Disaggregating Asian Race Reveals COVID-19 Disparities Among Asian American Patients at New York City's Public Hospital System

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Abstract

Objectives: Data on the health burden of COVID-19 among Asian American people of various ethnic subgroups remain limited. We examined COVID-19 outcomes of people of various Asian ethnic subgroups and other racial and ethnic groups in an urban safety net hospital system.

Methods: We conducted a retrospective analysis of 85 328 adults aged ≥18 tested for COVID-19 at New York City's public hospital system from March 1 through May 31, 2020. We examined COVID-19 positivity, hospitalization, and mortality, as well as demographic characteristics and comorbidities known to worsen COVID-19 outcomes. We conducted adjusted multivariable regression analyses examining racial and ethnic disparities in mortality.

Results: Of 9971 Asian patients (11.7% of patients overall), 48.2% were South Asian, 22.2% were Chinese, and 29.6% were in other Asian ethnic groups. South Asian patients had the highest rates of COVID-19 positivity (30.8%) and hospitalization (51.6%) among Asian patients, second overall only to Hispanic (32.1% and 45.8%, respectively) and non-Hispanic Black (27.5% and 57.5%, respectively) patients. Chinese patients had a mortality rate of 35.7%, highest of all racial and ethnic groups. After adjusting for demographic characteristics and comorbidities, only Chinese patients had significantly higher odds of mortality than non-Hispanic White patients (odds ratio = 1.44; 95% CI, 1.04-2.01).

Conclusions: Asian American people, particularly those of South Asian and Chinese descent, bear a substantial and disproportionate health burden of COVID-19. These findings underscore the need for improved data collection and reporting and public health efforts to mitigate disparities in COVID-19 morbidity and mortality among these groups.

Keywords

New York City was the first area in the United States to have a substantial health burden of COVID-19, with more than 200 000 cases, 50 000 hospitalizations, and 17 000 deaths from March 1 through May 31, 2020.[1] New York City (NYC) Health + Hospitals, the city's public hospital system and the largest one in the nation, was hit hardest in the city and the nation during this time; many of its 11 hospitals had neared capacity, and additional temporary facilities had opened to accommodate thousands of patients with severe illness.

Early data on outcomes showed that non-Hispanic Black (hereinafter, Black) and Hispanic American people had more infections, hospitalizations, and deaths from COVID-19 (hereinafter, burden) than non-Hispanic White (hereinafter, White) American people, with Asian American people

having similar or lower rates than White people.[2-6] However, Asian American leaders in New York City, which is home to the largest Asian and South Asian populations in the nation,

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voiced concerns about the lack of local and national attention to COVID-19 among Asian American people of various ethnicities, many of whom have similar clinical, social, and economic characteristics as those of Black and Hispanic American people, such as higher rates of hypertension and diabetes, working in service or frontline jobs, and, especially among recent immigrants, lower income.[7-10] This lack of accurate data on and attention to COVID-19 among Asian American people is due largely to 2 key factors: (1) an undercount of Asian American people in health records because of inadequate or inaccurate data collection and reporting of race and/or ethnicity and (2) aggregating all Asian ethnic groups into a single race category, obscuring differences in outcomes among these diverse groups.

A 2020 systematic review and meta-analysis of 50 studies from the United States and United Kingdom found a higher risk of COVID-19 infection among Asian and Black people than among White people and a higher risk of intensive care unit admission and death only among Asian people compared with White people.[11] Several studies from the United Kingdom, which has a large Asian and South Asian population, have shown a high burden of COVID-19 infection among South Asian communities.[12,13] Media reports in the United States have begun to illuminate the burden of COVID-19 among Asian American people, but data are largely lacking from health systems and health departments.[14-16] An analysis of excess deaths due to COVID-19 in the United States found a high rate among Asian people, with a 36.6% increase in deaths from 2015-2019 to 2020, far higher than the 11.9% increase among White people and second only to the 53.6% increase among Hispanic people.[17] Still, the impact of COVID-19 among Asian American people has not yet been fully elucidated.

