Racial/Ethnic and Income Disparities in the Prevalence of Comorbidities that Are Associated With Risk for Severe COVID-19 Among Adults Receiving HIV Care, United States, 2014–2019

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Background: Health inequities among people with HIV may be compounded by disparities in the prevalence of comorbidities associated with an increased risk of severe illness from COVID-19.

Setting: Complex sample survey designed to produce nationally representative estimates of behavioral and clinical characteristics of adults with diagnosed HIV in the United States.

Methods: We estimated the prevalence of having ≥1 diagnosed comorbidity associated with severe illness from COVID-19 and prevalence differences (PDs) by race/ethnicity, income level, and type of health insurance. We considered PDs ≥5 percentage points to be meaningful from a public health perspective.

Results: An estimated 37.9% [95% confidence interval (CI): 36.6 to 39.2] of adults receiving HIV care had ≥1 diagnosed comorbidity associated with severe illness from COVID-19. Compared with non-Hispanic Whites, non-Hispanic Blacks or African Americans were more likely [adjusted PD, 7.8 percentage points (95% CI: 5.7 to 10.0)] and non-Hispanic Asians were less likely [adjusted PD, −13.7 percentage points (95% CI: −22.3 to −5.0)] to have ≥1 diagnosed comorbidity after adjusting for age differences. There were no meaningful differences between non-Hispanic Whites and adults in other racial/ethnic groups. Those with low income were more likely to have ≥1 diagnosed comorbidity [PD, 7.3 percentage points (95% CI: 5.1 to 9.4)].

Conclusions: Among adults receiving HIV care, non-Hispanic Blacks and those with low income were more likely to have ≥1 diagnosed comorbidity associated with severe COVID-19. Building health equity among people with HIV during the COVID-19 pandemic may require reducing the impact of comorbidities in heavily affected communities.

Key Words: HIV, COVID-19, comorbidities, health disparities, medical monitoring project

BACKGROUND

Contrary to the early prediction that COVID-19 would be "the great equalizer,"[1] the disease burden in the United States falls disproportionately on non-Hispanic Blacks or African Americans (Blacks), Hispanics or Latinos of any race (Hispanics), people with low income, and those with certain chronic illnesses.

Relative to their proportion of the US population, Blacks and Hispanics have higher COVID-19 attack rates and hospitalization rates, and Blacks have higher death rates than non-Hispanic Whites (Whites).[2–9] Blacks constitute 13% of the US population but accounted for 16% of COVID-19 cases and 20% of COVID-19 deaths, as of November 15, 2020.[9] Hispanics, at 18% of the population, accounted for 26% of cases and 16% of deaths nationwide. Among those with diagnosed COVID-19, Blacks and people with low income are more likely to have severe illness and die.[10–13] Among people with HIV, those who are Black or Hispanic, or have low income, are also disproportionately affected by COVID-19.[14,15]

In addition to these sociodemographic risk factors, several chronic health conditions increase the risk of COVID-19 requiring hospitalization, eg, obesity, chronic kidney disease (CKD), type 2 diabetes, chronic obstructive pulmonary disease (COPD), immunocompromised state from solid organ transplantation, heart disease, and sickle cell disease.[13,16] Hospitalizations are 6 times higher and deaths 12 times higher for people with underlying illnesses.[7]

Although the Centers for Disease Control and Prevention (CDC) lists an immunocompromised state due to HIV as a condition that might increase the risk for severe illness

from COVID-19,[16] the available literature in North America and Europe suggests that HIV, in itself, does not increase the risk of SARS-CoV-2 infection or severe illness.[17–22] However, several studies have found that most people with diagnosed HIV and COVID-19 have other comorbidities,[14,15,17,20,23] suggesting these conditions, rather than HIV, may be the driver of severe illness in this population.

