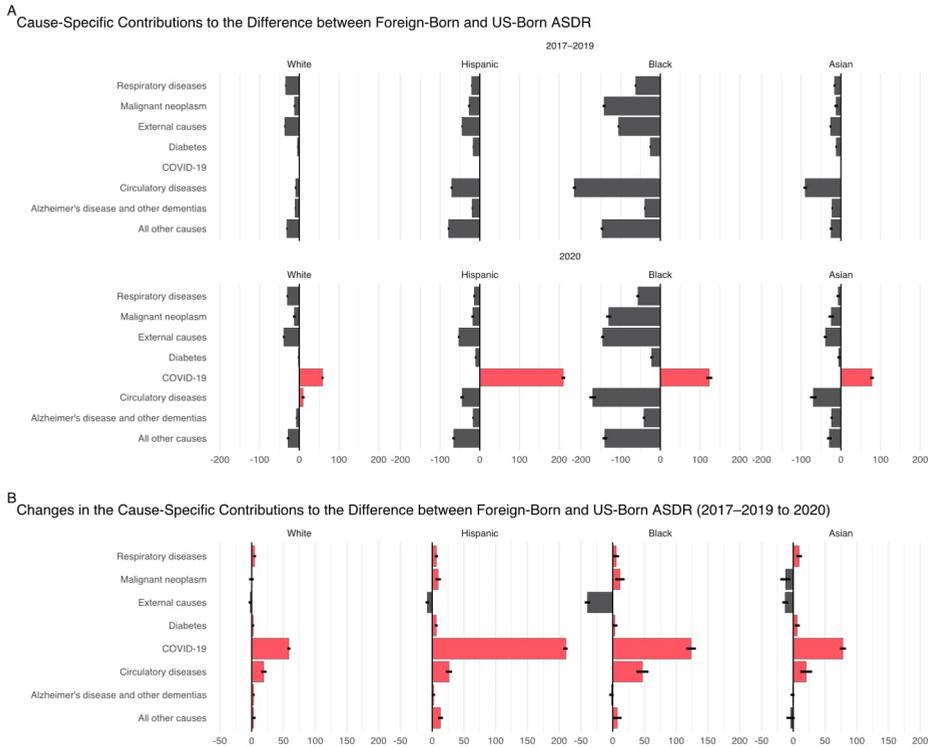
Notes: Each point represents the difference between the ASDRs for Hispanic, Black, and Asian men and women and the ASDR of the White population. Negative values indicate lower mortality for the group relative to the White population. Positive values indicate lower mortality for non-Hispanic Whites. The shape of the point reflects the period for which the differences are computed. Squares indicate differences for the period 2017–2019 (average) and thus represent the pre-pandemic period. Diamonds indicate differences for 2020 and thus represent the first year of the COVID-19 pandemic.

### **3.3 Cause of death contributions to US-born and foreign-born difference in mortality by race and Hispanic origin**

Figures 4a and 4b present the cause-of-death contributions to the US-born and foreign-born difference in all-cause mortality and to the change in this difference over time by race, Hispanic origin, and sex at ages 25+ (Supplementary Tables 5a and 5b). In 2017–2019, foreign-born men and women in all racial and Hispanic-origin groups had lower mortality from all causes of death. Circulatory diseases made the largest contribution to the US-born and foreign-born difference among Hispanic, Black, and Asian men and women, whereas external causes made the largest contribution among White men and respiratory diseases made the largest contribution among White women.