We hypothesized that disaggregating Asian race into ethnic subgroups would reveal high rates of COVID-19 infection, hospitalization, and death among certain Asian ethnic subgroups. The objectives of our study were to assess (1) COVID-19 outcomes, demographic characteristics, and relevant clinical risk factors among Asian American people tested for COVID-19 at New York City's public hospital system and (2) whether differences exist in characteristics and outcomes between Asian ethnic subgroups and other racial and ethnic groups.

Methods

Data Sources

We used NYC Health + Hospitals' electronic health record (EHR) database to identify all patients who received a SARS-CoV-2 test at the health system from March 1 through May 31, 2020, with follow-up through August 15, 2020. We extracted data on demographic characteristics and selected comorbidities for all patients, where available, as well as COVID-19–related outcomes (test dates and results, dates of hospitalization and discharge, and date of in-hospital death). The primary variables of interest were race, ethnicity, age, and COVID-19–related outcomes (positive test result, hospitalization, in-hospital mortality).

Because of known deficiencies in recorded race and ethnicity in the EHR database, we used validated Asian surname lists from the literature (available from authors upon request) in addition to data on race, ethnicity, and language in the EHR database to classify patients into 1 of 3 Asian ethnic groups: Chinese, South Asian (Afghani, Bangladeshi, Indian, Nepalese, Pakistani, Sri Lankan), and all other Asian.[18-20] We selected Chinese and South Asian as the 2 main groups because they compose the 2 largest groups of Asian American people in the New York City metropolitan area (4.0% and 3.3%, respectively, of the overall population, with all Asian people composing 11.2% of the population) and a large proportion of Asian patients at NYC Health + Hospitals.[21] We did not group "other Asian" individually because of their smaller population sizes in both New York City and our health system. Other race and ethnicity categories were Black, White, Hispanic, "Other" (ie, none of the aforementioned racial and ethnic groups, or a combination thereof), and unknown.

The primary outcomes were a positive SARS-CoV-2 test result, hospitalization for COVID-19, and death from COVID-19. Secondary outcomes were patient demographic characteristics and comorbidities.

Statistical Analysis

We summarized patient demographic characteristics and comorbidities as descriptive statistics, with categorical data presented as frequency (percentage) and numerical data as mean (SD) or median (interquartile range [IQR]), as appropriate.

We used the Pearson χ^2 test to examine differences between demographic and clinical characteristics by race and ethnicity. We performed multivariable logistic regression analyses to assess whether racial and ethnic disparities in mortality persisted after controlling for other demographic characteristics and comorbidities known to be associated with adverse outcomes of COVID-19. We ran 2 models: one that aggregated all Asian ethnic subgroups into a single Asian race category and another that disaggregated Asian race into the 3 specified ethnic subgroups. We presented the association between risk factors and outcome of death as odds ratios (ORs) and 95% CIs. For all analyses, we considered $P < .05$ to be significant. We conducted all analyses using R version 3.6 (R Foundation) and SAS Enterprise Guide version 7.15 (SAS Institute, Inc).

The Biomedical Research Alliance of New York Institutional Review Board approved this study. Informed consent was not required because of the retrospective nature of this study.

Results

Characteristics of Asian American Patients

From March 1 through May 31, 2020, 85 328 adults were tested for SARS-CoV-2, of whom 9971 (11.7%) were Asian.

Of Asian adults tested for SARS-CoV-2, 4804 (48.2%) were South Asian, 2214 (22.2%) were Chinese, and 2953 (29.6%) were in other Asian ethnic groups (Table 1). Chinese patients were the oldest among Asian patients (median [IQR] age, 53 [38-64]) and among the oldest of all racial and ethnic groups. Half of Chinese patients were new to NYC Health + Hospitals (50.6%), the highest proportion among all racial and ethnic groups. South Asian patients were the most likely among Asian patients to use Emergency Medicaid (2.2%) and Medicaid (23.5%), second overall only to Black patients (24.7%) for Medicaid use. Commercial health insurance was used most frequently by White and Asian patients (38.4% and 37.0%, respectively) and, among Asian patients, by people not of South Asian or Chinese descent (45.4%). Chronic diseases were prevalent among South Asian patients, who had a higher rate of obesity (14.1% with body mass index [BMI] 30.0-39.9 kg/m^2 and 1.7% with BMI ≥40 kg/m^2), diabetes (23.1%), hypertension (26.0%), and heart disease (22.0%) than other Asian ethnic subgroups; these rates were similar to and sometimes higher than rates observed among Black and Hispanic patients.