With HIV, as with COVID-19, Blacks, Hispanics, and people with low income bear a disproportionate burden of disease in the United States.[24] Compared with Whites, the prevalence of HIV in 2018 was 7.2 times higher among Blacks and 3.0 times higher among Hispanics.[25] Among those with recent HIV infection, 42% were Black and 28% Hispanic. Blacks and Hispanics have poorer outcomes than Whites at all stages of the HIV care continuum, including linkage to HIV care, retention in care, and viral suppression.[26] HIV is also a disease of poverty. Among adults with diagnosed HIV, 43% had a household income below the poverty threshold and one in 5 went without food during the past year because of lack of money.[27]

The burden of poor health outcomes from HIV in heavily affected communities may be compounded by similar patterns in the distribution of COVID-19 and by disparities in the prevalence of comorbidities associated with an increased risk for severe illness from COVID-19 among people with HIV.[28] To examine the prevalence of these comorbidities among people with HIV, we analyzed HIV surveillance data on adults receiving HIV care to determine the percentage with ≥1 diagnosed comorbidity and assessed differences by race/ethnicity, income level, and health insurance type.

METHODS

Design and Data Collection

The Medical Monitoring Project (MMP) is an annual cross-sectional survey designed to produce nationally representative estimates of the behavioral and clinical characteristics of adults with diagnosed HIV in the United States. This analysis presents estimates of adults receiving HIV care drawn from this sample. MMP data collection constitutes routine public health surveillance and was thus determined by the CDC to be nonresearch. This activity was conducted consistent with the applicable federal law and CDC policy.[29] When required, participating states or territories obtained local institutional review board approval to collect data. All participants provided informed consent. MMP uses 2-stage sampling in which, during the first stage, 16 states and one territory, including 6 separately funded metropolitan areas within selected states, were sampled from all states, the District of Columbia, and Puerto Rico. During the second stage, simple random samples of people with diagnosed HIV aged ≥18 years were drawn annually for each participating area from the National HIV Surveillance System, a census of people with diagnosed HIV in the United States. People sampled during the 2016–2018 data collection cycles were recruited for a phone or face-to-face interview and medical record abstraction at their usual place of HIV medical care. Data were collected beginning in June of each cycle until the

following May. Medical record data included selected laboratory test results and all diagnoses recorded in the problem list or assessment section of medical encounters during a 2-year, retrospective observation period ending on the interview date. For the 2016–2018 data collection cycles, this period spanned June 2014–May 2019.

All sampled areas and separately funded jurisdictions within states participated in the MMP, including California (including Los Angeles County and San Francisco), Delaware, Florida, Georgia, Illinois (including Chicago), Indiana, MI, Mississippi, New Jersey, New York (including New York City), North Carolina, Oregon, Pennsylvania (including Philadelphia), Puerto Rico, Texas (including Houston), Virginia, and Washington. Annual response rates for adults with diagnosed HIV were 44%–45%. During the 2016–2018 data collection cycles, 12,310 sampled people were interviewed (Fig. 1). Of these, 12,189 reported receiving HIV medical care or had medical record documentation of at least one element of HIV care (eg, an HIV laboratory result or antiretroviral prescription) during the past 24 months. We excluded 627 participants without a medical record abstraction containing at least one diagnosed condition. The analytic data set included 11,562 participants who received HIV medical care in the past 24 months and had diagnosis data abstracted (referred to as "adults receiving HIV care").

Measures

Sociodemographic variables included age, race/ethnicity (non-Hispanic American Indian/Alaska Native, Asian, Black, Native Hawaiian/other Pacific Islander, White, or multiracial, and Hispanic of any race), household income above or below the federal poverty threshold during the past 12 months, and health
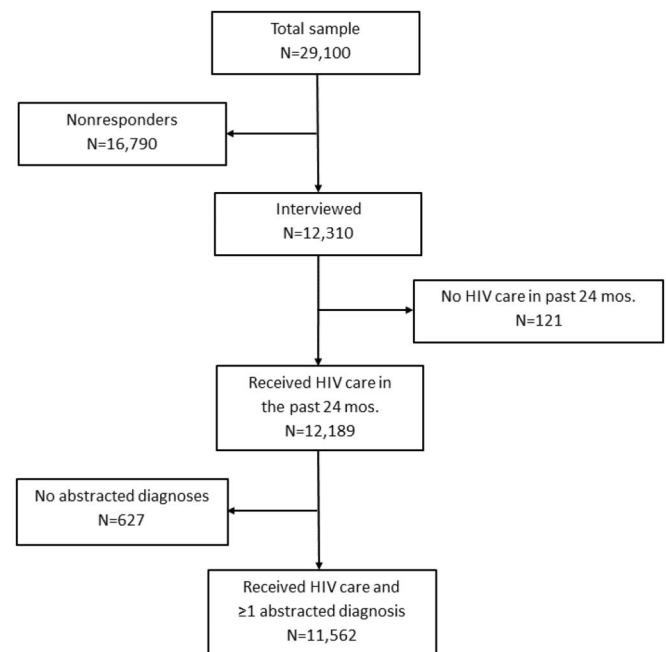

