



Disparities in COVID-19 Hospitalization at the Intersection of Race and Ethnicity and Income

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Abstract

Background Existing studies have elucidated racial and ethnic disparities in COVID-19 hospitalizations, but few have examined disparities at the intersection of race and ethnicity and income.

Methods We used a population-based probability survey of non-institutionalized adults in Michigan with a polymerase chain reaction-positive SARS-CoV-2 test before November 16, 2020. We categorized respondents by race and ethnicity and annual household income: low-income (< \$50,000) Non-Hispanic (NH) Black, high-income (≥ \$50,000) NH Black, low-income Hispanic, high-income Hispanic, low-income NH White, and high-income NH White. We used modified Poisson regression models, adjusting for sex, age group, survey mode, and sample wave, to estimate COVID-19 hospitalization prevalence ratios by race and ethnicity and income.

Results Over half of the analytic sample ($n = 1593$) was female (54.9%) and age 45 or older (52.5%), with 14.5% hospitalized for COVID-19. Hospitalization was most prevalent among low-income (32.9%) and high-income (31.2%) Non-Hispanic (NH) Black adults, followed by low-income NH White (15.3%), low-income Hispanic (12.9%), high-income NH White (9.6%), and high-income Hispanic adults (8.8%). In adjusted models, NH Black adults, regardless of income (low-income prevalence ratio [PR]: 1.86, 95% CI: 1.36–2.54; high-income PR: 1.57, 95% CI: 1.07–2.31), and low-income NH White adults (PR: 1.52, 95% CI: 1.12–2.07), had higher prevalence of hospitalization compared to high-income NH White adults. We observed no significant difference in the prevalence of hospitalization among Hispanic adults relative to high-income NH White adults.

Conclusions We observed disparities in COVID-19 hospitalization at the intersection of race and ethnicity and income for NH Black adults and low-income NH White adults relative to high-income NH White adults, but not for Hispanic adults.

Keywords COVID-19 · Hospitalization · Racial and ethnic disparities · Individual-level income · Population-based survey

Introduction

As the COVID-19 pandemic inundated health care systems across the USA [1, 2], hospitalization became an important pandemic surveillance metric highlighting key

sociodemographic disparities. Within weeks of the World Health Organization (WHO) declaring COVID-19 a pandemic [3], preliminary data from the Coronavirus Disease 2019 (COVID-19)–Associated Hospitalization Surveillance Network (COVID-NET) revealed that hospitalization rates were disproportionately higher among Black and Hispanic/Latino patients, compared to White patients [4, 5]. Even as hospitalization rates fluctuated throughout the first year of the pandemic, racial and ethnic disparities persisted [6].

Surveillance data has prompted further investigation into the disparate burden of COVID-19 on racial and ethnic minoritized populations. A systematic meta-analysis of over 1 million patients hospitalized during the first year of the pandemic found that the odds of hospitalization were higher among Black versus non-Black individuals [7]. Additionally, a COVID-NET observational study examining clinical trends

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among adults hospitalized with COVID-19 in 2020 found that COVID-19 hospitalization rates were higher among Hispanic and non-Hispanic (NH) Black persons relative to NH White persons, regardless of age [8]. Furthermore, a study of hospitalized patients in 12 states between April and June 2020 found that Black and Hispanic patients were disproportionately represented among hospitalized cases [9].

In addition to race and ethnicity, area-level socioeconomic measures may be independently associated with COVID-19 hospitalization. A study from a California health care system between January and April 2020 found that COVID-19 patients from higher (vs. lower) income ZIP codes were less likely to be hospitalized for COVID-19 [10]. Similarly, a systematic review of studies published between December 2019 and March 2021 suggested that socioeconomic status characteristics, including living in poverty or having a lower household income, were associated with increased risk of COVID-19 infection and hospitalization [11]. In contrast, a large retrospective cohort study from a New York City health system found that residence in a higher poverty area alone was not statistically associated with hospitalization [12].