COVID-19 Outcomes of Asian American Patients

Among all racial and ethnic groups, Asian patients had the second-highest rate of receiving a positive COVID-19 test result (27.9%); South Asian patients had the highest rate among Asian ethnic groups (30.8%), second only to Hispanic patients (32.1%) (Figure). More than half (51.6%) of Asian patients who received a positive COVID-19 test result were hospitalized, a lower proportion than that of Black and White patients; however, hospitalization rates were higher among Chinese (52.6%) and South Asian (54.7%) patients, the latter of whom had the second-highest rate (behind Black patients) among all racial and ethnic groups.

The 25.5% mortality rate among Asian patients was second only to the mortality rate among White patients (33.6%) (Figure). Chinese patients had a higher mortality rate (35.7%) than South Asian (23.7%) and other Asian (21.0%) patients, and this rate was the highest among all racial and ethnic groups. This disparity in mortality among Chinese patients persisted even after adjusting for age, other demographic characteristics, and comorbidities (OR = 1.44; 95% CI, 1.04-2.01; P = .03) (Table 2). However, we observed no disparity between the aggregate group of Asian patients and White patients (OR = 1.15; 95% CI, 0.93-1.43; P = .21). Use of Emergency Medicaid (OR = 2.86; 95% CI, 2.30-3.54; P < .001) and being a new patient at NYC Health + Hospitals (OR = 2.03; 95% CI, 1.79-2.30; P < .001) were both significantly associated with increased odds of death.

Discussion

At the time of analysis, this study was the first to identify disparities in COVID-19 outcomes among people of various Asian ethnic subgroups in the United States. Disaggregating Asian race into ethnic subgroups revealed a disproportionate burden of COVID-19 infection and hospitalization among South Asian patients and mortality among Chinese patients, with the latter having the highest likelihood of death among all racial and ethnic groups. Rates of COVID-19 positivity, hospitalization, and mortality were lower among the overall Asian group than among ethnic subgroups, masking disparities between ethnic groups.

Asian American people, especially those of South Asian and Chinese descent, have several clinical risk factors in common with Black and Hispanic American people. The BMI values for overweight and obesity among Asian people are lower than the BMI values for people of other racial and ethnic groups, resulting in a higher-than-expected prevalence of overweight and obesity.[22] South Asian people have high rates of diabetes and hypertension that are similar to rates observed among Black and Hispanic people, and they have a disproportionate burden of morbidity and mortality from cardiovascular disease. These factors, which are known to increase the risk of COVID-19 infection, hospitalization, and death, are prevalent among many Asian American people.[23,24]

Many Asian American people, especially those in New York City, have social factors that are known to increase the risk of COVID-19 exposure and illness, including living in multigenerational housing, having jobs as frontline or essential workers, lacking paid sick leave, and having limited access to linguistically and culturally appropriate health care.[25,26] Furthermore, the social conditions that drive racial and ethnic disparities in chronic diseases among Black and Hispanic American people, including poverty, limited access to health care, limited English-language proficiency, and other upstream social determinants of health, are similar in the largely immigrant Asian patient population at NYC Health + Hospitals.

The high infection rate observed among South Asian patients may be due to factors that increase the likelihood of exposure (eg, jobs in essential services) or impede the ability to isolate or quarantine (eg, crowded housing, lack of paid sick leave) that are well-established risk factors among other groups of color in the United States. An analysis of community-level factors associated with racial and ethnic COVID-19 disparities found that "household size and food service occupation are strongly associated with the risk of COVID-19 infection."[27] These factors are common among Asian people in New York City, particularly recent immigrants, which may partially explain the high infection rate observed among South Asian patients. This same analysis also found that the proportion of non–US-born non-citizens was positively associated with the number of COVID-19 cases in a community, which may also explain high rates of COVID-19 infection among Asian and Hispanic people in New York City, many of whom are recent immigrants. Furthermore, Asian American people are the most likely of all racial and

Table 1. Characteristics and comorbidities of adult patients (aged ≥18) tested for SARS-CoV-2, by race and ethnicity, at New York City Health + Hospitals, March 1–May 31, 2020[a]