FIGURE 1. Sample disposition for this analysis, the Medical Monitoring Project, 2016–2018 data collection cycles.

insurance or coverage type during the past 12 months [any private insurance, public insurance alone, Ryan White HIV/AIDS Program (RWHAP) assistance alone, unspecified, and no insurance/coverage]. We ascertained whether facilities identified by participants as their usual place of HIV care received any funding from the RWHAP.[30] Clinical variables included diagnosed comorbidities identified by the CDC on July 15, 2020, as associated with an increased risk of severe illness from COVID-19, defined as requiring hospitalization (obesity, CKD, diabetes, COPD, immunocompromised from solid organ transplantation, heart disease, and sickle cell disease)[16] as well as diagnosed AIDS-defining illnesses.[31] We ascertained obesity from recorded diagnoses of obesity, without consideration of body mass index. Because medical records often do not differentiate type 1 and type 2 diabetes,[32] we measured diagnosed diabetes, irrespective of type. Diagnosed heart disease included atherosclerotic heart disease, congestive heart failure, cardiomyopathy, pulmonary hypertension or cor pulmonale, and arrhythmia. Other clinical variables included CD4$^+$ T-lymphocyte cell count (CD4 count) and HIV RNA level.

Outcomes

The primary outcome was having ≥1 diagnosed comorbidity associated with an increased risk for severe illness from COVID-19 recorded in the medical record during the 24 months before being interviewed. Because the risk increases with age[33] and possibly with immunocompromised state secondary to HIV, secondary outcomes included having ≥1 diagnosed comorbidity along with combinations of older age (≥50 or ≥65 years) and poorly controlled HIV, defined as lowest CD4 count <200 cells/μL, any HIV RNA ≥200 copies/mL, or diagnosis of an AIDS-defining illness during the past 24 months.

Statistical Analysis

Data were weighted based on known probabilities of selection at the state or territory and person levels, adjusted for nonresponse, and poststratified to known population totals by age, race/ethnicity, and sex from the National HIV Surveillance System. This design allows inference to all adults with diagnosed HIV in the United States.[27]

We estimated the prevalence, with 95% confidence intervals (CIs), of having ≥1 diagnosed comorbidity associated with an increased risk for severe illness from COVID-19 by race/ethnicity, income, type of health insurance, and RWHAP facility funding. We used logistic regression with predicted marginals to estimate prevalence differences (PDs), with corresponding 95% CIs and *t* test *P* values, for having ≥1 comorbidity by race/ethnicity, income, health insurance type, and RWHAP facility funding.

Because the median age of Whites was higher than for other race/ethnicities and older adults are more likely to have diagnosed comorbidities, we adjusted the association between race/ethnicity and having ≥1 diagnosed comorbidity for age. To assess whether the association between race/ethnicity and having ≥1 diagnosed comorbidity differed by income level, we added poverty as an interaction term to the race/ethnicity model. For income, health insurance type, and RWHAP-funding status, we

reported unadjusted measures of association. We considered a PD ≥5 percentage points to be meaningful from a public health perspective.

RESULTS

The sociodemographic characteristics of people receiving HIV care during June 2014–May 2019 are displayed in Table 1.