There is also preliminary evidence that COVID-19-associated hospitalization differs at the intersection of race and ethnicity and area-level income. A retrospective analysis involving patients hospitalized for COVID-19 in Southeast Michigan between March and April 2020 found that lower neighborhood income was associated with intensive care unit admission, use of mechanical ventilation, and death among hospitalized Black patients [13]. Another COVID-NET study found that age-adjusted hospitalization rates varied by census tract-level poverty strata and race and ethnicity [14]. In contrast, a cross-sectional analysis from March of 2020 reported the interaction of race and census-level poverty status was not significantly associated with COVID-19 hospitalization in Wisconsin [15]. Similarly, a retrospective cohort study conducted between March and July 2020 at the University of Michigan health system found that the Neighborhood Socioeconomic Disadvantage Index (NDI) did not differ significantly by race among hospitalized COVID-19 patients [16]. Because aggregate data cannot be attributed to individuals without the potential for ecological fallacy, the use of area-level income, in conjunction with area-level COVID-19 outcomes, precludes interpretation at the individual-level and underscores the need to study disparities in COVID-19 hospitalization using individual-level measures of race and ethnicity and income.

Given the discrepancies in current findings, and the lack of published literature on the impact of individual-level income on COVID-19 hospitalization, the present analysis examines disparities in COVID-19 hospitalization prevalence at the intersection of race and ethnicity and household income using a population-based representative sample of non-institutionalized adults who tested positive for

SARS-CoV-2 in Michigan during the first several months of the pandemic.

Methods

Study Population

We used data from the Michigan COVID-19 Recovery Surveillance Study (MI CReSS), a population-based probability survey of adults with polymerase-chain reaction (PCR)-confirmed COVID-19 in Michigan. All non-institutionalized adults (≥ 18 years old) with a positive SARS-CoV-2 test result before November 16, 2020, in the Michigan Disease Surveillance System (MDSS) who were alive when the survey sample was drawn were eligible for selection. Our sampling frame was further restricted to adults with a valid date of birth, telephone number, and geographic information (county and/or zip code) ($N=237,468$). Due to the disproportionate number of COVID-19 cases diagnosed in Southeast Michigan early in the pandemic, we drew five sequential random samples based on COVID-19 onset date, stratified by geographic region: Public Health Preparedness Regions 1, 3, 5, 6, 7, and 8 [17], the counties of Macomb, Monroe, Oakland, Saint Clair, Washtenaw, and Wayne (excluding Detroit), and the City of Detroit. For each sample, we drew a base number of 50–70 participants from each geographic stratum and proportionally sampled the remaining participants to obtain a pre-defined sample size of 1000–2000, for a total of 6000 adults across samples. We weighted our sample to reflect the sex and age distribution of the total population within Michigan and within each geographic stratum.

Sampled cases were invited to complete a survey over the phone with a trained interviewer in English, Spanish, or Arabic, or via a self-facilitated online questionnaire in English. Proxy respondents could complete a survey on behalf of a sampled case if the intended respondent was hospitalized, cognitively or hearing impaired, and/or did not speak English, Spanish, or Arabic. Of the 6000 adults sampled, 1839 completed the survey between June 23, 2020, and October 3, 2021, corresponding to a response rate (#6) and cooperation rate (#2) of 31.8% and 50.7%, respectively, per the American Association for Public Opinion Research (AAPOR) 2016 handbook [18].

Measures

Our primary exposure was the intersection of race and ethnicity and income. Due to sample size limitations, we restricted this analysis to participants who self-identified as NH Black, Hispanic, or NH White (86.7% of our sample). We categorized participants as low ($< \$50,000$) or high ($\geq \$50,000$) income to preserve adequate sample size within

each race and ethnicity and income strata. To account for missing income information (11.4%), we employed weighted sequential hot-deck method [19] and hot deck propensity score (HDPS) imputation [20] to impute annual household income prior to categorization under the missing at random assumption. We then created a six-level categorical variable that classified participants by race and ethnicity and income: low-income NH Black, high-income NH Black, low-income Hispanic, high-income Hispanic, low-income NH White, and high-income NH White.

We defined our outcome, hospitalization for COVID-19, using the question “Did you have an overnight stay in a hospital for COVID-19?” Additional covariates included sex (male, female), age group (18–34; 35–44; 45–54; 55–64; 65 years or older), survey mode (phone, online), and sample wave based on COVID-19 onset (Sample 1: before April 16, 2020; Sample 2: April 16–May 31, 2020; Sample 3: June 1–July 31, 2020; Sample 4: August 1–September 30, 2020; Sample 5: October 1–November 15, 2020). After dropping respondents with missing data on the measures (13.38%), our analytic sample consisted of 1593 adults.

Statistical Analyses

We calculated weighted descriptive statistics for the analytic sample. To assess differences in hospitalization prevalence by income within each racial and ethnic group, we employed the Rao-Scott chi-square test. We used modified Poisson regression to determine if certain racial and ethnic-income groups were more likely to be hospitalized for COVID-19 relative to high-income NH White adults.