Characteristic	Total	NH White	NH Black	Hispanic	Any Asian	South Asian[b,c]	Chinese[c]	Other Asian[c]	Other	Unknown	P value[d]
						Asian					
All	85 328 (100.0)	8037 (9.4)	20 827 (24.4)	25 119 (29.4)	9971 (11.7)	4804 (5.6)	2214 (2.6)	2953 (3.5)	13 505 (15.8)	7869 (9.2)	—
Male sex	40 306 (47.2)	4025 (50.1)	8822 (42.4)	12 550 (50.0)	4469 (44.8)	2350 (48.9)	1026 (46.3)	1093 (37.0)	6523 (48.3)	3917 (49.8)	<.001
Median age (IQR), y	51 (38-62)	53 (37-64)	54 (40-64)	51 (40-62)	49 (35-61)	49 (35-60)	53 (38-64)	47 (35-59)	48 (34-60)	49 (5-61)	NA
Age group, y											<.001
18-44	31 381 (36.8)	2903 (36.1)	6510 (31.3)	8662 (34.5)	4124 (41.4)	2054 (42.8)	762 (34.4)	1308 (44.3)	5904 (43.7)	3278 (41.7)	
45-64	36 927 (43.3)	3126 (38.9)	9564 (45.9)	11 428 (45.5)	4163 (41.8)	1939 (40.4)	936 (42.3)	1288 (43.6)	5462 (40.4)	3184 (40.5)	
65-74	10 647 (12.5)	1067 (13.3)	2964 (14.2)	3188 (12.7)	1079 (10.8)	542 (11.3)	293 (13.2)	244 (8.3)	1403 (10.4)	946 (12.0)	
≥75	6373 (7.5)	941 (11.7)	1789 (8.6)	1841 (7.3)	605 (6.1)	269 (5.6)	223 (10.1)	113 (3.8)	736 (5.4)	461 (5.9)	
Health insurance payer											<.001
Commercial	22 464 (26.3)	3083 (38.4)	6342 (30.5)	3471 (13.8)	3687 (37.0)	1580 (32.9)	766 (34.6)	1341 (45.4)	3965 (29.4)	1916 (24.3)	
Emergency Medicaid	2409 (2.8)	91 (1.1)	254 (1.2)	1559 (6.2)	195 (2.0)	104 (2.2)	44 (2.0)	47 (1.6)	234 (1.7)	76 (1.0)	
Medicaid	17 809 (20.9)	1200 (14.9)	5154 (24.7)	5180 (20.6)	1801 (18.1)	1128 (23.5)	290 (13.1)	383 (13.0)	3379 (25.0)	1095 (13.9)	
Medicare	12 602 (14.8)	1646 (20.5)	3812 (18.3)	3600 (14.3)	1050 (10.5)	500 (10.4)	371 (16.8)	179 (6.1)	1733 (12.8)	761 (9.7)	
Self-pay	27 393 (32.1)	1790 (22.3)	4659 (22.4)	10 449 (41.6)	2986 (29.9)	1363 (28.4)	697 (31.5)	926 (31.4)	3684 (27.3)	3825 (48.6)	
Other	2651 (3.1)	227 (2.8)	606 (2.9)	860 (3.4)	252 (2.5)	129 (2.7)	46 (2.1)	77 (2.6)	510 (3.8)	196 (2.5)	
History with NYC Health + Hospitals											<.001
Acute only	8426 (9.9)	849 (10.6)	2801 (13.4)	2336 (9.3)	779 (7.8)	468 (9.7)	146 (6.6)	165 (5.6)	1418 (10.5)	243 (3.1)	
Outpatient	36 257 (42.5)	3287 (40.9)	10 150 (48.7)	11 158 (44.4)	5218 (52.3)	2384 (49.6)	948 (42.8)	1886 (63.9)	5382 (39.9)	1062 (13.5)	
New patient	40 645 (47.6)	3901 (48.5)	7876 (37.8)	11 625 (46.3)	3974 (39.9)	1952 (40.6)	1120 (50.6)	902 (30.5)	6705 (49.6)	6564 (83.4)	
Chronic conditions[a]											
Obesity, BMI, kg/m²[e]											<.001
30.0-39.9	12 636 (14.8)	967 (12.0)	3898 (18.7)	4545 (18.1)	1085 (10.9)	679 (14.1)	126 (5.7)	280 (9.5)	1735 (12.8)	406 (5.2)	
≥40.0	2391 (2.8)	202 (2.5)	1020 (4.9)	558 (2.2)	127 (1.3)	82 (1.7)	17 (0.8)	28 (0.9)	387 (2.9)	97 (1.2)	
Chronic diseases[f]											<.001
Diabetes	16 499 (19.3)	1138 (14.2)	5058 (24.3)	5657 (22.5)	1900 (19.1)	1108 (23.1)	318 (14.4)	474 (16.1)	2238 (16.6)	508 (6.5)	
Hypertension	21 184 (24.8)	1952 (24.3)	7458 (35.8)	5987 (23.8)	2265 (22.7)	1250 (26.0)	452 (20.4)	563 (19.1)	2778 (20.6)	744 (9.5)	
Heart disease	16 535 (19.4)	1786 (22.2)	5407 (26.0)	4600 (18.3)	1862 (18.7)	1055 (22.0)	391 (17.7)	416 (14.1)	2316 (17.1)	564 (7.2)	
Cancer	7082 (8.3)	657 (8.2)	2240 (10.8)	2488 (9.9)	706 (7.1)	365 (7.6)	167 (7.5)	174 (5.9)	822 (6.1)	169 (2.1)	
Liver disease	2622 (3.1)	277 (3.4)	671 (3.2)	923 (3.7)	276 (2.8)	150 (3.1)	66 (3.0)	60 (2.0)	404 (3.0)	71 (0.9)	
Chronic kidney disease	4591 (5.4)	413 (5.1)	1952 (9.4)	1101 (4.4)	445 (4.5)	255 (5.3)	92 (4.2)	98 (3.3)	525 (3.9)	155 (2.0)	