TABLE 1. Sociodemographic Characteristics of Adults Receiving HIV Care in the United States, 2014–2019, the Medical Monitoring Project

Characteristic	Sample Size	Weighted Col % (95% CI)
Total	11,562	
Race/ethnicity		
American Indian/Alaska Native, non-Hispanic	55	0.6 (0.4 to 0.8)
Asian, non-Hispanic	114	1.0 (0.7 to 1.2)
Black or African American, non-Hispanic	4877	40.8 (35.3 to 46.2)
Hispanic or Latino of any race	2540	22.7 (18.0 to 27.4)
Native Hawaiian/Other Pacific Islander, non-Hispanic	25	0.2 (0.1 to 0.2)
White, non-Hispanic	3318	29.2 (25.7 to 32.7)
Multiracial, non-Hispanic	630	5.6 (4.7 to 6.4)
Age		
18–29 yrs	945	8.4 (7.7 to 9.2)
30–39 yrs	1840	16.8 (16.0 to 17.6)
40–49 yrs	2648	23.2 (22.2 to 24.1)
≥50 yrs	6129	51.6 (50.4 to 52.8)
Sex		
Male	8412	74.6 (73.1 to 76.1)
Female	2946	23.7 (22.3 to 25.2)
Transgender	195	1.6 (1.4 to 1.9)
Highest education level		
Less than high school	2021	17.2 (16.0 to 18.4)
High school	3040	26.6 (25.4 to 27.8)
Greater than high school	6464	56.2 (54.4 to 58.1)
Income*†		
Above the poverty threshold	5997	57.2 (54.8 to 59.6)
At or below the poverty threshold	4690	42.8 (40.4 to 45.2)
Health insurance*‡		
Any private insurance	3987	35.1 (33.1 to 37.1)
Public insurance alone	6428	54.3 (52.0 to 56.6)
RWHAP assistance alone	919	9.0 (7.4 to 10.6)
Unspecified insurance	49	0.4 (0.3 to 0.6)
No insurance or coverage	102	1.1 (0.8 to 1.4)
RWHAP-funded facility§		
Yes	7997	69.1 (63.7 to 74.6)
No	3462	30.9 (25.4 to 36.3)

*During the past 12 months.
†Poverty guidelines as defined by the Department of Health and Human Services: https://aspe.hhs.gov/frequently-askedquestions-related-poverty-guidelines-and-poverty
‡Participants could select more than 1 response for health insurance or coverage for medications (including antiretroviral medications).
§Whether the usual place of care where participants received HIV care during the past 24 months received any funding from the RWHAP (parts A, B, C, D, or F).

Clinical characteristics are displayed in Table 2. An estimated 12.3% (95% CI: 11.4 to 13.1) had diagnosed obesity, 11.7% (95% CI: 10.8 to 12.6) had CKD, 12.6% (95% CI: 11.9 to 13.4) had diabetes, 10.1% (95% CI: 9.4 to 10.8) had COPD, 0.1% (95% CI: 0.1 to 0.2) were immunocompromised from organ transplantation, 9.3% (95% CI: 8.7 to 10.0) had heart disease, and 37.9% (95% CI: 36.6 to 39.2) had ≥1 diagnosed comorbidity associated with an increased risk for severe illness from COVID-19 (Table 2). An estimated 51.6% (95% CI: 50.4 to 52.8) were aged ≥50 years, 8.3% (95% CI: 7.5 to 9.0) were aged ≥65 years, and 35.8% (95% CI: 34.4 to 37.2) had poorly controlled HIV. Prevalence estimates of combinations of these characteristics are presented in Table 2. PDs for having ≥1 diagnosed comorbidity are displayed in Table 3 and Figure 2. Compared with White adults, Black adults were more likely

[adjusted PD (APD), 7.8 percentage points (95% CI: 5.7 to 10.0)] and Asian adults were less likely [APD, −13.7 percentage points (95% CI, −22.3 to −5.0)] to have ≥1 diagnosed comorbidity, after adjusting for age differences (for the median age of categories within each variable see Table 1, Supplemental Digital Content, http://links.lww.com/QAI/B588). There were no meaningful differences in the prevalence of having ≥1 diagnosed comorbidity between White adults and adults of any other race/ethnicity. APDs for race/ethnicity were not substantially different among those with incomes above vs. at or below the poverty threshold (see Table 2, Supplemental Digital Content, http://links.lww.com/QAI/B588). The likelihood of having ≥1 diagnosed comorbidity was higher among those with incomes at or below vs. above the poverty threshold [PD, 7.3 percentage points (95% CI: 5.1 to 9.4)]. Compared with people with any private insurance, those with public insurance alone were more likely [PD, 10.2 percentage points (95% CI: 8.3 to 12.2)] and those with RWHAP assistance alone were less likely [PD, −8.4 percentage points (95% CI, −11.5 to −5.2)] to have ≥1 diagnosed comorbidity. The likelihood of having ≥1 diagnosed comorbidity did not differ among adults receiving HIV care at RWHAP-funded vs. non–RWHAP-funded facilities.

