Investing in Communities to Modify Social Drivers of Cardiovascular Risk:

Moving From Observation to Action*

Nilay S. Shah, MD, MPH[a,b], **Sadiya S. Khan, MD, MSc**[a,b]

aDepartment of Medicine (Cardiology), Northwestern University Feinberg School of Medicine, Chicago, Illinois, USA

bDepartment of Preventive Medicine, Northwestern University Feinberg School of Medicine, Chicago, Illinois, USA

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Improvement in overall cardiovascular disease (CVD) mortality rates in the United States over the last several decades reflects substantial advances in pharmacologic and procedural therapeutic options and improvements in clinical quality of care.[1] Despite this progress, inequities in CVD morbidity and mortality persist. Specifically, CVD mortality rates are disproportionately higher among racially and ethnically minoritized groups, those with lower socioeconomic position, and those living in rural areas. A significant proportion of these deaths are preventable with differences in health outcomes among groups resulting from adverse social factors, collectively termed social determinants of health (SDoH). SDoH represent factors that influence the conditions in which people are born, work, live, and age, and include employment, housing, and social support. These operate at multiple levels to influence health outcomes, from individuals, to neighborhoods and communities, to populations.

A growing body of evidence has demonstrated that the neighborhood environment is a SDoH significantly associated with risk of CVD that reflects, in part, the legacy of residential segregation in the United States. One metric summarizing neighborhood-level SDoH is the Social Vulnerability Index (SVI). The SVI is a summary measure developed by the U.S. Centers for Disease Control and Prevention and Agency for Toxic Substances and Disease Registry that integrates 15 U.S. Census variables reflecting area-level metrics

ADDRESS FOR CORRESPONDENCE: Dr Nilay S. Shah, Northwestern University Feinberg School of Medicine, Department of Preventive Medicine, 750 N. Lake Shore Drive, Suite 680, Chicago, Illinois 60611, USA. nilay.shah@northwestern.edu.

of socioeconomic status, household characteristics, racial and ethnic minoritized population, and housing type and transportation (Table 1). The SVI percentile rankings were developed to identify areas at the census tract- or county-level and that may be at risk during public health or environmental emergencies.[2] Greater social vulnerability assessed by higher SVI percentile has also been demonstrated to be associated with higher age-adjusted mortality rates from CVD in the United States, as well as higher likelihood of several CVD risk factors including hypertension, diabetes, hyperlipidemia, and smoking, compared with areas with lower SVI score.[3,4]

The analysis by Ibrahim et al[5] in this issue of *JACC: Advances* extends prior work by evaluating differences in ischemic heart disease mortality rates among over 9 million deaths in the United States between 1999 and 2020. Using mortality data from the U.S. Centers for Disease Control and Prevention Wide-Ranging Online Data for Epidemiologic Research surveillance database of death certificates, the authors evaluated U.S. counties categorized by SVI quartiles, overall and across racial and ethnic groups, sex, and geographic areas. They identified that age-adjusted mortality rates were higher among male (compared with female) decedents, Black (compared with White, American Indian or Alaska Native, and Asian American or Pacific Islander) decedents, in nonmetropolitan (compared with metropolitan) counties, and in the Northeast (compared with Midwest, South, and West) census region. Overall and across subgroups, age-adjusted mortality rates from ischemic heart disease were quantitatively highest in the most vulnerable counties (ie, those in the highest SVI quartile).

The authors' findings add to the available evidence that adverse neighborhood-level social factors are associated with worse CVD outcomes in the United States. Although this investigation was not able to identify the relationship between SVI and ischemic heart disease mortality rates among several other segments of the population known to experience disproportionate burden of CVD (such as certain Asian American subgroups, or people with disabilities) due to the nature of data collected in the National Vital Statistics System, this national-level analysis suggests that worse county-level social vulnerability is associated with a higher burden of CVD mortality for most in the United States. Traditionally, clinical risk factors have been prioritized to reduce CVD risk, such as treatment of high blood pressure or blood glucose. The findings by Ibrahim et al now prompt a critical question: Should SVI similarly be conceptualized as a modifiable upstream risk factor?