Abbreviations: BMI, body mass index; IQR, interquartile range; NA, not applicable; NH, non-Hispanic; NYC, New York City.
[a]All data are from New York City Health + Hospitals' electronic health record database. All percentages are based on the full population tested, not just patients with available values.
[b]South Asian includes surnames classified as Afghani, Bangladeshi, Indian, Nepalese, Pakistani, and Sri Lankan.
[c]Percentage for each Asian subgroup was based on denominator of all Asian patients, not the full population tested. Southeast Asian patients composed 48.2% of Asian patients; Chinese, 22.2%; and other Asian, 29.6%.
[d]The Pearson χ^2 test was used to examine differences between demographic and clinical characteristics by race and ethnicity, with $P < .05$ considered significant.
[e]More than half (50.8%) of patients tested did not have a BMI value available.
[f]Chronic disease status is based on the presence of a diagnosis in the patient's medical record.

ethnic groups to live in larger, multigenerational households, thereby further increasing their risk of COVID-19 exposure and infection.[28]

New York City's Asian diaspora is ethnically and socioeconomically diverse, with many Asian New Yorkers working in low-wage jobs for which working from home is not possible. The US Bureau of Labor Statistics shows that only 9% of low-wage (<25th percentile) workers are able to work at home as compared with 62% of workers in the highest income quartile, which may partially explain high COVID-19 infection rates among South Asian people in New York City.[29]

These social factors are even more common among recent immigrants, who may delay seeking care because of their immigration status. This delay in care-seeking has been exacerbated by the public charge rule, which put legally present immigrants at risk of permanent resident status denial if they use public benefits from the local, state, or federal government.[30] Although a July 2020 injunction prevented the rule from being enforced during the COVID-19

public health emergency, immigrants have avoided seeking medical care or enrolling in public benefits because of concerns about the public charge rule and its effect on their immigration status.[31-34] This delay in or avoidance of seeking care may partially explain the high rates of hospitalization and mortality observed among South Asian and Chinese patients, respectively.