DISCUSSION

More than one-third of adults receiving HIV care in the United States (37.9%) had ≥1 diagnosed comorbidity associated with an increased risk for severe illness from COVID-19. Those with low income or public insurance alone and Blacks (adjusting for age) with income either above or below the poverty threshold were more likely to have ≥1 diagnosed comorbidity.

To the best of our knowledge, these are the first population-based data exploring these issues among people with HIV. In the general adult population, based on data from the Behavioral Risk Factor Surveillance System, a slightly higher percent (40.7%) of adults reported having ≥1 of these comorbidities.[34] However, methodologic differences between the 2 surveys (self-reported data for the Behavioral Risk Factor Surveillance System and medical record review for the MMP) prevent direct comparison of the prevalence of comorbidities in the general population and people receiving HIV care.

Our finding that Blacks (but not Hispanics) receiving HIV care were more likely than Whites to have ≥1 diagnosed comorbidity is consistent with an analysis of surveillance data exploring racial/ethnic disparities in progression of COVID-19 from mild illness to hospitalization and death.[35] Holtgrave constructed a continuum of COVID-19 outcomes, modeled on the HIV care continuum,[36] and found that although infection rates were higher for Blacks and Hispanics than Whites, hospitalization rates (given infection) were higher for Blacks but not Hispanics. Together, our findings suggest that different interventions may be needed to build COVID-19 health equity in Black and Hispanic communities. Reducing the burden of severe illness from COVID-19 in both communities may require addressing factors related to exposure, eg, housing

TABLE 2. Clinical Characteristics of Adults Receiving HIV Care in the United States, 2014–2019, the Medical Monitoring Project

Risk Factor for Severe COVID-19	Sample Size	Weighted Col % (95% CI)
Total	11,562	
Comorbidities in the past 24 months*		
Obesity	1476	12.3 (11.4 to 13.1)
Chronic kidney disease	1390	11.7 (10.8 to 12.6)
Diabetes	1503	12.6 (11.9 to 13.4)
Chronic obstructive pulmonary disease	1168	10.1 (9.4 to 10.8)
Immunocompromised from organ transplantation	21	0.1 (0.1 to 0.2)
Heart disease	1114	9.3 (8.7 to 10.0)
Sickle cell disease	11	0.1 (0.0 to 0.1)†
Any comorbidity in the past 24 months*	4473	37.9 (36.6 to 39.2)
Age		
≥50 yrs	6129	51.6 (50.4 to 52.8)
≥65 yrs	993	8.3 (7.5 to 9.0)
HIV control during the past 24 mo		
Lowest CD4 count <200 cells/μL	1539	13.2 (12.2 to 14.2)
Any HIV RNA ≥200 copies/mL	3070	27.6 (26.1 to 29.2)
Any AIDS-defining illness‡	727	5.9 (5.5 to 6.4)
Poorly controlled HIV (any CD4 count <200 cells/μL, any HIV RNA ≥200 copies/mL, or any AIDS-defining illness)	3990	35.8 (34.4 to 37.2)
Combinations of any comorbidity, age, and poorly controlled HIV		
Any comorbidity or age ≥50 yrs	7614	64.5 (63.3 to 65.7)
Any comorbidity or age ≥65 yrs	4868	41.2 (40.0 to 42.4)
Any comorbidity or poorly controlled HIV	6898	61.3 (59.9 to 62.7)
Any comorbidity, age ≥50 years, or poorly controlled HIV	9125	79.7 (78.7 to 80.7)
Any comorbidity, age ≥65 years, or poorly controlled HIV	7203	63.9 (62.7 to 65.1)

*Defined as documented diagnosis in the medical record at the usual place of HIV care.

