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Area-Level socioeconomic disadvantage and access to primary care: A rapid review

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Abstract

Social drivers of health aggregate geographically, contributing to health inequities that primary care access may mitigate. Two area-level measures of social disadvantage are the Area Deprivation Index and Social Vulnerability Index. This rapid review aimed to assess the association between these measures and primary care access. We conducted a rapid review of US studies published through February 11, 2025. Included studies were categorized as defining primary care access by self-reported access to primary care, geographic accessibility, or utilization. We analyzed 31 studies, of which 68% ($N = 9/13$ Area Deprivation Index, $N = 12/18$ Social Vulnerability Index) found that greater area-level social disadvantage was consistently associated with reduced primary care access. This association was most consistently observed in studies measuring primary care access via self-report ($N = 2/2$), vaccine uptake ($N = 5/7$), and via a higher odds of using telephone vs audio–visual or in-person primary care in areas of high socioeconomic disadvantage ($N = 5/5$). These findings have implications for telemedicine payment policy and care redesign. The possible expiration of Medicare's expanded telemedicine reimbursement may disproportionately reduce access points to primary care for individuals living in high socioeconomic disadvantage areas. These findings also support the need for community-level interventions to increase access to primary care administered vaccines.

Key words: primary care; access; area-level socioeconomic disadvantage; area deprivation index; social vulnerability index.

Background

Social drivers of health, such as socioeconomic status and access to the health care system, can aggregate in geographic areas, affect health outcomes, and contribute to health inequities.[1-3] Prior research shows that higher socioeconomic disadvantage within geographic areas, independent of individual socioeconomic status, is associated with worse disease outcomes.[4-10]

Over the last several decades, composite measures have been developed to capture community-level socioeconomic disadvantage. Two of the most widely studied and publicly available of these measures are the Area Deprivation Index (ADI)[4,11,12] and Social Vulnerability Index (SVI), wherein higher scores reflect higher area-level disadvantage.[13] Area Deprivation Index and SVI each capture small area-level measures of income, employment, education, household, and other characteristics, and are derived from the US Census Bureau American Community Survey.[14] Area Deprivation Index was originally developed in 2003 to document social disparities in morbidity and mortality, whereas SVI was developed in 2011 to identify communities in need as part of disaster planning.[14] Area Deprivation Index is a singular composite measure, whereas SVI is available as an overall composite measure or as 4 composite submeasures that includes indicators reflecting socioeconomic status (eg, percent below 150% federal poverty level, unemployed, with no high school diploma, and without health insurance), household characteristics (eg, English language proficiency, single-parent households, and civilians with disabilities), racial and ethnic minority status, and housing type (eg, multiunit structures, mobile homes, and crowding) and transportation (eg, people without vehicles).[15]

One component of addressing health inequity is ensuring that communities of varying socioeconomic disadvantage have access to high quality primary care, which is associated with more equitable health outcomes than specialty care access.[16-19] Such efforts are already underway, with measures such as ADI already being used to identify and target investments toward areas with greatest need. For example, ADI was recently integrated into the Accountable Care Organization Realizing Equity, Access, and Community Health (ACO REACH) and Making Care Primary (MCP) payment models by the Centers for Medicare and Medicaid Services to adjust payment and performance targets to better reflect the social complexity of populations served.[20,21]

Despite this use, evidence gaps persist in understanding about the association between area-level socioeconomic

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disadvantage and primary care access. For example, it is unknown if high area-level disadvantage (measured via ADI or SVI) is consistently associated with reduced primary care access across the literature base, or if one of the indices captures this association more consistently than the another. Second, it is not known which measures of primary care access are potentially influenced by area-level disadvantage, or if primary care access is defined consistently and narrowly in this area of research. This study was meant to address these gaps by reviewing the relationship between ADI and SVI as area-level measures of socioeconomic disadvantage and primary care access.

Methods

Identification and selection of studies

We conducted a rapid review in accordance with published rapid review best practice recommendations.[22] We incorporated observational cohort and cross-sectional studies that examined the association between ADI and/or SVI as the primary exposure or mediator and primary care access as either the primary or secondary outcome. We chose to include both ADI and SVI as the community-level measures of socioeconomic disadvantage based on both their similarities and their unique features. Similarities include their public accessibility and frequent utilization in the literature. Among their unique features, ADI is used in payment and delivery policies such as MCP and ACO REACH,[20,21] and is available at the census block group or 9-digit zip code level. In contrast, SVI is available at the US Census tract or county levels and can be used as an overall composite or broken into submeasures.[4,15,23] Social Vulnerability Index is scored on a measure from 0 to 1 (up to the 10 000th or 4 decimal places),[24] with higher scores reflecting greater disadvantage. Area Deprivation Index can be scored as a percentile (from 0 to 100) or as a decile (from 1 to 10), also with higher scores reflecting higher disadvantage.[12] Area Deprivation Index and SVI also differ in several of the Census–based variables they include: SVI includes a measure of racial or ethnic minoritized status, as well as age (being age 65 years or older or younger than 18 years), while ADI includes more measures of housing costs, including rent, mortgage, and home value.