Our finding that Chinese American patients had the highest mortality rate of all racial and ethnic groups and the highest odds of death is concerning, and this elevated burden was revealed only when the overall Asian race category was disaggregated into ethnic subgroups. Since the emergence of COVID-19 in the United States in early 2020, Chinese and other Asian American people have experienced increased xenophobia, discrimination, and harassment: one-quarter of Asian New Yorkers who were surveyed reported witnessing or experiencing COVID-19–related harassment, violence, or racism, and more than half of Chinese American adults and their children who were surveyed reported being targeted by COVID-19–related racial discrimination.[35-38]
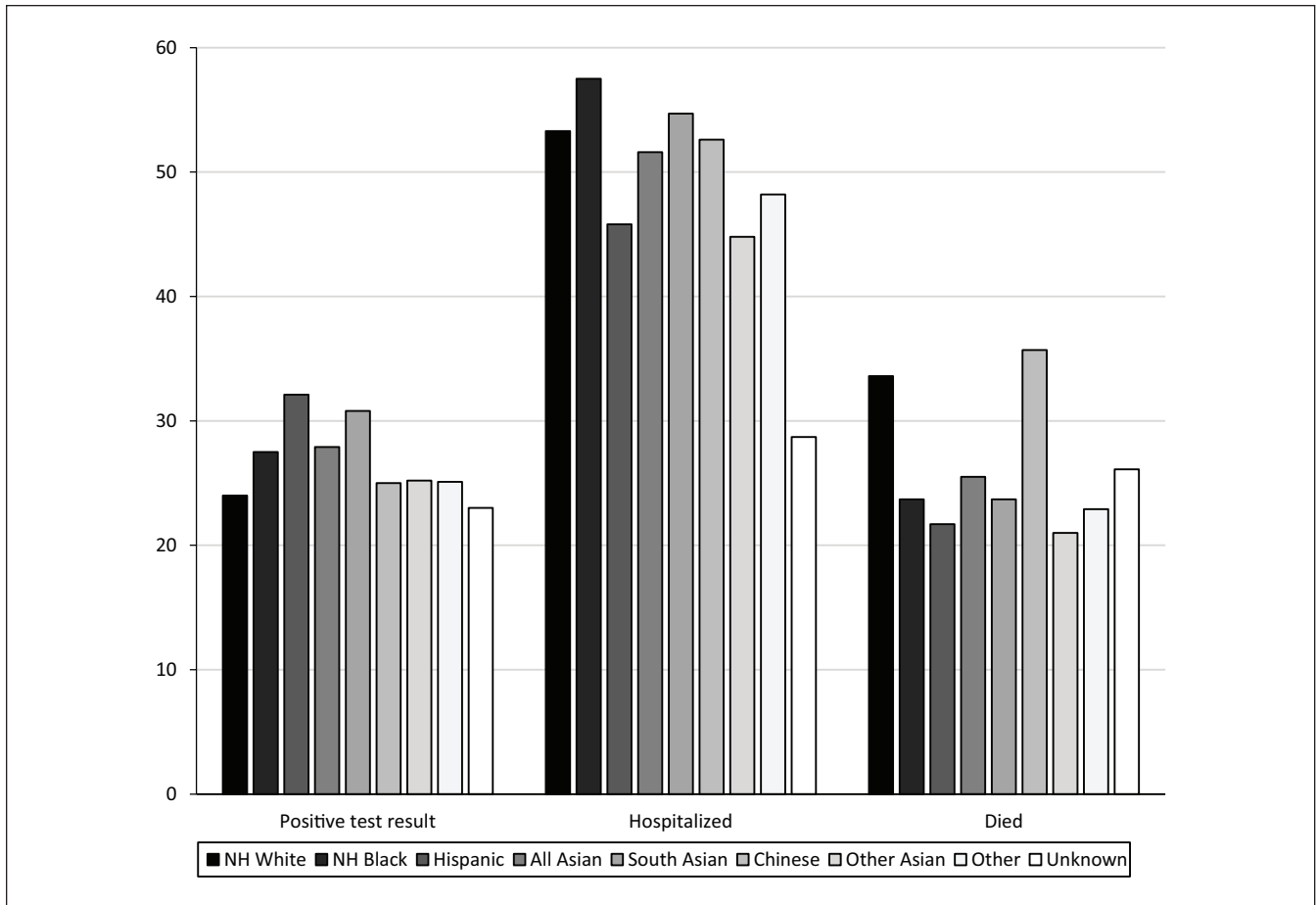
Figure. COVID-19 outcomes among adult (aged ≥18) patients tested for SARS-CoV-2, by race and ethnicity, at New York City Health + Hospitals, March 1–May 31, 2020. Rates are unadjusted. Abbreviation: NH, non-Hispanic.