†Estimate is unstable. Coefficient of variation is ≥ 0.3.

‡AIDS-defining opportunistic illness defined by CDC during the past 24 months: https://www.cdc.gov/mmwr/preview/mmwrhtml/rr5710a1.htm

CD4, CD4+ T-lymphocyte cell.

TABLE 3. Weighted Prevalence and Prevalence Differences of Having ≥1 Diagnosed Comorbidities Associated With Severe COVID-19 Among People Receiving HIV Care in the United States, 2014–2019, the Medical Monitoring Project

Sociodemographic Characteristic	Sample Size	Weighted Row % (95% CI)	Prevalence Difference % (95% CI)	P	Adjusted Prevalence difference* % (95% CI)	P
Total	4473	37.9 (36.6 to 39.2)				
Race/ethnicity						
American Indian/Alaska Native, non-Hispanic	22	32.0 (19.5 to 44.4)†	−5.7 (−18.8 to 7.4)†	0.390	−4.2 (−16.5 to 8.2)†	0.507
Asian, non-Hispanic	25	17.7 (10.0 to 25.3)	−20.1 (−27.8 to −12.3)	<0.001	−13.7 (−22.3 to −5.0)	0.002
Black or African American, non-Hispanic	2063	41.3 (39.5 to 43.1)	3.6 (1.2 to 6.0)	0.004	7.8 (5.7 to 10.0)	<0.001
Hispanic or Latino of any race	843	32.9 (31.0 to 34.8)	−4.8 (−7.6 to −2.0)	0.001	−0.1 (−2.7 to 2.5)	0.952
Native Hawaiian/Other Pacific Islander, non-Hispanic	10	45.0 (16.7 to 73.4)†	7.3 (−21.2 to 35.8)†	0.615	18.5 (−4.1 to 41.0)†	0.108
White, non-Hispanic	1270	37.7 (35.7 to 39.8)	Reference		Reference	
Multiracial, non-Hispanic	239	37.6 (33.1 to 42.1)	−0.1 (−5.2 to 5.0)	0.964	3.8 (−1.1 to 8.8)	0.132
Income‡§						
Above poverty threshold	2156	35.1 (33.4 to 36.8)	Reference			
At or below poverty threshold	1998	42.4 (40.6 to 44.1)	7.3 (5.1 to 9.4)	<0.001		
Health insurance‖						
Any private insurance	1354	33.1 (31.3 to 35.0)	Reference			
Public insurance alone	2809	43.4 (41.5 to 45.3)	10.2 (8.3 to 12.2)	<0.001		
RWHAP assistance alone	237	24.8 (21.9 to 27.6)	−8.4 (−11.5 to −5.2)	<0.001		
Unspecified insurance	21	47.9 (29.2 to 66.6)	14.8 (−3.5 to 33.1)	0.114		
No insurance or coverage	28	27.1 (18.1 to 36.2)	−6.0 (−15.4 to 3.4)	0.210		
RWHAP-funded facility¶						
Yes	3090	37.7 (35.9 to 39.5)	−0.4 (−2.9 to 2.2)	0.789		
No	1346	38.1 (36.3 to 39.9)	Reference			

*Model adjusted for age (continuous variable).
†Estimate is unstable. Absolute confidence interval is ≥30.
‡During the past 12 months.
§Poverty guidelines as defined by the Department of Health and Human Services: https://aspe.hhs.gov/frequently-askedquestions-related-poverty-guidelines-and-poverty
‖Participants could select more than 1 response for health insurance or coverage for medications (including antiretroviral medications).
¶Any RWHAP funding (parts A, B, C, D, or F).

density, food and housing insecurity, dependence on public transportation, and reliance on front-line jobs that makes physical distancing difficult. To reduce burden in Black communities, structural changes to mitigate the higher prevalence of underlying health conditions may also be needed, including increased access to medical care and supportive services, healthy food options, and recreational spaces.[37,38] Findings from a study of 6916 patients with COVID-19 at the Kaiser Permanente of Southern California support this assumption.[39] In contrast to most population-based studies, the risk of death from COVID-19, once diagnosed, was comparable among Black and White adults, suggesting that equalized access to health care within an integrated health care system may mitigate the high COVID-19 case fatality rate among Blacks.