In addition to peer-reviewed journal articles, we also included abstracts from conference proceedings that had been peer-reviewed. We excluded editorials, commentaries, and publications not subjected to peer-review (eg, dissertations and theses). We included only English-language articles based in the US given study scope.

We tailored our search and included studies based on core concepts of health care access articulated by Fortney et al., which characterizes access as the fit between the patient and the health care system. As part of this model, access is defined through a combination of directly observable indicators of access to care (eg, utilization, geographic measures of access such as driving distance) and patient perceived access to care (eg, self-reported access to primary care).[25] The Fortney model has been used to study access to multiple types of healthcare services and settings,[26-28] including primary care,[29,30] which we defined as clinicians or health care settings providing care coordination, comprehensiveness of services, and continuity of care.[31] Applying the Fortney model led us to include studies that measured primary care access using patient-reported or perceived primary care access, geographic access to primary care, or direct measurement of utilization of in-person or telemedicine primary care services, including visits or preventive care services typically rendered through primary care (cancer screenings, vaccinations, etc.).[25] We adopted this approach acknowledging that primary care access can be conceptualized and proxied in multiple ways. Our use of multiple definitions reflects limitations of different measures of access. For example, hospital readmissions or severity of a disease presentation may imply poor access to primary care; however, readmission rates could be affected by other drivers, such as hospital quality during index hospitalization or environmental exposures (eg, which could trigger an asthma exacerbation).

Identification and selection of studies

We searched PubMed, Web of Science, Embase, and Cochrane registries from inception to February 11, 2025, developing a search strategy in consultation with a research librarian (Appendix A [To access the Appendix, click on the Details tab of the article online]). We also searched the SVI Utilization and Implementation Tool, a CDC database of peer-reviewed journal articles using the SVI from January 2015 through February 2023.[32] Our selection process is demonstrated in Figure 1. Title, abstract, and full text screening was completed by one author (J.A.S.). In accordance with rapid review best practice recommendations, 20% of studies were re-screened by second author (A.M.M.) to verify validity, and any disagreements were resolved through consensus.[22] Studies were selected for inclusion in the rapid review only if ADI or SVI were studied as an exposure of interest, were based in the US, written in English, and used our previously mentioned primary care access outcomes of interest. Studies that used ADI or SVI as a covariate to adjust the estimate of a different primary exposure, that used an area-level socioeconomic disadvantage index other than ADI or SVI, or that studied outcomes not relevant to our definitions of primary care access were excluded.

Data extraction

We created an evidence table and extracted relevant information on topic area, study design, study population, data source, level and categorization of the ADI or SVI exposure, outcomes, covariates, access model, statistical analysis, findings, and limitations (Appendix B)[To access the Appendix, click on the Details tab of the article online.]. One author initially extracted this information from each included article (J.A.S.), and then data extraction was verified by a second author working independently (A.M.M.). Analysis was performed in Microsoft Excel (version 16.55). Data were analyzed from May through July 2024 and then again February through March 2025.

Limitations

This analysis had limitations. First, all included studies were observational in nature. Therefore, while most analyses were multivariate, studies were nonetheless subject to unobserved confounding. Among the multivariable regression analyses, there were varying levels of adjustment for individual-level variables such as education, insurance type, dual eligibility status, and marital status. Incorporation of individual-level variables alongside ADI and SVI to distinguish between area-level vs individual-level effects of social risk should be a priority for future research.[14] Second, only 4 studies used multilevel