These experiences may have led to reluctance to or fear of leaving one's home for care or testing, which may have exacerbated the known reluctance of Chinese American people to seek timely care, possibly leading to severe illness that may have been difficult to treat successfully.[39] The "model minority" myth that Asian people are healthier than other racial and ethnic groups and implicit biases among health care providers may have led to disparate interactions with and treatment decisions among Asian patients. Although reporting on Asian American people in research on biases toward and stereotypes of non-White patients is limited, Asian American people are more likely than White people to feel a lack of respect or misunderstood by health care providers and not as involved in health care decisions as they would like to be.[40-42] Our findings underscore the urgency of additional research into the factors leading to high COVID-19 mortality among Chinese American people.

We found that patients who used Emergency Medicaid had nearly 3-fold higher odds of death than patients using commercial health insurance. In our study, Emergency Medicaid use was most frequent among Hispanic patients (6.2%), followed by South Asian patients (2.2%) and both

Asian patients overall and Chinese patients (2.0% for both), groups that have large numbers of undocumented immigrants. The markedly higher likelihood of death observed among patients using Emergency Medicaid likely reflects delayed care-seeking among undocumented immigrants. In New York State, Emergency Medicaid for undocumented immigrants was expanded to cover COVID-19 testing and treatment early in the pandemic.[43] However, many undocumented immigrants likely delayed or avoided care because of concerns about their immigration status.[44]

Similarly, we found that patients who were new to or had only an inpatient or emergency department visit at NYC Health + Hospitals had higher odds of death than patients with a history of outpatient visits. Based on our own clinical experience as well as the extant literature, these higher odds may have been due in part to poorer health among new patients and patients who had previously only had an acute care visit, as they may not have been receiving regular care for or may have had poorly controlled and/or undiagnosed chronic conditions known to be a risk factor for COVID-19.[45-47] These patients also may have presented with more severe COVID-19 illness than other patients because of a

Table 2. Odds of death among patients hospitalized with COVID-19, by selected characteristics, New York City Health + Hospitals, March 1–May 31, 2020[a]

Characteristic	Adjusted odds ratio (95% CI) (N = 9836)[b]	P value[c]
Race and ethnicity		
NH White	1 [Reference]	
NH Black	0.77 (0.64-0.93)	.006
Hispanic	1.10 (0.91-1.33)	.34
Other[d]	0.99 (0.80-1.23)	.95
Unknown/declined/missing	0.94 (0.69-1.28)	.69
Asian[e]	1.15 (0.93-1.43)	.21
South Asian	1.06 (0.82-1.37)	.68
Chinese	1.44 (1.04-2.01)	.03
Other Asian	1.08 (0.76-1.54)	.66
Health insurance payer		
Commercial	1 [Reference]	
Emergency Medicaid	2.86 (2.30-3.54)	<.001
Medicaid	1.03 (0.86-1.24)	.76
Medicare	1.16 (0.97-1.38)	.11
Self-pay	0.34 (0.26-0.45)	<.001
Other	0.86 (0.47-1.58)	.62
History with NYC Health + Hospitals		
Outpatient	1 [Reference]	
New patient	2.03 (1.79-2.30)	<.001
Acute only	1.36 (1.16-1.60)	<.001

Abbreviations: NH, non-Hispanic; NYC, New York City.
[a]All data are from NYC Health + Hospitals' electronic health record database.
[b]Only patients with a recorded body mass index value were included.
[c]Multivariable logistic regression analyses were used to assess whether racial and ethnic disparities in mortality persisted after controlling for other demographic characteristics and comorbidities known to be associated with adverse outcomes of COVID-19, with $P < .05$ considered significant.
[d]Includes none of the aforementioned racial and ethnic groups or a combination thereof.
[e]Results for the overall Asian group are from a model that aggregated all Asian ethnic subgroups into a single Asian race category; results for Asian ethnic subgroups are from a model run with Asian race disaggregated into the 3 specified ethnic subgroups.