We conducted additional sensitivity analyses to evaluate the robustness of our findings. Because the primary objective of this manuscript is to determine if disparities in COVID-19 hospitalization exist at the intersection of race and ethnicity and income and because we presumed pre-existing conditions mediate the relationship between race and ethnicity and income and hospitalization, we did not formally adjust for comorbidities in our primary analysis. However, because underlying conditions prior to COVID-19 diagnosis could confound the association between COVID-19 hospitalization at the intersection of race and ethnicity and income, we conducted a sensitivity analysis in which we additionally adjusted for 13 self-reported comorbidities (chronic obstructive pulmonary disease (COPD) or emphysema; asthma; diabetes; heart disease; high blood pressure; liver disease; kidney disease; stroke or other cerebrovascular disease; cancer; immunosuppressive condition; autoimmune condition; physical disability, and psychological/psychiatric condition). We also conducted a complete-case analysis using non-imputed annual household income to assess whether the imputed income variable affected the association between race and ethnicity and income and hospitalization prevalence.

All analyses accounted for complex survey design and were conducted using Stata SE, version 17 (StataCorp). The University of Michigan’s Institutional Review Board deemed this study exempt due to the use of de-identified data. Informed consent was obtained from all individual participants included in the study.

Results

Weighted Prevalence Estimates

A majority of the analytic sample ($n = 1593$) was female (54.9%), 45 years or older (52.5%), and high-income NH White (48.6%) (Supplementary Table 1). One-third (33.7%) of adults were diagnosed with COVID-19 before April 16, 2020, corresponding to the first wave of the pandemic. Over half (52.9%) of respondents completed the questionnaire online. Additionally, 14.5% (263) had an overnight stay in a hospital for COVID-19.

Weighted Prevalence of Hospitalization for COVID-19 by Demographic and Survey Factors

Table 1 presents COVID-19 hospitalization prevalence estimates by respondent and survey characteristics. Hospitalization was more prevalent among males (16.4%) than females (13.0%), adults aged 65 years or older (35.3%) than younger age groups (e.g., 2.8% for 18–34), adults from Sample 1 (30.6%) compared to subsequent samples (e.g., 4.3% for Sample 5), and adults who completed the questionnaire over the phone (21.8%) versus online (8.1%). Hospitalization prevalence was highest among low-income (32.9%) and high-income (31.2%) NH Black adults, followed by low-income NH White (15.3%), low-income Hispanic (12.9%), high-income NH White (9.6%), and high-income Hispanic (8.8%) adults. Hospitalization prevalence differed significantly by income for NH White adults ($p = 0.008$), but not for NH Black ($p = 0.792$) or Hispanic adults ($p = 0.479$) (Table 1).

Predictors of Hospitalization for COVID-19

Table 2 presents results from the modified Poisson regression examining COVID-19 hospitalization prevalence at the intersection of race and ethnicity and income. In the unadjusted model, hospitalization prevalence was more than three times higher among both low-income (PR: 3.41, 95% CI: 2.45–4.74) and high-income (PR: 3.23, 95% CI: 2.15–4.84) NH Black adults compared to high-income NH White adults. Although attenuated following covariate adjustment, hospitalization prevalence for NH Black adults, regardless of income, was still higher than for high-income NH White

Table 1 Weighted prevalence of COVID-19 hospitalization by demographic and survey factors ($n = 1593$); Michigan COVID-19 Recovery Surveillance Study (COVID-19 onset before November 16, 2020)

	Prevalence of COVID-19 hospitalization ($n = 1593$)		
	No. of cases	Weighted row %	95% CI
Race and ethnicity by income			
Low-income Non-Hispanic Black	165	32.9	(25.8, 40.9)
High-income Non-Hispanic Black	88	31.2	(21.9, 42.2)
Low-income Hispanic	113	12.9	(7.6, 21.1)
High-income Hispanic	43	8.8	(3.2, 21.9)
Low-income Non-Hispanic White	416	15.3	(11.9, 19.4)
High-income Non-Hispanic White	768	9.6	(7.6, 12.2)
Sex			
Male	629	16.4	(13.5, 19.8)
Female	964	13.0	(11.0, 15.3)
Age (years)			
18–34	422	2.8	(1.6, 4.8)
35–44	242	8.1	(5.1, 12.5)
45–54	307	13.3	(9.5, 18.2)
55–64	302	24.2	(19.2, 30.1)
65+	320	35.3	(29.6, 41.4)
COVID-19 onset (sample)			
Sample 1: On or before April 15, 2020	560	30.6	(26.6, 34.9)
Sample 2: Between April 16 and May 31, 2020	220	13.9	(9.6, 19.8)
Sample 3: Between June 1 and July 31, 2020	283	4.7	(2.7, 8.1)
Sample 4: Between August 1 and September 30, 2020	243	4.5	(2.5, 7.7)
Sample 5: Between October 1 and November 15, 2020	287	4.3	(2.5, 7.1)
Survey mode			
Phone	755	21.8	(18.9, 25.0)
Online	838	8.1	(6.3, 10.4)