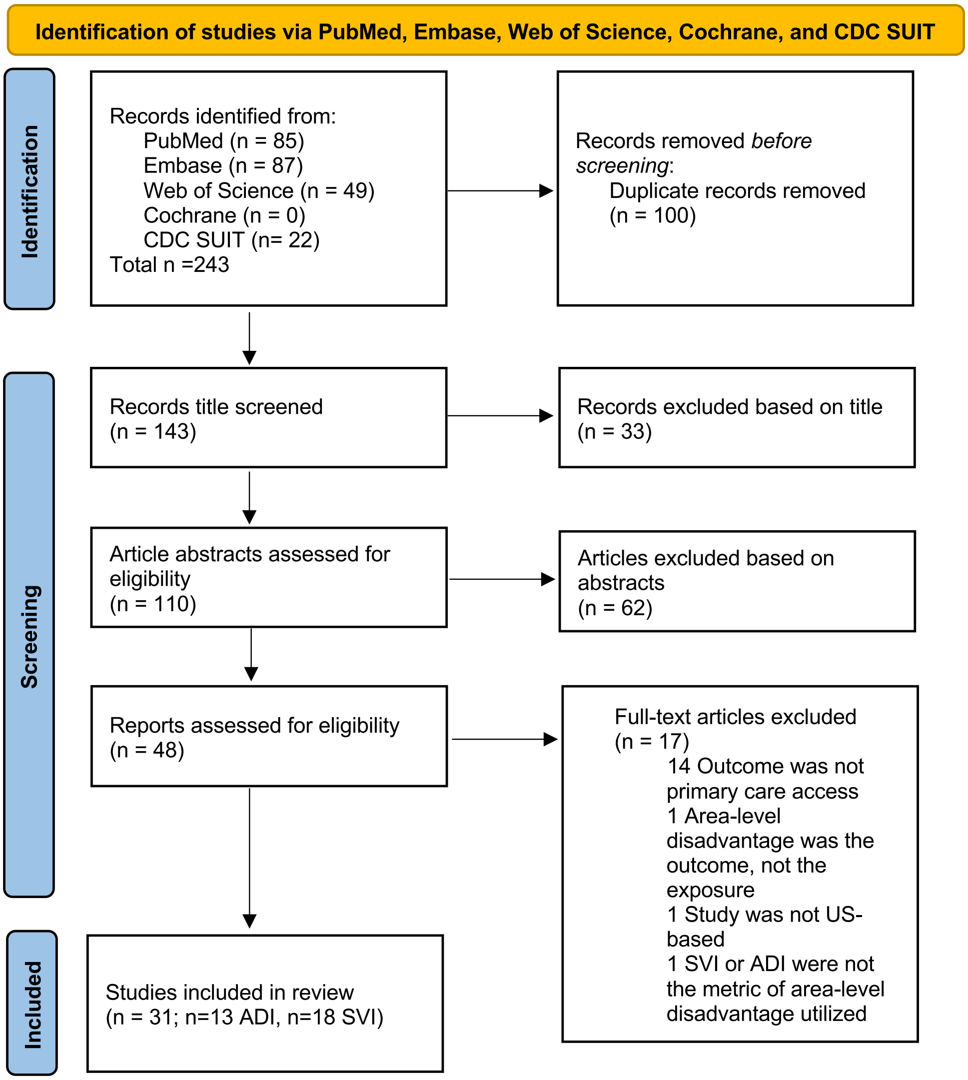

Figure 1. Flow diagram for rapid review search. Abbreviations: ADI, Area Deprivation Index; SVI, Social Vulnerability Index.

modeling design, the preferred approach to distinguish between associations due to individual-level characteristics of people clustered in a particular area and characteristics of the area itself.[33] Third, several approaches were used to categorize ADI and SVI for analyses without there being a clear best practice for ADI and SVI categorization, such as by tertiles, quartiles, or binarized. Fourth, though ADI and SVI are the most widely utilized and studied indices of area-level socioeconomic disadvantage, they are not the only ones in existence.[34,35] Therefore, this review does not capture the totality of research investigating area-level socioeconomic disadvantage and access to primary care. Lastly, preventive care services can be rendered in specialty settings and thus may not always reflect access to primary care, but given that they are usually rendered by primary care and that primary care is held accountable for preventive care quality measures, we maintained preventive care services as a proxy for primary care access as one of our included outcomes.

Results

We screened 143 articles from 4 peer-reviewed literature registries and one CDC database, excluded 33 based on the title alone, 62 based on the abstract, and 17 after reviewing the full article (Figure 1). Our search ultimately included 31 unique articles or abstracts (Appendix B), 13 of which studied ADI[36-48] and 18 studied SVI (Table 1).[49-66] The included articles measured primary care access either as a self-reported construct, as a geographic construct, or used utilization of primary care visits, preventive services, or medications as a proxy for access (Figure 2).