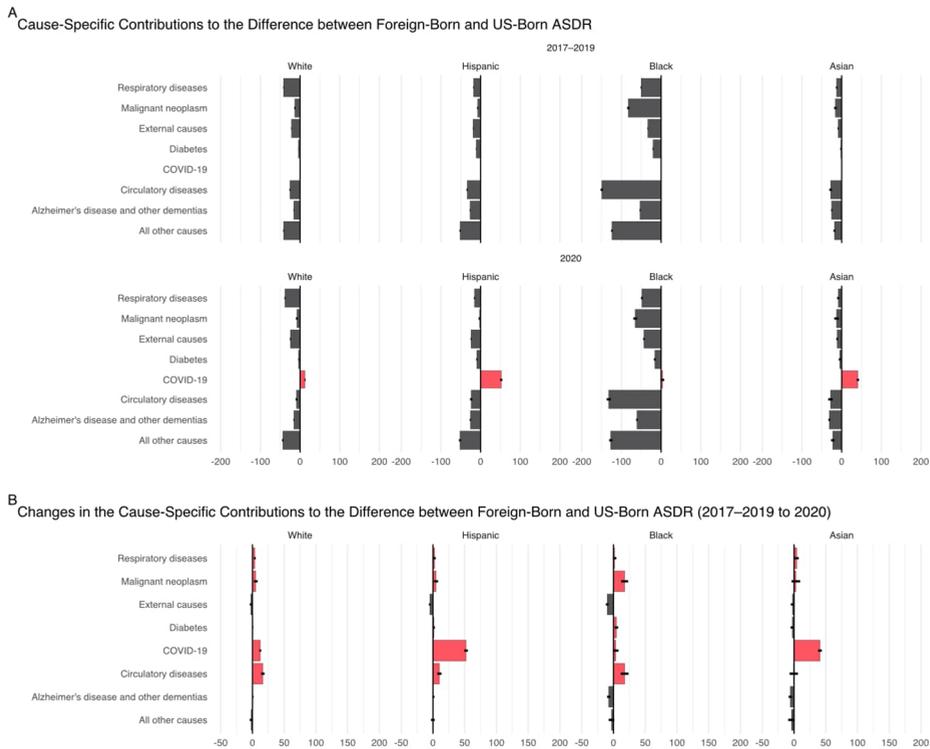
In 2020, although COVID-19 mortality made the largest contribution to the narrowing of the foreign-born and US-born difference in mortality, mortality from other causes of death also contributed (Supplementary Tables 5a and 5b; Panel A of Figures 4a and 4b). Among them, circulatory diseases made the largest contribution to the narrowing of the US-born and foreign-born difference among men in all subgroups and among White and Hispanic women. Among Black women, both circulatory diseases and neoplasms were equally important, whereas respiratory diseases made the largest contribution among Asian women. The most consistent exception was mortality from external causes, for which trends were more adverse for the US-born population.

**Figure 4a: Decomposition of cause-of-death contributions to the US-born and foreign-born difference in ASDRs by period, race, and Hispanic origin, 2017–2019 and 2020 (males 25+)**



*Notes:* The small black lines in the middle of each bar indicate 95% confidence intervals. These intervals were obtained under the assumption that the age-standardized rates involved in each difference are statistically independent. This assumption should produce conservative standard deviations as the correlation is likely to be positive, so that the sum of the variances overestimates the variance of the difference.

**Figure 4b: Decomposition of the cause-of-death contributions to the US-born and foreign-born difference in ASDRs by period, race, and Hispanic origin, 2017–2019 and 2020 (females 25+)**



Notes: The small black lines in the middle of each bar indicate 95% confidence intervals. These intervals were obtained under the assumption that the age-standardized rates involved in each difference are statistically independent. This assumption should produce conservative standard deviations as the correlation is likely to be positive, so that the sum of the variances overestimates the variance of the difference.

## 4. Discussion

The greater impact of the pandemic on Hispanic and Black mortality compared to White mortality in 2020 is well documented (Andrasfay and Goldman 2021; Arias and Xu 2022; Cronin and Evans 2021; Elo et al. 2022; Luck et al. 2022; Sáenz and Garcia 2021). We show that these adverse trends among Hispanic and Black populations were largely

driven by higher foreign-born mortality, particularly among Hispanic men and women. Furthermore, the large increases in COVID-19 mortality among foreign-born older Hispanic men resulted in the elimination of the Hispanic mortality paradox at ages 65+. The foreign-born advantage was also reduced among Hispanic women, as was their mortality advantage relative to White women. COVID-19 mortality, together with mortality from other causes of death, such as circulatory diseases, contributed to the narrowing of the foreign-born advantage among Black men and women and to the widening of Black–White mortality disparities.

The disproportionate burden of the COVID-19 pandemic on foreign-born mortality compared to US-born mortality is not unique to the United States. A similar pattern has been documented in Western Europe in that foreign-born individuals from Asia, sub-Saharan Africa, and the Americas had higher mortality than immigrants from European countries during 2020 (Aldea 2022; Drefahl et al. 2020; Indseth et al. 2021; Khlat et al. 2022; Vanthomme et al. 2021). There are several common explanations for the greater burden of the pandemic on foreign-born residents, including less access to health care, occupational exposures, economic hardship, more crowded living arrangements, and concentration in urban areas.