lack of engagement with health care and concerns about presenting for care as a result of the public charge rule. We found that half of Chinese patients were new to NYC Health + Hospitals, which may have reflected their reluctance to seek care and contribute to their high mortality rate.[38,39]

Our findings illuminate the heretofore hidden burden of COVID-19 among Asian American people. Community leaders and experts in Asian American health in New York City and the United States have voiced concerns about the burden of COVID-19 among Asian American people since the start of the pandemic in New York City, but data have been lacking, impeding an appropriate public health reponse.[7,8,16] Our findings provide critical information that can help inform public health initiatives and policies to address the disproportionate burden of COVID-19 among communities of color, including Asian American people. Policies and strategies that improve access to testing, isolation, early care, and vaccination may help reduce disparities and mitigate the spread of COVID-19 among communities that have been hardest hit and will likely continue to be at high risk of exposure because of their employment and housing, as well as at increased risk of hospitalization and

death because of their immigration status. More broadly, these findings underscore the need for further investigation into the health and social factors of Asian American communities that have had a disproportionate burden of COVID-19 and illuminate the need for improved data collection and disaggregation among Asian American people to advance health equity.[48]

Limitations

This study had several limitations. We included patients from a single health system; as such, the results are not representative of all of New York City. However, NYC Health + Hospitals is the largest public hospital system in the nation, serving more than 1 million patients each year at 70 facilities, including 11 hospitals. NYC Health + Hospitals serves a highly diverse population, including thousands of low-income Asian American people, who are typically underrepresented in national datasets. As such, our findings may be generalized to other areas with similar Asian American populations that may be smaller or understudied.[18] Nearly half of patients tested were new to NYC Health + Hospitals; as

such, a clinical history was not available for them. However, most new patients who were hospitalized had EHR data on BMI and diagnoses; as such, key clinical predictors of mortality were available for nearly all hospitalized patients.

We did not analyze outcomes for patients categorized as Asian solely based on race entered in the EHR, as this group was nearly half the size of the group identified through surname matching. We used surname lists that were validated in other databases and had demonstrated accuracy to discern Chinese and Asian Indian names to stand in for the gold standard of self-identified race and ethnicity.[19,49] However, such algorithms do have limitations, as some overlap may occur between Chinese and South Asian names and names in other Asian ethnic subgroups (eg, Korean, Middle Eastern). In addition, because of the large overlap between Filipinx and Hispanic surnames and the small Filipinx patient population at NYC Health + Hospitals, we did not categorize any surnames as Filipinx.

Emerging research and local and national data on the burden of COVID-19 among Asian American people support similar observations among Chinese and South Asian groups in urban areas and the substantial impact of COVID-19 on the Filipinx community.[50] As such, our findings must be taken in the context of the growing body of evidence pertaining to COVID-19 among Asian American ethnic subgroups.

We did not adjust our reporting of test results and hospitalization by race and ethnicity for age; as such, the rates reported here should be interpreted with caution, especially for racial and ethnic groups with a high proportion of older patients. We included data only on in-hospital mortality; including mortality for patients who died after discharge from the hospital would have required matching to city-wide death records and was outside the scope of this analysis. We did not adjust BMI categories for Asian ethnic groups to align with World Health Organization recommendations, which categorize people of Asian race as overweight and obese at lower BMI values than the overall population. Despite the American Diabetes Association's recommendation to incorporate adjusted Asian BMI categories into clinical practice, this recommendation is not widely implemented.[51] As such, we conducted our analysis using BMI categories consistent with current clinical practice. The prevalence of overweight and obesity among Asian patients may be underestimated in our study, and the differences observed in the adjusted estimates of mortality rates may be higher than reported.[10]

Conclusion

In New York City, differences exist in COVID-19 outcomes among Asian ethnic subgroups, but these outcomes have been masked by the reporting of data on a single, aggregate Asian racial group. We found that South Asian and Chinese American people experience adverse COVID-19 outcomes at high rates that are similar to rates observed among Black

and Hispanic people. Our findings confirm and validate community observations and concerns of a disproportionate burden of COVID-19 among South Asian and Chinese American people. More importantly, our findings underscore the critical need for disaggregating Asian ethnic groups in data collection and reporting to appropriately allocate resources to the hardest-hit communities and to implement public health policies to mitigate risk factors and improve health equity.

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