Neighborhood Vulnerability Predicts Non-Communicable Disease Risk Among People With HIV

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INTRODUCTION

- Social determinants of health (SDoH) underly persistent disparities in non-communicable disease (NCD) burden across communities[1].
- Understanding SDoH and their relationship to NCD burden is important for identifying individuals at greatest risk and improving outcomes in PWH.
- **We assessed associations between the CDC's Social Vulnerability Index (SVI) and NCD burden among adult PWH in care at the Vanderbilt HIV Clinic (Jan 2009-Dec 2019)**

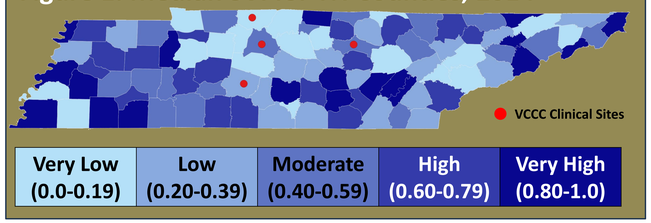
METHODS

- The **CDC's Social Vulnerability Index (SVI) is a census-tract-level measure of deprivation and vulnerability, grouped into a total score and four subthemes[2]:**

Overall Vulnerability	
Socioeconomic Status	• *Below poverty* • *Unemployed* • *Income* • *No HS diploma*
Household composition & disability	• *≥65 years of age* • *≤17 years of age* • *Civilian with disability* • *Single-parent household*
Minority Status & Language	• *Minority* • *Speaks English less than well*
Housing & Transportation	• *Multi-unit structures* • *Mobile homes* • *Crowding* • *No vehicles*

- **Higher SVI indicates greater neighborhood vulnerability**

Figure 1. Median SVI for TN Counties, 2014[3]



- SVI was assigned using residence at enrollment or first visit after Jan 2009
- **Outcomes: Prevalent and incident NCDs including hyperlipidemia (HLD), hypertension (HTN), diabetes (DM), coronary artery disease (CAD), chronic kidney disease (CKD), chronic liver disease, and non-AIDS cancers (NADC)**
- **Analyses:** Multivariable proportional odds logistic and Poisson regression models assessed relationships between number of prevalent and incident NCDs with SVI at baseline (total and subthemes). Continuous covariates (including SVI) were examined using restricted cubic splines.

RESULTS

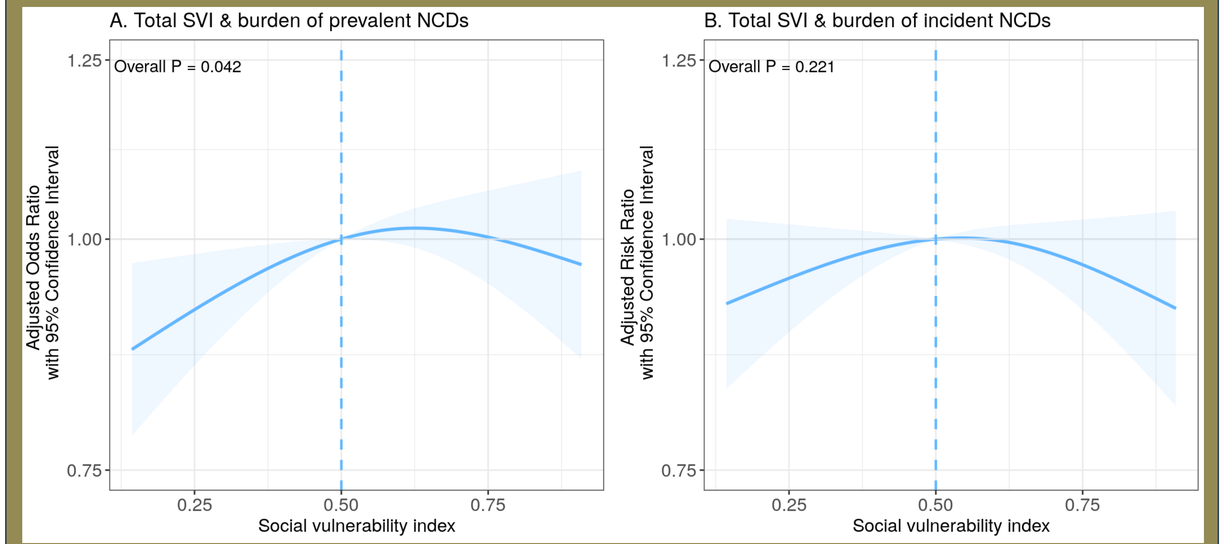
Population:

