Effect of Social Determinants of Health on Uncontrolled HIV Infection

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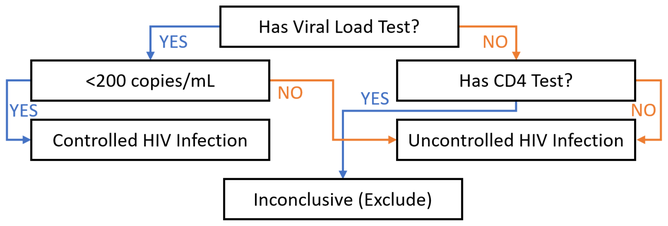
BACKGROUND

In 2013-2014, the San Francisco Department of Public Health (SFDPH) established programs to rapidly link people living with HIV (PLWH) to care and offer antiretroviral therapy (ART) at HIV diagnosis. Such programs reduced the number of PLWH out of care or with detectable HIV viral load (i.e., uncontrolled HIV). Beyond these programs there are social, structural, and environmental factors that contribute to access to HIV care and ART. We investigated the role of social determinants of health (SDH) on uncontrolled HIV among PLWH in San Francisco (SF).

- We hypothesized that socioeconomic marginalization is associated with uncontrolled HIV infection among PLWH.

METHODS

Figure 1. Hierarchical definition of controlled HIV infection



Data from PLWH ages 18 and older in the SFDPH case registry, diagnosed and alive as of 12/31/2019, prescribed ART, and residing in SF during 2017-2019 were analyzed in conjunction with SDH metrics derived from the American Community Survey 2015-2019, linked by census tract. We focused on five census tract-level SDH metrics: percent of residents below the federal poverty level, with less than a high school diploma, or uninsured; median household income; and GINI index, an income inequality metric. We compared uncontrolled HIV (viral load >200 copies/mL or viral load and CD4 test absent) prevalence across quartiles of each metric independently, constructing logistic regression models to estimate prevalence odds ratios (POR) and 95% confidence intervals (CI), with the least marginalized quartile as the referent group for each metric.

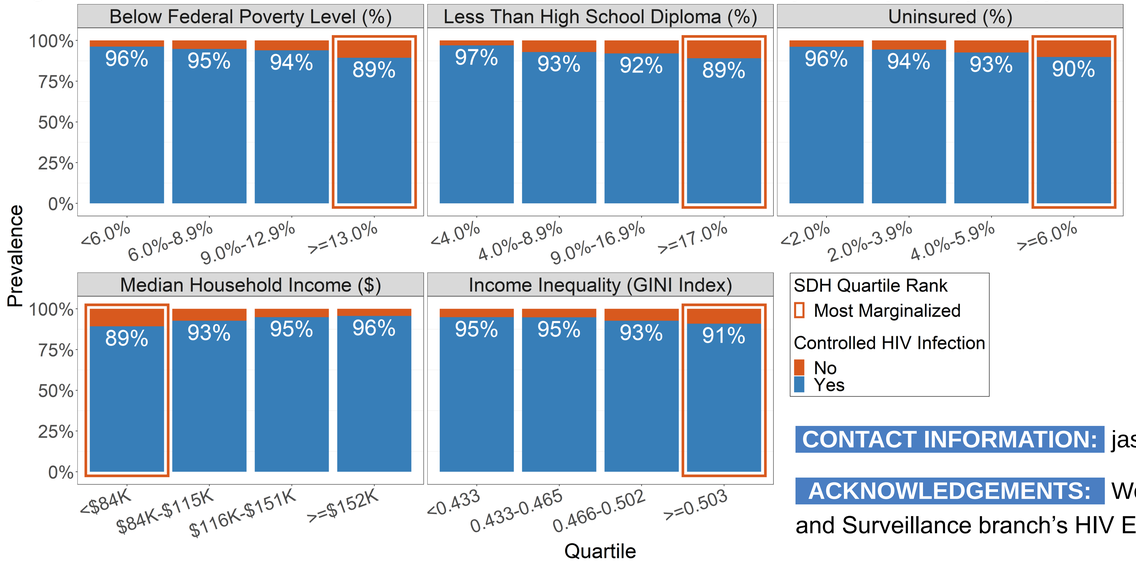
People living with HIV (PLWH) who experience ***socioeconomic marginalization*** may need additional support and ***targeted interventions*** to ***achieve controlled HIV*** infection.