Foreign-born residents in the United States are more likely to lack health insurance than their US-born counterparts, with 23% of the foreign-born population ages 19 to 64 lacking health insurance in 2020 compared to 9.6% among US-born residents. These rates were particularly high among noncitizens (33.8%) compared to naturalized citizens (10.7%) (Keisler-Starkey and Bunch 2021). Among all foreign-born residents, the Hispanic population is the most likely to be uninsured (Fuentes, Desai, and Dawson 2022). In addition, increased immigration enforcement that coincided with the pandemic further discouraged undocumented migrants from seeking health care (Clark et al. 2020).

Foreign-born individuals are more likely to work in low-skill and essential occupations, where social distancing and remote work are often not feasible (Bennett 2020; Chishti and Gelatt 2022; Goldman et al. 2021; Kochhar and Bennett 2020). In California, for example, foreign-born Hispanic individuals employed in food/agriculture and manufacturing – especially those with lower levels of education (Riley et al. 2021) – experienced a significantly higher COVID-19 mortality risk (House et al. 2021; Saitone, Schaefer, and Scheitrum 2021).

The risk of infection is also greater in more crowded living arrangements, especially if a member of the household works in a frontline occupation. In the United States, multigenerational living is more common in Hispanic, Black, and Asian households than in White households, especially among the foreign born (Pew Research Center 2022). Approximately one-fourth of Hispanic, Black, and Asian individuals lived in extended family households in 2021, compared to about 13% of White individuals. Furthermore,

undocumented Hispanic migrants are more likely to live in larger households with more complex structures than are other groups (Hall, Musick, and Yi 2019).

The COVID-19 pandemic also had worse economic consequences for foreign-born individuals in 2020. In 2019, the unemployment rates among US-born and foreign-born workers were similar, with the foreign born having a slightly lower unemployment rate in the last three quarters of the year. Throughout 2020, however, the unemployment rate among the foreign born exceeded that of US-born residents, peaking at 15.3% in the second quarter of 2020. Further adding to the economic hardship among unauthorized migrants was their exclusion from the stimulus payments (Chishti and Gelatt 2022).

Higher mortality from COVID-19 has also been linked to smoking, obesity, and preexisting chronic conditions such as diabetes, hypertension, and respiratory diseases (Cai, Yang, and Zhang 2021; Liu et al. 2020; Tisminetzky et al. 2022). Yet the evidence remains inconclusive as to whether these preexisting conditions are systematically higher among the foreign born than among the US born. Foreign-born adults have lower prevalence of smoking (Blue and Fenelon 2011; Bosdriesz et al. 2013; Fenelon 2013) and obesity (Barrington et al. 2010; Mehta et al. 2015), though there is variability in the prevalence of diabetes and hypertension by race, Hispanic origin, and nativity (Choi, Narayan, and Patel 2022; Commodore-Mensah et al. 2018; Fang, Ayala, and Loustalot 2012; Mozaffarian et al. 2016; Zhang, Hayward, and Lu 2012). Nonetheless, it is unlikely that differences in comorbidities would account for the greater impact of the pandemic on the foreign born. Finally, the share of foreign-born residents is higher in urban areas (Parker et al. 2018), which experienced higher excess mortality in 2020 (Paglino et al. 2023).

This study has limitations. First, we estimated the size of the foreign-born population by race and Hispanic origin by applying proportions of foreign-born individuals from the 2019 ACS to race-, age-, and sex-specific populations. Sensitivity analyses using the average of 2019 and 2021 proportions did not substantively change our conclusions. Second, emigration and the pandemic's impact on data collection in 2020 could have affected the population estimates. We repeated the analyses using 2019 population data, and the results did not change our conclusions. Third, the assignment of COVID-19 as the underlying cause of death may vary by nativity, race, and Hispanic origin, though we are not aware of studies investigating this possibility. Nonetheless, coding practices would not affect changes in all-cause mortality or our overall conclusion that mortality trends were more adverse for foreign-born than for US-born populations in 2020. Fourth, our analysis covers only the first year of the COVID-19 pandemic. Future research is needed to see how these trends changed as the pandemic unfolded. Finally, the demographic decomposition employed, as in many prior studies, assumes that causes of death are independent. It is possible that COVID-19 displaced or increased mortality from other causes of death. However, our results clearly demonstrate increases in mortality not

only from COVID-19 but also from several other causes of death. Consistent with other studies (Luck 2023b), we find that COVID-19 mortality was not accompanied by declines in mortality from other causes, suggesting that the impact of the pandemic extended to mortality beyond the infection itself.

## **5. Acknowledgements**

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