- Among 4440 PWH, median age was 41 years, 59% were men who have sex with men, 21% were cis-gender women, 41% were non-Hispanic Black, and 50% were non-Hispanic white.
- Median total SVI was 0.6 (IQR: 0.3-0.8) and median follow-up was 3.8 years (IQR: 1.6-7.4).

Outcomes:

- At baseline, 44% of PWH had ≥1 NCD and 19% had ≥2 prevalent NCDs (specific NCDs shown in **Table 1**)
- Of 2442 PWH without prevalent NCDs, 32% developed NCDs during follow-up. Of 1916 patients with prevalent NCDs, 41% developed additional NCDs.

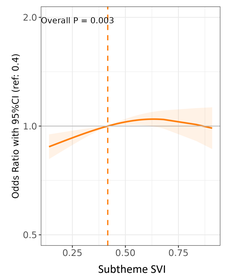
Figure 2. Neighborhood vulnerability (SVI) is associated with (A) prevalent but not (B) incident NCD burden among PWH



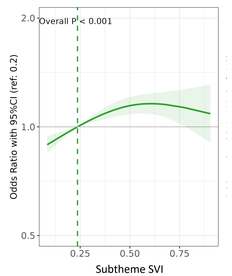
Models accounted for clustering by SVI and adjusted for age, substance use, gender/HIV acquisition risk factor, race/ethnicity, prevalent NCDs, antiretroviral therapy, depression, HIV RNA, hepatitis C, year, CD4 count, time since HIV diagnosis, and body mass index. Continuous variables including SVI were modeled using restricted cubic splines with 3 knots.

- In separate, adjusted analyses, the **SVI subthemes of socioeconomic status and household composition & disability were also associated with prevalent NCD burden*:**

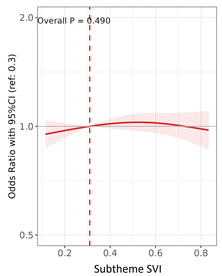
Socioeconomic status*



Household composition & disability*



Minority status & language



Housing type & transportation

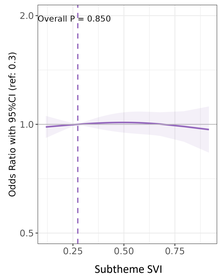


Table 1. Prevalent & Incident NCDs

NCDs	Prevalent[a] n (%)	Incident[b] n (%)
CAD	252 (13)	223 (14)
CKD	163 (8)	466 (3)
DM	277 (14)	317 (20)
Liver	249 (13)	222 (14)
HLD	1222 (64)	741 (47)
HTN	1054 (55)	436 (28)
NADC	111 (6)	146 (9)

[a] n refers to number of PWH and % the proportion of total (n=1923) PWH with ≥1 NCD at baseline
[b] n refers to number of incident diagnoses and % the proportion of total (n=1565) PWH with any incident NCD during follow-up

LIMITATIONS

- SVI is based on census data and survey responses, therefore subject to response bias
- Single-site study; validation in other cohorts will improve power and make results more generalizable

CONCLUSIONS

- Neighborhood vulnerability was associated with prevalent NCD burden among PWH, even after adjusting for individual characteristics
- **Significant associations found between SVI and NCD burden demonstrate how SDoH may independently impact clinical treatment and outcomes of PWH**
- Further investigation into biologic mechanisms through which SDoH influence NCDs in PWH is needed.
- PWH in neighborhoods with high SVI may benefit from additional structural NCD prevention interventions such as ensuring healthy food access and improving the built environment to promote exercise.

REFERENCES & FUNDING

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3. Centers for Disease Control and Prevention. https://www.atsdr.cdc.gov/placeandhealth/svi/data_documentation_download.html

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