Differential Impact of Social Determinants of Health by Sex in HIV for COVID-19 Hospitalizations

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BACKGROUND

Our study investigated sex differences in how individual-level social determinants of health (SDoH) affect COVID-19 related hospitalizations among people with HIV (PWH) and without HIV (PWoH) in the U.S.

METHODS

- We analyzed the National Clinical Cohort Collaborative (N3C) data from January 2020 to November 2023 to assess how SDoH (healthcare access, economic stability, social cohesion) impact COVID-19 hospitalization risk among PWH and PWoH, stratified by sex.
- We conducted hierarchically-nested additive and adjusted mixed-effects logistic regression models stratified by HIV and sex, adjusting for age, race/ethnicity, comorbidities, data source, and mediation by healthcare utilization.

RESULTS

- Among our study population of 280,441 individuals from 24 data partner sites, 11.2% were hospitalized due to COVID-19. This hospitalization rate was higher for males (14%) compared to females (9.5%).
- Overall, females consistently demonstrated higher proportions for issues with SDoH factors; these proportions were even higher among female PWH.

Table 1: Distribution of HIV status, SDoH factors and COVID-19 outcomes by sex

Variable	Male (N=107,804)	Female (N=172,637)	Overall (N= 280,441)
HIV positive status	1495 (1.39)	1796 (1.04)	3291 (1.17)
Age: 18-44 years	25,093 (23.28)	60,668 (35.14)	85,761 (30.58)
45-64 years	49,727 (46.13)	62,010 (35.92)	111,737 (39.84)
> 65 years	32,984 (30.60)	49,959 (28.94)	82,943 (29.57)
CCI Score	1 (0,4)	1 (0,4)	1 (0,4)
Access to healthcare issue	1845 (1.71)	3607 (2.09)	5452 (1.94)
Social cohesion issue	39,201 (36.36)	70,131 (40.62)	109,332 (38.98)
Economic stability issue	9842 (9.13)	18,911 (10.95)	28,753 (10.25)
COVID-19 related hospitalization	15,112 (14.02)	16,398 (9.5)	31,510 (11.23)

Social determinants of health are associated with COVID-19 hospitalizations in both females and males, even after accounting for HIV; females face worse SDoH.

Figure 1: Distribution of responses among PWH to the individual-level SDoH questions

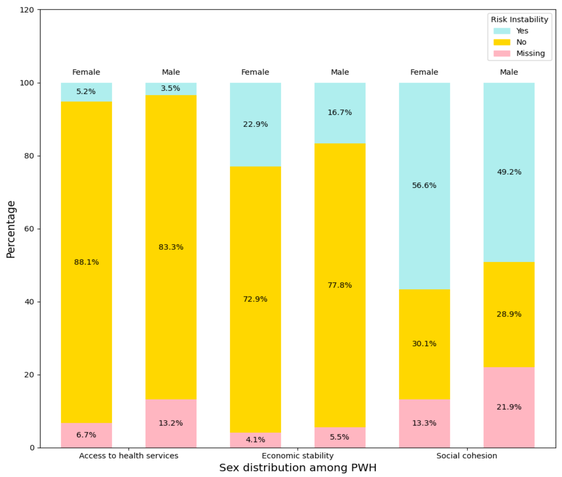
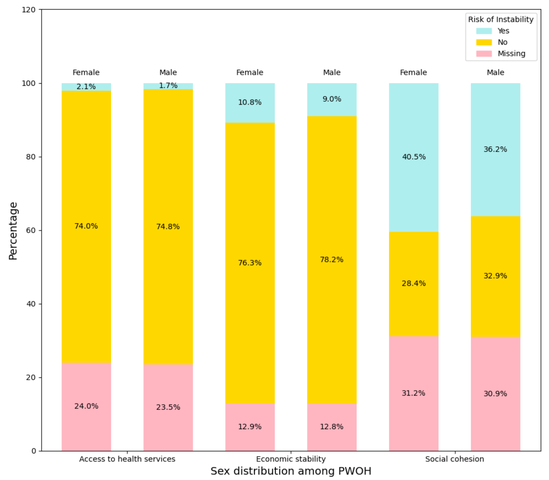


Figure 2: Distribution of responses among PWoH to the individual-level SDoH questions



RESULTS (cont.)

- In our initial additive modeling, all three SDoH domains were significantly associated with hospitalizations, with adjusted odds ratios (aOR) ranging from 1.36 to 1.97.
- Our HIV-stratified analyses indicated economic instability was associated with hospitalization among PWH, while all 3 SDoH domains were associated with hospitalization among PWoH (aOR range 1.36-1.96).
- Lastly, our fully adjusted, sex-stratified analysis indicated social cohesion issues were associated with hospitalization across both sex groups (aOR range 1.18-2.37) as was HIV positive status (aOR range 1.18-1.22).

Table 2: Results of hierarchically nested models for each individual-level SDoH factor and COVID-19- related hospitalization

Category, issue	Model 1: Univariate OR (95%CI)	Model 2: M1 + age, race/ethnicity, CCI , OR (95%CI)	Model 3: M2 + HIV, OR (95%CI)	Model 4: M3 + sex, OR (95%CI)
Access to healthcare issue	1.97 (1.83, 2.11)	1.81 (1.67, 1.96)	1.81 (1.67, 2.02)	1.82 (1.68, 1.97)
Economic stability issue	1.43 (1.38, 1.50)	1.44 (1.37, 1.50)	1.44 (1.37, 1.50)	1.45 (1.38, 1.51)
Social cohesion issue	1.52 (1.47, 1.59)	1.36 (1.31, 1.42)	1.36 (1.31, 1.42)	1.39 (1.33, 1.44)

Table 3: Results of modeling jointly each of the individual-level SDoH factors, HIV status, as predictors of COVID-19-related hospitalization stratified by sex

	Male (N=107,804)		Female (N=172,637)	
	Unadjusted OR[2] (95% CI)	Adjusted OR[3] (95% CI)	Unadjusted OR[2] (95% CI)	Adjusted OR[3] (95% CI)
HIV positive status	0.99 (0.84, 1.17)	**1.18 (1.17, 1.19)**	**1.18 (1.00, 1.40)**	**1.22 (1.22, 1.23)**
Access to healthcare issues	**1.53 (1.36, 1.72)**	0.87 (0.73, 1.03)	**1.78 (1.61, 1.95)**	0.99 (0.82,1.20)
Economic instability	**1.43 (1.35, 1.53)**	**1.75 (1.32, 2.33)**	**1.21 (1.14, 1.28)**	0.99 (0.78, 1.26)
Social cohesion issue	**1.08 (1.03, 1.13)**	**2.37 (2.00, 2.81)**	**1.10 (1.05, 1.14)**	**1.59 (1.39, 1.83)**

CONCLUSIONS

- The interplay of female sex and HIV status shows worse SDoH risk and health outcomes.
- Important of unpack the intricate interplay between SDoH factors, HIV status, and sex in shaping health outcomes.

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The analyses were conducted with data or tools accessed through the NCATS N3C Data Enclave https://covid.cd2h.org