Overall characteristics and findings

The most common study type was retrospective cohort for both ADI ($N=8$) and SVI ($N=12$) studies. The most common geographic level of disadvantage used for analyses was the US census block group or 9-digit zip codes for ADI studies ($N=12$) and either US census tract ($N=10$) or county ($N=3$) for SVI studies. The most common analytic method was multivariable logistic regression for both ADI ($N=7$) and SVI ($N=9$) studies, and only 4 studies (ADI $N=1$, SVI $N=3$) used multi-level modeling approaches. Every ADI study used either some form of utilization ($N=13$) and/or geographic accessibility ($N=1$) in defining access. Similarly, most SVI studies conceptualized primary care access based on utilization ($N=16$). However, some SVI studies also used self-reported access ($N=2$), while none used geographic accessibility (Table 1).

Table 1. Characteristics of studies evaluating the association between ADI or SVI with primary care access.

Characteristic	No. (%) of studies		
	With ADI as exposure ($N = 13$)	With SVI as exposure ($N = 18$)	Total ($N = 31$)
Study design			
Ecological	1	1	2
Cross-sectional	4	5	9
Retrospective cohort	8	12	20
Study setting			
Single center/health system	10	6	16
Multiple centers or systems	0	2	2
State-wide or multiple counties within one state	1	0	1
Multi-state region	1	1	2
Nationwide	1	9	10
Geographic level of socioeconomic disadvantage			
US Census block group (or cross-walk from 9-digit zip code)	12	0	12
US Census tract	0	10	10
Historic neighborhoods	0	1	1
County	0	3	3
State	0	2	2
Not specified	1	2	3
Analytic method[a]			
Multivariable linear regression	1	0	1
Multivariable logistic regression	7	9	16
Other regression model (ie, Cox, Poisson, Multivariate generalized linear models)	1	1	2
Test statistics (eg, χ^2, Fisher's Exact, Kruskal–Wallis, Spearman, ANOVA)	1	3	4
Descriptive statistics only	0	3	3
Multi-level modeling	1	3	4
Other methods	0	1	1
Not specified	1	0	1
Measure of primary care access[a]			
Self-reported access to primary care	0	2	2
Primary care visit utilization	6	0	6
Telemedicine visit utilization	6	2	8
Preventive service utilization (cancer screening, vaccines, etc.)	6	12	18
Access to primary care prescribed medications	0	3	3
Geographic accessibility	1	0	1

[a]Sum of research studies within a category may be larger than the sum of studies included in the review, as multiple categorizations may apply to a single study.

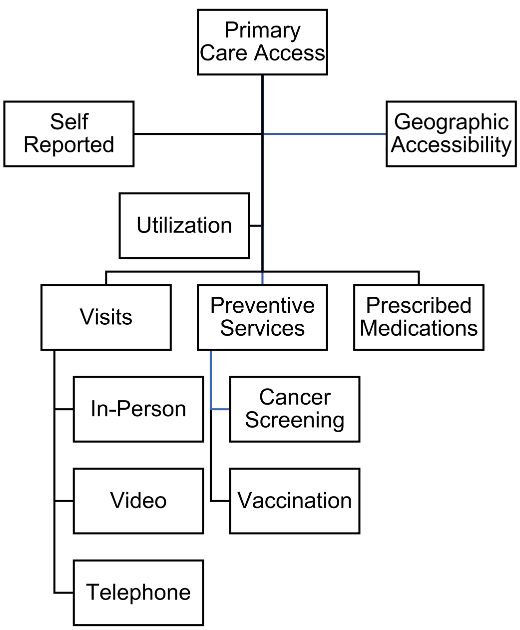

Figure 2. Measures of primary care access in included studies.

Most studies (68%, $N = 21/31$) found that greater area-level social disadvantage was consistently associated with reduced access to primary care, and this relationship was reported at a similar frequency in ADI (69%, $N = 9/13$) and SVI (67%, $N = 12/18$) studies. The relationship between area-level socioeconomic disadvantage and reduced primary care access was most consistently observed in studies of primary care access measured via self-report ($N = 2/2$), vaccine uptake ($N = 5/7$), and via a higher odds of using telephone vs other telemedicine or in-person primary care in areas of high area-level disadvantage ($N = 5/5$). There was $N = 1$ study investigating the relationship between ADI or SVI and primary care geographic accessibility. Only $N = 1/3$ studies of access to primary care prescribed medications observed a relationship between area-level socioeconomic disadvantage and reduced access. Similarly, $N = 5/9$ studies comparing differences in cancer screening rates found that high area-level socioeconomic disadvantage was associated with reduced cancer screening rates (Table 2). Additional details on findings for each primary care access category can be summarized as below.