COVID-19, coronavirus disease 2019; *No.*, total number of cases in denominator; *95% CI*, 95% confidence interval

^aWe used the Rao-Scott chi-square test to determine if there was a significant association between income and hospitalization for COVID-19 for/within each racial and ethnic group. There was a significant difference in the proportion of adults hospitalized by income for NH White adults (two-sided $p = 0.008$), but not for NH Black ($p = 0.792$) or Hispanic adults ($p = 0.479$)

adults (low-income NH Black aPR: 1.86, 95% CI: 1.36–2.54; high-income NH Black aPR: 1.57, 95% CI: 1.07, 2.31). In both unadjusted and adjusted models, hospitalization prevalence among low-income NH White adults was more than 50% greater than that of high-income NH White adults (aPR: 1.52, 95% CI: 1.12–2.07). In contrast, hospitalization prevalence among both low-income and high-income Hispanic adults was not statistically different from high-income NH White adults in unadjusted or adjusted models.

COVID-19 hospitalization prevalence was 36% higher among males compared to females (aPR: 1.36, 95% CI: 1.09–1.70), and nearly eightfold higher (aPR: 7.67, 95% CI: 4.23–13.90) among adults aged 65 years or older relative to 18–34-year-olds. Hospitalization was 4.65 times more prevalent among adults from Sample 1 (95% CI: 2.72–7.94) compared to adults from Sample 5. Survey mode was also a significant predictor of hospitalization among our analytic sample (phone aPR: 1.42, 95% CI: 1.08–1.88).

Sensitivity Analyses

When additionally controlling for all 13 comorbid conditions included in our survey, the prevalence estimates of hospitalization among high-income NH Black (aPR: 1.48, 95% CI: 0.98, 2.22) and low-income NH White (aPR: 1.38, 95% CI: 0.99, 1.93) adults were slightly attenuated relative to high-income NH White adults such that the association was no longer statistically significant (Supplementary Table 2).

The results of the complete-case analysis using non-imputed income were largely consistent with the results from the primary analysis using imputed annual household income (Supplementary Table 3). The magnitude of the observed association between COVID-19 hospitalization and the intersection of race and ethnicity and income were strengthened slightly among all exposure groups relative to high-income NH White adults, except for high-income

Table 2 Predictors of hospitalization for COVID-19 ($n = 1593$); Michigan COVID-19 Recovery Surveillance Study (COVID-19 onset before November 16, 2020)

	Unadjusted		Adjusted	
	PR	95% CI	PR	95% CI
Race and ethnicity by income				
Low-income Non-Hispanic Black	3.41	(2.45, 4.74)	1.86	(1.36, 2.54)
High-income Non-Hispanic Black	3.23	(2.15, 4.84)	1.57	(1.07, 2.31)
Low-income Hispanic	1.34	(0.76, 2.35)	1.25	(0.75, 2.11)
High-income Hispanic	0.91	(0.33, 2.48)	0.96	(0.35, 2.61)
Low-income Non-Hispanic White	1.59	(1.13, 2.23)	1.52	(1.12, 2.07)
High-income Non-Hispanic White	1.00	—	1.00	—
Sex				
Male	1.26	(0.98, 1.62)	1.36	(1.09, 1.70)
Female	1.00	—	1.00	—
Age (years)				
18–34	1.00	—	1.00	—
35–44	2.90	(1.42, 5.93)	2.21	(1.10, 4.46)
45–54	4.75	(2.49, 9.06)	3.24	(1.71, 6.16)
55–64	8.68	(4.76, 15.83)	5.41	(2.97, 9.85)
65+	12.65	(7.06, 22.65)	7.67	(4.23, 13.90)
COVID-19 onset (sample)				
Sample 1: On or before April 15, 2020	7.18	(4.17, 12.34)	4.65	(2.72, 7.94)
Sample 2: Between April 16 and May 31, 2020	3.27	(1.73, 6.18)	2.75	(1.47, 5.13)
Sample 3: Between June 1 and July 31, 2020	1.10	(0.51, 2.35)	1.18	(0.57, 2.46)
Sample 4: Between August 1 and September 30, 2020	1.05	(0.49, 2.25)	1.16	(0.56, 2.40)
Sample 5: Between October 1 and November 15, 2020	1.00	—	1.00	—
Survey mode				
Phone	2.69	(2.01, 3.60)	1.42	(1.08, 1.88)
Online	1.00	—	1.00	—