Although many of the structural barriers that underlie the higher prevalence of comorbidities among Blacks receiving HIV care are linked to poverty, we found a higher prevalence of comorbidities among Blacks with incomes above and below the poverty threshold, suggesting that factors in addition to poverty (eg, segregation and discrimination) may limit access to health services, health messaging, and healthy lifestyle options in Black communities.

The intersection of poverty with HIV and COVID-19 is complex. People with low income are at increased risk for acquiring and having poor outcomes from both illnesses, for many of the reasons discussed above. In turn, COVID-19 has caused unemployment and loss of employer-based health insurance for millions of Americans,[40] potentially weakened the health safety net,[41] and challenged recent efforts to end the HIV epidemic.[42] Interrupting the mutually reinforcing cycle of HIV, COVID-19, and poverty may require sustained economic support to prevent worsening of income and health disparities.

About half of US adults with HIV have Medicaid and/or Medicare as their only health insurance,[43] and this proportion may increase as people who lose employer-based insurance during the pandemic become newly eligible for Medicaid.[44] We found that adults receiving HIV care who had public insurance alone were more likely than those with private insurance to have ≥1 diagnosed comorbidity (43.4% vs. 33.1%), suggesting Medicare and Medicaid programs may bear increased responsibility as payers of care for adults with HIV at increased risk of severe illness from COVID-19. Conversely, we found that those whose only health coverage was RWHAP assistance were less likely than those with
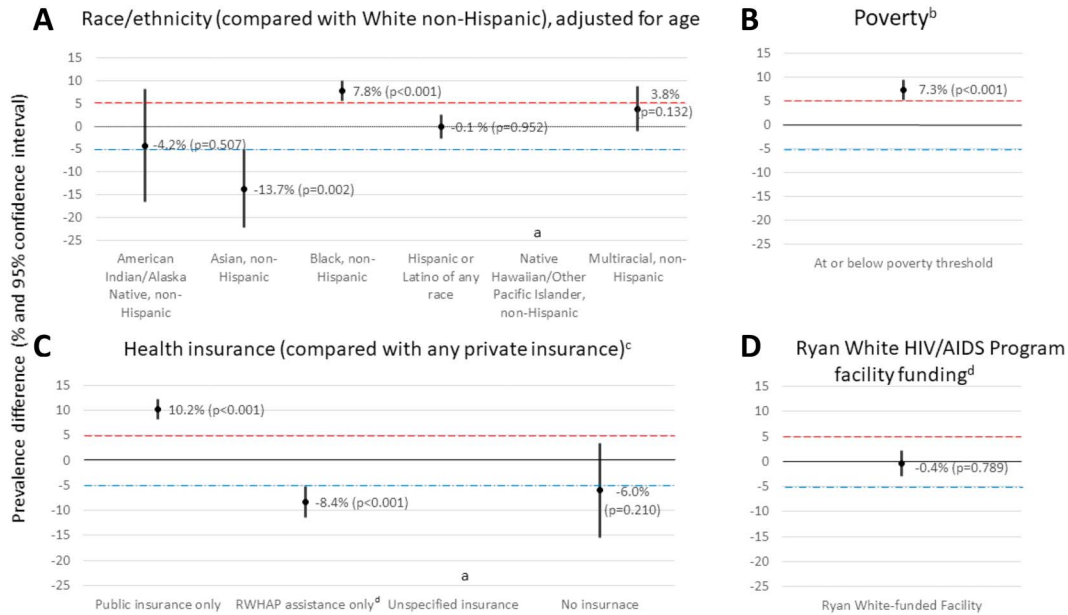
FIGURE 2. Prevalence difference of having ≥1 diagnosed comorbidities associated with severe COVID-19 among people receiving HIV care in the United States, 2014–2019, the Medical Monitoring Project, N = 4473. A, Race/ethnicity, adjusted for age, reference group is White, non-Hispanic adults. B, Income at or below the poverty threshold, unadjusted, reference is income above the poverty threshold. C, Type of health insurance, unadjusted, reference is any private insurance. D, Ryan White HIV/AIDS Program funding of the usual place of care (health care facility), unadjusted, reference is no funding. Dashed red line is the meaningful threshold of increased prevalence. Dashed blue line is the meaningful threshold of decreased prevalence. Solid black line is the null threshold. [a]Unstable estimate (coefficient of variation is ≥0.3, absolute confidence interval is ≥30, and/or relative confidence interval is >130%). [b]Poverty guidelines as defined by the Department of Health and Human Services: https://aspe. hhs.gov/frequently-askedquestions-related-poverty-guidelines- and-poverty. [c]Participants could select more than 1 response for health insurance or coverage for medications. [d]Any RWHAP funding (parts A, B, C, D, or F). full color online