Self-reported access to primary care

A negative association was found between state-level SVI and access to primary care as self-reported by individuals included in the Behavior Risk Factor Surveillance System survey. In Rifai et al. (cross-sectional study, $N = 1.74$ million people), those living in the highest tertile of state-level SVI vs lowest tertile had a higher prevalence of not having a Primary Care

Table 2. Findings of included studies evaluating the association between ADI or SVI with primary care access.

Association between high area-level socioeconomic disadvantage and primary care access				
	Lower access	Greater access	No relationship	Mixed findings
ADI studies	9	1	3	0
SVI studies	12	0	3	3
Self-reported access to primary care	2	0	0	0
Primary care in-person visit utilization	1	0	1	0
Telemedicine visit utilization				
Use of telephone (lower access) over video or in-person use (greater access)	5	0	0	0
Preventive service utilization				
Cancer screening	5	0	4	0
Vaccines	5	0	0	2
Geographic accessibility	1	0	0	0
Access to primary care prescribed medications	1	0	2	0

ADI, Area Deprivation Index; SVI, Social Vulnerability Index.

Provider (PCP) (adjusted OR [aOR] = 1.34 [95% CI, 1.22-1.48]) and having >1-year duration since last routine checkup (aOR = 1.18 [95% CI, 1.10-1.27]).[56] These individuals were also more likely to endorse the inability to see a doctor owing to cost (aOR = 1.38 [95% CI, 1.23-1.54]). In Thompson et al. (cross-sectional study, $N = 203\,347$ people), which only included Behavior Risk Factor Surveillance System survey participants with a history of atherosclerotic cardiovascular disease, participants in states in the highest vs lowest tertile of SVI were still more likely to report absence of a PCP (aOR = 1.33 [95% CI, 1.12-1.58]), > 1 year since last routine checkup (aOR = 1.09 [95% CI, 0.96-1.23]), delay in access to health care (OR = 1.39 [95% CI, 1.18-1.63]), and inability to see a doctor because of cost (aOR = 1.21 [95% CI, 1.06-1.40]).[58] Area Deprivation Index was not used in any studies examining self-reported access.

Geographic accessibility

Wang et al. (ecological cross-sectional study, $N = 4.7$ million people) found that primary care geographic accessibility (both physical and telemedicine) was lower for residents in higher ADI areas than in lower ADI areas. There were no SVI studies examining this outcome.[46]

Primary care utilization

In-person visits

Findings of the association between ADI and primary care utilization were mixed. Allen-Watts et al.[36] (cross-sectional study, $N = 174$ people) found that ADI was not a significant predictor of in-person utilization (no care vs primary care vs tertiary care) (aOR = 0.97 [95% CI, 0.988-1.005]). In contrast, Skinner et al.[45] (cross-sectional study, $N = 306$ Hospital Referral Regions) found that an increase in ADI was associated with a small increase in the percent of eligible Medicare enrollees who received an annual primary care visit (average increase = 0.14% [95% CI, 0.11%-0.17%]). Social Vulnerability Index was not used in any of the studies examining this outcome.

Telemedicine visits

Findings of the association between ADI and the likelihood of patients' accessing primary care via telemedicine were mixed. In 2 articles, Cherabuddi et al.[37,38] (cross-sectional study, $N = 72\,153$ patient encounters; retrospective cohort study, $N = 86\,715$ people) found that patients residing in lower ADI areas were less likely to use telemedicine primary care visits rather than in-person visits, but findings were mixed across modalities of telemedicine visits. Specifically, telephone visits were less likely than in-person visits for patients living in the three lowest ADI (least disadvantaged) decile areas (aOR = 0.61 [95% CI, 0.58-0.68]), whereas video and e-visits were more likely in those areas (aOR = 1.76 [95% CI, 1.53-2.03]).[37] Gwinn et al.[41] (retrospective cohort study, $N = 72\,153$ people) also found that individuals in high ADI areas were more likely to utilize telemedicine than individuals in low ADI areas.

In contrast, El-Nahal et al.[40] (retrospective cohort study, $N = 1884$ people) found that the probability of completing a telemedicine visit rather than an in-person visit was 38% lower for patients living in the highest ADI zip codes compared to those living in the lowest ADI zip codes (relative risk = 0.62 [95% CI, 0.49-0.79]). However, El-Nahal found that among telemedicine visits, the odds of using a video vs telephone was lower among patients in high ADI (more disadvantaged) vs low ADI (less disadvantaged) areas (OR = 0.55 [95% CI, 0.39-0.78] for highest ADI vs lowest ADI quartiles), though this finding did not hold in adjusted analysis.[40] Ostovari et al.[44] (retrospective cohort study, $N = 41\,583$ people) also found lower odds of video vs office visits and video vs phone among patients living in the lowest ADI (least disadvantaged) communities compared with patients living in higher ADI communities.