COVID-19, coronavirus disease 2019; PR, prevalence ratio; 95% CI, 95% confidence interval

Hispanic adults (aPR: 0.91, 0.28, 2.91), though the interpretation of our results did not change.

Discussion

Using a population-based probability sample of adults in Michigan with PCR-confirmed COVID-19 before November 16, 2020, we examined disparities in COVID-19 hospitalization prevalence at the intersection of race and ethnicity and income. In adjusted models, COVID-19 hospitalization prevalence was at least 50% greater among NH Black adults (regardless of income level) and low-income NH White adults compared to high-income NH White adults. We did not observe a statistically significant difference in the proportion of low- or high-income Hispanic adults hospitalized for COVID-19 relative to high-income NH White adults.

Our results confirm previous findings of a disparate burden of COVID-19 hospitalization among NH Black adults during the first several months of the pandemic [10, 12, 15,

16, 21–27]. Although we observed differences in COVID-19 hospitalization for NH Black adults relative to high-income NH White adults, COVID-19 hospitalization did not differ significantly by household income among NH Black adults. Existing evidence is inconclusive regarding the intersection of race and ethnicity and socioeconomic status and COVID-19 hospitalization [9, 15]. A cross-sectional analysis conducted early in the pandemic revealed that race and census tract-level poverty independently increased the odds of COVID-19 hospitalization, though the interaction of race and poverty was not statistically significant [15]. Alternatively, a retrospective analysis found that lower neighborhood income was a more significant predictor of severe COVID-19 outcomes for Black patients compared to White patients [13].

In contrast to published literature [1, 7, 21, 25, 28], we did not observe a statistical difference in the prevalence of COVID-19 hospitalization among either low- or high-income Hispanic adults compared to high-income NH White adults, nor did we observe a statistical difference in hospitalization among Hispanic adults by income. The number of Hispanic adults in our analytic sample may

have limited our power to detect statistical differences by income for this ethnic group. Additionally, our analysis was restricted to adults who tested positive for COVID-19 before November 16, 2020, and thus excluded a rise in cases and hospitalizations in December 2020, particularly among Hispanic individuals [8, 29]. Future research is needed to quantify how the prevalence of hospitalization among Hispanic adults varies by income during subsequent waves of the pandemic.

Consistent with prior research at the census tract-level [10], we observed disparities in COVID-19 hospitalizations by individual-level income among NH White adults. Specifically, the proportion of low-income NH White adults hospitalized for COVID-19 was significantly higher than high-income NH White adults. Conversely, COVID-19 hospitalization prevalence did not statistically differ by income level for either NH Black or Hispanic adults, suggesting income has a protective effect for NH White adults but not NH Black or Hispanic adults. NH White adults constituted the largest proportion of non-hospitalized and hospitalized cases in our sample, which may explain why we were able to observe individual differences by income for this racial and ethnic group in contrast to NH Black or Hispanic adults.

Two common hypotheses have emerged to explain the disparate impact of COVID-19 among racial and ethnic minoritized and socioeconomically disadvantaged communities: differential risk of exposure and differential risk of severe illness [22, 24, 28, 30]. Differences in exposure risk are driven largely by employment for NH Black and Hispanic adults, who are more likely to be employed in public-facing sectors and industries that were deemed essential amid statewide shelter-in-place executive orders [22, 28, 31]. The inability to work remotely is especially important to consider within the context of personal protective equipment shortages in many workplaces at the beginning of the pandemic. The precarious nature of many essential occupations may have forced socioeconomically disadvantaged populations to prioritize a paycheck over their health, despite a lack of workplace protections. Furthermore, NH Black and Hispanic adults are also more likely to reside in larger, multi-generational households compared to NH White adults, which may influence an individual's ability to prevent and/or reduce personal exposure to COVID-19 [28]. The capacity to distance oneself safely from others and adhere to public health measures within the workplace, community, and at home can play an important role in preventing disease transmission, though it is a privilege afforded unequally across racial and ethnic and socioeconomic lines [24, 30, 32]. In this way, the observed differences at the intersection of race and ethnicity and income are driven by the social determinants of health and represent inequities exacerbated by the COVID-19 pandemic [38].