private insurance to have comorbidities, at least in part because they are, on average, younger than others.

Because a large proportion of patients receiving HIV care at Ryan White–funded facilities have social determinants associated with poor health outcomes,[45] we expected a higher percentage of patients at those facilities to have comorbidities. However, there was no difference, again at least in part, because RWHAP-funded facilities serve younger patients. However, any conclusion about the burden of severe illness from COVID-19 among patients receiving HIV care at RWHAP-funded facilities should be tempered by knowledge that Blacks and Hispanics, who comprise three-quarters of HIV patients at these facilities,[45] die from COVID-19 at younger ages than Whites.[8]

LIMITATIONS

For several reasons, our primary outcome likely underestimates the increased risk of severe illness from COVID-19 among adults receiving HIV care. First, to measure comorbidities, we used only diagnosis data instead of supplementing with medical record information that can identify some conditions, even when not diagnosed, eg, laboratory data for CKD and height and weight for obesity. Our estimate of diagnosed obesity (12.3%) is lower than a previous MMP estimate that calculated the prevalence of body mass index ≥30 kg/m^2 using height and weight

documented in the medical record (19% of men and 42% of women were obese).[46] Because some conditions (eg, COPD) can only be identified using diagnosis data, for consistency, we measured all comorbidities in the same way to avoid information bias of the prevalence of comorbidities, relative to each other.

Second, we included comorbidities known to increase the risk of severe illness as of July 15, 2020, and there may have been subsequent additions to the list. We did not include diagnosed conditions that *might* be associated with the risk for severe illness, but for which there is currently insufficient evidence to support inclusion on the CDC list of conditions that *definitely* increase the risk,[16] including poorly controlled HIV, which affects one in 3 adults receiving HIV care.

Third, we did not include older age as a risk factor for severe illness from COVID-19. Because the relationship between age and risk is continuous,[33] we did not include an age cut-off when formulating the primary outcome.

For these reasons, our estimate that 37.9% of adults receiving HIV care had ≥1 diagnosed comorbidity should be considered a minimum estimate of disease burden. Underestimation of risk could have biased our estimates of PDs across race/ethnicities, income levels, and types of health insurance. However, because several of the comorbidities we assessed are more prevalent among Blacks than Whites with HIV,[32,46,47] underestimation of their prevalence would likely have biased differences toward the null.

Strengths of our study included population-based sampling and weighting designed to produce nationally representative estimates of a wide range of sociodemographic and clinical characteristics of adults with diagnosed HIV, of which those receiving HIV care is a subset. The large sample size allows reasonably precise estimates of subgroup characteristics. Although not all sampled persons participated, results were adjusted for nonresponse using the standard methodology.[48,49] Even with suboptimal response rates, there is still value in results obtained from unbiased sampling methods.[50]

CONCLUSIONS

Among adults receiving HIV care, those with low income or public insurance alone and Blacks with income either above or below the poverty threshold were more likely to have ≥1 diagnosed comorbidity associated with severe illness from COVID-19. Building health equity during the co-occurring epidemics of COVID-19 and HIV may require structural changes to mitigate the burden of these underlying health conditions in Black and low-income communities, including increased access to medical care and supportive services, healthy food options, and recreational spaces.

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