For SVI studies, Chang et al.[51] (cohort survey study, $N = 918$ people) found that clinicians practicing in high SVI areas were almost twice as likely to use telephone rather than video as their primary telemedicine modality (41.7% vs 23.8%; $P < 0.001$). Clinicians in high-SVI areas also faced more patient-related barriers and fewer clinician-related barriers than those in low-SVI areas. Govier et al. (retrospective cohort study, $N = 11\,326$ people), who studied differences in access to telemedicine and in-person primary care among adults diagnosed with COVID-19, found that use of telemedicine in primary care was not significantly different by Census tract SVI in the year before or after a COVID-19 diagnosis. However, individuals residing in areas categorized as vulnerable based on their minority status and language or housing type and transportation SVI submeasures had decreased likelihoods of using in-person primary care in the year before COVID-19 diagnosis (−3.72%., $P < 0.01$ and −5.61%, $P < 0.001$, respectively).[54]

Preventive services

Findings about the relationship between area-level measures of disadvantage and utilization of cancer screening were mixed. Area Deprivation Index was not significantly associated with receipt of mammograms in 2 studies,[39,45] but was associated with decreased odds of receiving a mammogram for individuals in highest compared to lowest ADI quintile census block groups (aOR = 0.51 [95% CI, 0.46-0.57]) in Kurani et al.[42] (cross-sectional study, N = 78 302 people). Kurani et al.[42] also found that the odds of cervical cancer (aOR = 0.58 [95% CI, 0.54-0.62]) and colorectal cancer (CRC) screening (aOR = 0.57 [95% CI, 0.53-0.61]) were lower for those in highest compared to lowest ADI quintile Census block groups. Simpson et al.[47] (retrospective cohort study, N = 9719 people) also found that individuals living in higher (deciles five or higher) ADI areas had decreased adjusted odds of completing a fecal immunochemical test for colon cancer screening after a mailed outreach than individuals living in lower (deciles one and two) ADI areas (aOR = 0.87 [95% CI, 0.77-0.79]).

Bauer et al.[49] (cross-sectional study, N = 3141 US counties) found that individuals living in the highest SVI quintile (high disadvantage) had lower odds of completing breast cancer (aOR = 0.92 [95% CI, 0.90-0.93]), cervical cancer (aOR = 0.87 [(95% CI, 0.86-0.88]), and CRC (aOR = 0.86 [95% CI, 0.85-0.88]) screening than individuals living in the lowest SVI quintile. Mehta et al.[62] (cross-sectional study, N = 3132 US counties) found that US counties in the highest SVI tertile had lower odds of being at or above the median for breast cancer (aOR = 0.24 [95% CI, 0.20-0.29]) and colon cancer (aOR = 0.15 [95% CI, 0.13-0.19]) screening rates than counties in the lowest SVI tertile. Ashad-Bishop (retrospective cohort study, N = 136 census tracts in Miami Dade County) also found that counties in the highest SVI tertile had lower screening rates than counties in the lowest SVI tertile for breast (51.8% vs 65.7%), cervical (79.6% vs 87.8%), and colon cancer (79.3% vs 85.3%), $P < 0.001$.[63] Moazzam et al.[55] (cross-sectional ecologic study, N = 11 831 census tracts), who studied individual components of SVI, found that poverty, lack of education, and limited English proficiency mediated the adverse effect of historical redlining on cancer screening. In contrast, Bhat et al.[50] (retrospective cohort study, N = 29 187 and N = 33 692 people in 2020 and 2023, respectively), who studied CRC screening during the COVID-19 pandemic, found no association between SVI and the change in CRC screening prevalence related to the COVID-19 pandemic.