Differences in the risk of severe illness are rooted in the disparate burden of pre-existing conditions among racial and ethnic minoritized and socioeconomically marginalized populations, which may predispose individuals to more severe COVID-19 illness warranting hospitalization [30, 33, 34]. However, emerging evidence suggests that racial and ethnic disparities in COVID-19 outcomes may be better explained by differential risk of exposure [16, 21, 26, 35–37]. For example, a retrospective cohort study found that higher comorbidity burden was associated with increased odds of COVID-19 hospitalization among NH White patients, but not NH Black patients [16]. The results from our sensitivity analysis further suggest that other factors may better explain the observed disparities at the intersection of race and ethnicity and income.

Limitations

To our knowledge, our study is the first to examine COVID-19 hospitalization at the intersection of race and ethnicity and individual-level income, and has several noteworthy strengths. Specifically, our six-level combined race and ethnicity and income exposure allowed us to examine COVID-19 hospitalization at the intersection of two closely associated, individual-level determinants of health before testing was ubiquitous and vaccines were widely administered to the public. In addition, the present analysis helps close the gap on missing racial and ethnic data that characterized surveillance efforts in the earliest waves of the pandemic [39].

Despite its importance, our study is not without limitations. First, we restricted our sampling frame to non-institutionalized adults who had a positive COVID-19 test in the MDSS and were alive at time of sampling. As a result, our findings are not generalizable to all adults living in Michigan, including those who refrained from seeking testing or treatment due to an inability to access care. Because testing was not universally available early on the pandemic, our first sample is likely biased to more severe COVID-19 cases, higher risk patients, and essential workers who met the criteria for testing. Our results also do not reflect racial and ethnic and income differences in hospitalization among adults who died. Nonetheless, our results are more representative of the general population than many other COVID-19 hospitalization studies that currently exist, given our population-based probability design. By adjusting our analysis for sample wave, we were also able to account for temporal changes in the prevalence of hospitalization as testing, health care delivery, and the sociodemographic profile of adults hospitalized for COVID-19 shifted overtime. Second, our findings are susceptible to reporting bias since we based our outcome on self-reported hospitalization.

However, the probability of misclassification is low with this outcome. Third, we dichotomized income as low versus high without considering related factors such as household size, composition, or poverty level primarily due to insufficient data collection on household composition. Many papers on COVID-19 hospitalization are limited by the use of aggregate-level income if income can be examined at all. Therefore, our study remains novel in its assessment of disparities in COVID-19 hospitalization using individual-level race and ethnicity and income. Finally, our results are subject to participation bias and may over- or underestimate the true prevalence of hospitalization by race and ethnicity and income among non-institutionalized adults in Michigan. Despite this, we applied sampling weights to reflect the age and sex distribution of the sampling frame overall and by geographic region to account for differential participation by age and sex.

Conclusion

We observed disparities in the prevalence of COVID-19-associated hospitalizations among low- and high-income NH Black adults and low-income NH White adults relative to high-income NH White adults. In contrast, the prevalence of hospitalization did not statistically differ among low- or high-income Hispanic adults compared to high-income NH White adults. Within each racial and ethnic group, the proportion of adults hospitalized for COVID-19 differed significantly by income among NH White adults, but not NH Black or Hispanic adults. The disparate health outcomes observed in this study add to the broader understanding of health inequities that exist in historically marginalized communities and the need to dismantle social structures and systems that perpetuate them.

Supplementary Information The online version contains supplementary material available at <https://doi.org/10.1007/s40615-023-01591-9>.

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Author Contribution Giovanna Buttazzoni, Nancy L Fleischer, and Jana L Hirschtick contributed to the study conception and methodology. Data curation was completed by Akash Patel, Giovanna Buttazzoni, and Blair J Whittington. Blair J Whittington conducted the formal analysis and wrote the first draft of the manuscript. All authors commented on draft versions of the manuscript and all authors read and approved the final manuscript. Resources were provisioned by Nancy L Fleischer, Jana L Hirschtick, and Patricia McKane, and funding was acquired by Nancy L Fleischer. Jana L Hirschtick supervised this manuscript.

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Declarations

Ethics Approval The University of Michigan's Institutional Review Board deemed this study exempt due to the use of de-identified data.

Consent to Participate Informed consent was obtained from all individual participants included in the study.

Competing Interests The authors declare no competing interests.

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