To answer this question, we need to consider whether SVI meets criteria as a causal factor for CVD. Specifically, Sir Bradford Hill outlined several criteria for causation with which the SVI aligns, such as consistency, plausibility, and a dose-response gradient in its association with health outcomes. Many of the 15 social factors summarized in the SVI may themselves be potential targets for intervention. For example, policy interventions can drive socioeconomic investment in communities, generate employment opportunities, or define zoning policies to address crowding. However, conceptualizing other SVI measures as modifiable (such as area-level English language proficiency, or presence of single-parent households) could lead to discriminatory interventions or policies that displace vulnerable individuals and families. Rather than intervention targets, these factors are likely surrogate

metrics of a neighborhood's affluence. Further, the SVI likely reflects underlying structural determinants such as racism, discrimination, and segregation.

Ultimately, evidence supports recognition of neighborhood environments as a causal factor in cardiovascular risk and outcomes, and the study by Ibrahim and coauthors underscores the importance of moving beyond observation of social vulnerability and its associations with health outcomes. Developing interventions at the neighborhood level offers opportunities to improve the health of communities. Policy interventions are frequently invoked as potential solutions to adverse area-level social conditions, given the potential to influence behavior and outcomes more broadly, and evidence indeed indicates that policy changes can improve health.[6] Local, community-led, or health system-level interventions that address area-level social vulnerability are perhaps just as important but must be contextualized to each area and population. Several active efforts may help address this critical evidence gap. For instance, a recent funding announcement from the National Institutes of Health Common Fund's Community Partnerships to Advance Science for Society Program, called the Community-Led, Health Equity Structural Intervention Initiative, sought proposals for community-led research partnerships to develop and test interventions addressing a range of social and structural determinants to advance health equity and eliminate health disparities.[7] Findings from this program are anticipated to result in tailored interventions that address structural barriers to health. Simultaneously, programs addressing social determinants at the health system level exist. Examples include screening tools for SDoH, partnerships between health systems and community-based food providers to address community food and nutrition insecurity, and ride-share transport services to facilitate access to care. These programs would benefit from rigorous implementation evaluation to optimize each initiative to the needs of the respective area in which they are deployed.

The findings by Ibrahim et al[5] demonstrate an increasingly recognized truth: so much of what determines health occurs outside of clinical settings. Clinicians and the health systems in which they provide care are not powerless. Given growing evidence linking neighborhood-level social determinants with health outcomes, understanding and supporting patients to address and surmount these factors is within our scope of practice. It is incumbent upon us to develop, adapt, test, implement, and scale interventions that span from individuals to neighborhoods to populations, coupled with robust community engagement to ensure that nothing occurs in a community without the community. As this study demonstrates, we need to move beyond the walls of our clinic and hospitals to equitably achieve optimal cardiovascular health for all.

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TABLE 1

Factors Summarized by the Area-Level Social Vulnerability Index

Socioeconomic Status	Percent of population living below federal poverty level
	Percent unemployed
	Per capita income
	Percent without a high school diploma
Household Composition and Disability	Percent of population age 65 y or older
	Percent of population age 17 y or younger
	Percent of population 5 y or older with a disability
	Percent of households with children that have a single parent
Minority Status and Language	Percent of population that are Hispanic or race other than White
	Percent of population who speak English "less than well"
Housing Type and Transportation	Percent of housing units that are multiunit structures
	Percent of housing units that are mobile homes
	Percent of housing units with more than 1 person per room (crowding)
	Percent of households with no vehicle available
	Percent of population living in group quarters

Adapted from the U.S. Centers for Disease Control and Prevention/Agency for Toxic Substances and Disease Registry Social Vulnerability Index documentation.[2] The 15 factors are derived from American Community Survey at the area level. The Social Vulnerability Index is available for U.S. counties and census tracts.