For utilization of vaccinations, Saelee et al.[57] (retrospective cohort study, N = 192 million people) found that counties with higher minority health SVI, which includes 11 indicators of racial and ethnic minority status and language, had lower completion rates of the primary and booster COVID-19 vaccine series than counties with moderate (primary rate difference = 3.1% points; booster rate difference = 5.5% points) or low scores (primary rate difference = 1.6% points; booster rate difference = 7.6% points) scores. Similarly, Kurani et al. (retrospective cohort study, N = 34 637 people), found that individuals living in highest ADI quartile census block groups had lower likelihood of initiation (adjusted hazard ratio = 0.84, 0.74-0.96) or completion (Q4: Adjusted hazard ratio = 0.82, 0.74-0.92) of the human papilloma virus vaccine series compared to lowest ADI quartile census block groups,[43] and Roberts-McCarthy et al.[65] (retrospective cohort study, N = 4.9 million people) found that patients residing in high SVI areas had decreased odds of receiving their second dose of COVID-19 vaccine on-time compared to those living in low-SVI areas (aOR = 0.86 [95% CI, 0.85-0.87]). Takada et al.[59] (retrospective cohort study, N = 247 774 people) found that an increase in SVI from 0 (lowest disadvantage) to 1 (highest disadvantage) was associated in a 46% reduction in the odds of receiving the influenza vaccine for individuals under 65 (aOR = 0.54 [95% CI, 0.50-0.59]), and a 34% reduction for individuals aged 65 years and older (aOR = 0.66 [95% CI, 0.55-0.78]).

However, some studies had mixed findings surrounding the relationship between SVI and receipt of vaccinations. For example, Khazanchi et al. (cross-sectional study, N = 15.2 million people) found that higher overall SVI was associated with reduced pediatric uptake of the COVID-19 vaccine for ages 6 months-4 years compared to low-SVI areas (Incidence rate ratio 0.70 [95% CI, 0.80-0.81]; however, high SVI in the minority status and language subthemes was associated with increased uptake of COVID-19 vaccination in the 6 month-4 years (incident rate ratio 5.16 [95% CI, 3.59-7.42] and 5-11 years 1.73 [95% CI, 1.44-2.08]) age groups. Khazanchi et al.[60] also found that there was no significant relationship between SVI and COVID-19 vaccine uptake in rural areas in both the 6 months-4 years and 5-11 years age groups. Additionally, Sheehan et al. (retrospective cohort study, N = 7036 people) also identified mixed relationship between SVI and vaccination status, where overall SVI was associated with reduced adjusted odds of receiving the influenza (aOR = 0.47 [95% CI, 0.37-0.59]), COVID-19 (aOR = 0.54 [95% CI, 0.42-0.69]), Pneumococcal pneumonia (aOR = 0.73 [95% CI, 0.57-0.93]), and herpes zoster vaccines (aOR = 0.39 [95% CI, 0.22-0.67]), but this relationship did not hold true for all SVI subthemes. For example, Sheehan et al.[61] also found that higher vulnerability on the minority and language status SVI subtheme was associated with increased odds of vaccination against influenza (aOR = 1.28 [95% CI, 1.03-1.58]), COVID-19 (aOR = 1.53 [95% CI, 1.22-1.92]), and herpes zoster (aOR = 1.64 [95% CI, 1.03-2.64]) compared to lower scores, and that higher vulnerability on Housing Type and Transportation was associated with increased adjusted odds of vaccination against COVID-19 (aOR = 1.43 [95% CI, 1.11-1.83]) compared to lower vulnerability scores.

Medications

Our review did not reveal associations between SVI and medication requests. For example, Fiastro et al. (retrospective cohort, N = 160 people) found that less than half of the people requesting abortion medications had either high or medium-high social vulnerability (23% and 26%, respectively).[52] Similarly, Godfrey et al.[53] (retrospective cohort, N = 534 people) found no difference in the median number of individuals who used Aid Access (a nonprofit that provides access to medication abortion by mail) per 100 000 population by county-level SVI. In contrast, our review did find an association between high SVI and medication non-adherence. For example, among patients with atherosclerotic cardiovascular disease, Thompson et al.[58] (cross-sectional study, N = 203 347 people) found that individuals living in the highest vs lowest SVI tertile had higher odds of reporting cost-related medication non-adherence (aOR = 1.10 [95% CI, 0.83-1.47]). There were no ADI studies of primary care medication access.

Discussion

Overall, the majority of studies (68%; N = 9 ADI, N = 12 SVI) found that greater community-level socioeconomic disadvantage was associated with reduced access to primary care. Additionally, all 4 studies using multi-level modeling approaches—the preferred method for distinguishing between associations due to individual vs geographic characteristics—[33] found an association between greater socioeconomic disadvantage and reduced access to primary care.[43,49,55]

Beyond the overall relationship between area-level disadvantage and reduced access to primary care, our study also points to several distinctions that are important for policymakers, clinicians, and researchers to consider when applying area-level indices in policy and practice.