RESULTS

- Controlled HIV prevalence dropped with increasing marginalization across all five SDH metrics.
- The POR for uncontrolled HIV in the most marginalized quartile was significant across all metrics.

The cross-sectional analysis included 7188 PLWH (6696 controlled HIV; 492 uncontrolled HIV). Most were cisgender men (90%), white (54%), 50-59 or 60-69 years old (35% and 26%, respectively), men who have sex with men who do not inject drugs (72%), and USA-born (72%). The unadjusted prevalence of uncontrolled HIV rose with increasingly marginalized quartiles, compared to the least marginalized quartile for each metric (Figure 2). Adjusting for demographics and transmission category, the POR for uncontrolled HIV for PLWH in the most marginalized quartile remained significant across census tract-based metrics for poverty, education, insurance, income, and income inequality (Table 1).

Figure 2. Prevalence of controlled HIV by social determinant of health (SDH) metric quartile (n=7188)



CONCLUSIONS

- Social determinants of health differentially affect the ability of PLWH to control HIV.
- Despite established programs, PLWH experiencing socioeconomic marginalization require targeted support and interventions to achieve health outcome goals.

Our study identified a significant relationship between SDH and controlled HIV infection, finding worse SDH metrics were associated with increases in uncontrolled HIV infection and consequently identifying areas to improve HIV-related care and reduce health disparities among PLWH in SF. By focusing on the health needs of vulnerable subpopulations, coupled with tailored programs and policies, we can create pathways to good health and reduce health inequities.

Table 1. Prevalence odds ratios (POR) for uncontrolled HIV infection by social determinants of health quartiles (N=7188)

	Quartile	Bivariate POR[2]	Adjusted POR[2,3]
Below Federal Poverty Level (%)	<6.0%	--	--
	6.0%-8.9%	1.39 (0.98, 1.95)	1.17 (0.82, 1.66)
	9.0%-12.9%	**1.64 (1.20, 2.24)**	1.31 (0.95, 1.82)
	>=13.0%	**3.03 (2.31, 3.99)**	**1.95 (1.46, 2.61)**
Less Than High School Diploma (%)	<4.0%	--	--
	4.0%-8.9%	**2.44 (1.81, 3.29)**	**1.94 (1.45, 2.60)**
	9.0%-16.9%	**2.76 (2.02, 3.77)**	**2.02 (1.49, 2.74)**
	>=17.0%	**3.94 (2.92, 5.30)**	**2.37 (1.76, 3.20)**
Uninsured (%)	<2.0%	--	--
	2.0%-3.9%	**1.45 (1.04, 2.03)**	1.26 (0.90, 1.76)
	4.0%-5.9%	**1.97 (1.40, 2.78)**	**1.51 (1.07, 2.14)**
	>=6.0%	**2.79 (2.01, 3.88)**	**1.80 (1.29, 2.51)**
Median Household Income ($)	<$84K	**2.65 (2.06, 3.41)**	**1.79 (1.38, 2.32)**
	$84K-$115K	**1.74 (1.30, 2.33)**	**1.46 (1.09, 1.95)**
	$116K-$151K	1.18 (0.87, 1.59)	1.17 (0.87, 1.56)
	>=$152K	--	--
Income Inequality (GINI Index)	<0.433	--	--
	0.433-0.465	1.01 (0.74, 1.39)	1.09 (0.80, 1.48)
	0.466-0.502	**1.47 (1.10, 1.95)**	1.25 (0.94, 1.67)
	>=0.503	**1.85 (1.39, 2.45)**	**1.48 (1.11, 1.96)**

[1]Quartiles boxed in orange indicate the "worst" exposure category
[2]PORs significant at alpha=0.05 are in bold
[3]Multivariate models adjust for gender, race/ethnicity, age group, transmission risk category, birth country, & housing status

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