First, a similar though slightly larger majority of ADI studies (69%, $N = 9/13$) found a relationship between high area-level disadvantage and reduced primary care access than did SVI (67%, $N = 12/18$) studies. Area Deprivation Index was also more often used at a more granular, sub-county geographic level (92%, $N = 12/13$) than SVI, which was used at the county or state levels in 28% of studies ($N = 5/18$), which are larger, more socioeconomically heterogeneous areas and thus could have attenuated associations in the SVI studies. Area Deprivation Index is already being used in payment models that look to improve equitable primary care access (eg, MCP and ACO REACH). Based on our review, there was no compelling evidence to replace ADI with SVI in payment models to monitor or incent equitable primary care access.[20,21] There are newer indices of area-level socioeconomic disadvantage, such as the Equitable Distribution Index, that have been used in specific federal government efforts such as monitoring equitable distribution of oral antiviral drugs during the COVID-19 pandemic.[35] However, our literature review focused on ADI and SVI as they are the most widely utilized and highly studied indices to date and therefore with highest relevance for use across primary care policy initiatives. As the literature continues to evolve and newer markers of area-level socioeconomic disadvantage are developed and widely studied, policymakers can revisit the evidence base for the association between ADI, SVI, or other metrics with primary care access and adjust policy decisions accordingly.

Second, the relationship between area-level social disadvantage and access was evident most consistently for 3 measures of primary care access. For one, individuals and clinicians in higher ADI or SVI areas were more likely to use telephone than video visits for primary care, suggesting that telephone care may be a means to increase primary care utilization in these communities.[40,44,51] Indeed, prior research has demonstrated that a large percentage of patients receive primary care almost exclusively via telephone visits, and that these patients are more likely to live further away from their nearest primary care facility than patients who use a combination of telephone, video, and in-person visits.[67] Policymakers could consider potential impacts on these populations when determining reimbursement of telephone visits while avoiding a tiered and inequitable system of telemedicine care.[37,40,44,51,68] This is particularly important in light of Medicare's expanded telemedicine coverage policy pending expiration on September 30, 2025.[69] If Medicare does not extend or permanently establish coverage expansions, most telephone and video visits will no longer be reimbursable. Prior research has demonstrated that patients who receive a combination of telemedicine and in-person care receive comparable or higher quality primary care services in several areas compared to those who only receive in-person visits, including blood pressure control, completion of cancer screenings, and receipt of some immunizations.[70] While evidence is scant comparing the quality of care between telephone and video visits in primary care, the restriction of telephone–based telemedicine may reduce access to primary care for patients living in areas of high socioeconomic disadvantage in particular.

For another, greater social disadvantage was consistently associated with reduced vaccine uptake, and this association was more pronounced for subsequent or booster doses rather than initial doses in a vaccine series.[43,57] These dynamics suggest that policymakers could use community-level interventions (eg, placing vaccination sites in areas with high socioeconomic disadvantage, increasing outreach through mobile health clinics and community partnerships)[71,72] to address vaccination gaps in areas of high socioeconomic disadvantage. Employing such approaches is particularly important to improve uptake of subsequent doses of multidose vaccine series (eg, COVID and Human Papillomavirus). Finally, high SVI at the state-level was associated with reduced self-reported access to primary care—a finding that can be further examined in future research at more granular geographic levels.[56,58]

Third, our analysis highlights 2 areas where work is urgently needed. No studies in our review specifically tested hypotheses for how high ADI or SVI might be associated with reduced primary care access. Going forward, researchers can conduct mediation and qualitative analyses to better illuminate why high area-level disadvantage is associated with reduced primary care access—insights that could support tailored payment and delivery programs. Additionally, our analysis revealed a relative dearth of multi-level modeling approaches. Future research studying the relationship between ADI, SVI, and primary care access can use multi-level modeling to improve the strength of available evidence and elucidate relationships between individual vs area-level risk factors and primary care access.[33]

Conclusion

Findings from this rapid review suggest that area-level measures ADI and SVI can be associated with reduced primary care access, in particular when assessed through low-self-reported access to primary care, higher use of telephone than video telemedicine or in-person visits for primary care, and low vaccine uptake. However, the existing literature base is still limited due to differing types of primary access, mixed findings within some of these types, and the need for future research involving hypothesis-testing and multi-level modeling. Future research can build on these findings and identify potentially actionable mechanisms for the relationship between area-level social disadvantage and reduced primary care access.

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Supplementary material

Supplementary material is available at *Health Affairs Scholar* online.

Conflicts of interest

Please see ICMJE form(s) for author conflicts of interest. These have been provided as supplementary materials.

Notes

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